PLANTING FOR BEES – 12, 41, and 48

Mar 2014

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Dandelions

In her article about how to make a wax dandelion (January 2014), Rose failed to mention that dandelions provide a great pastime for children. I remember fondly how we made "curlicues" and necklaces by splitting the stems, used the yellow pollen for rouge, and loved to blow and see the seeds fly.

Amy Johnson
Paola, KS

In Defense Of Bee Culture

Kim Flottum displayed a lot of courage to write a piece in the December issue taking a balanced view of Monsanto. Full disclosure: I am a doctor living in St. Louis and I have done research on the medication Celebrex which was developed by a Monsanto subsidiary. I am also a first year beekeeper, and every other meeting of the Eastern Missouri Beekeepers Association is held in a Monsanto auditorium. And I have learned a lot from Kim Flottum's books.

It is easy for Adam Stockman to condemn Kim Flottum and suggest that he has uncritically accepted Monsanto's point of view; at least he did not call him Kim-Il-Flottum. This is the way we do things in the USA: you are either Good or Bad. Corporations like Monsanto are complicated; they do some good things, they do some bad things. But Kim Flottum decided to take a look and make his own judgment: it was a balanced, cautious, SKEPTICAL analysis. And he concluded that Monsanto was not all bad.

A friend describes the difference between the True Believers and The Believers in Truth. Some critics are clearly True Believers: sure of the truth, and don't bother them with the facts. I think Mr. Flottum is a Believer in Truth, who wants to find the right answer, wherever it may lead. But the True Believers cannot tolerate an opinion at odds with their view of the world.

Beekeeping is pretty complicated. There are few, if any, right answers.

Thanks, Mr. Flottum, for having the courage to write something that you must have known the True Believers would condemn!

I will continue to aspire to be a Believer in Truth.

Richard Brasington
MD

Even More On Monsanto

I was happy to find *Bee Culture* magazine as an alternative to *American Bee Journal* these past six years during my struggle to perfect my beekeeping practices. I was pleased to finally see in 2012, timidly escaping your magazine's pages, some real info about pesticides, commercial farming methods and it's connection to the dangers our bees are facing; but the approach has been very timid and a long time in coming.

So far I still am inclined to get your magazine, but feeling some regrets here as I read your response to the letter from Concord, NH protesting your interviews with Monsanto employees. Her letter didn't reflect any of my feelings, necessarily, about your interviews, but your response was deeply troubling.

All you did was to confirm all our fears by expressing in the defensive, That 'Monsanto feeds people', and the idea that you are 'keeping your enemies close.' Monsanto wants to make money and corner the market on feeding people at the cost of our planet's future deferring to the needs of it's investors. There is only one way in this economy to keep your enemies close. Through the compromise of one's principles.

I just finished reading two biographies about Rachel Carson. They are big heavy volumes, but if you don't have the time, at least read the Afterward of the biography by author Linda Lear & the Epilogue of the biography by William Souder. Not much has changed. Not really. The earth has continued to face the same issues.

Carson's greatest contribution was probably to unmask all the stooges from behind the curtains of the government jobs filled by Corporation loyalists who traditionally choose money over quality of life. It is even worse today, 50 years later as they now sit on the boards of conservation groups as well. Are they now on the board of our bee magazines? Of course they are. I Googled the other day 'systemic pesticides and honey bee health' and number one on the list was an ad for the Bayer Bee Care Program. Monsanto and other corporations

spent what would today equal millions on such ad campaigns in an effort to discredit Rachel Carson in the 1960s. Sadly, Carson's words haven't amounted to much in the way of real legislation. Our bees are still disappearing.

In your response to a concern expressed by perhaps only one letter of many that you must have received about those Monsanto interviews, which I thought to be done alright, you've lost my confidence in *Bee Culture* as a tool to keep me informed of what is really happening out there. That concern is felt by all of us and deserved a response that would reflect the integrity of your magazine in regards to what is truly a life and death matter, not just for the bees, but for all living things on what companies like Monsanto have made into a very fragile planet.

Athena Holtey
Chocorua, NH

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Thank you for printing and responding to Mr. Stockman's letter in January's magazine. I too have agonized about my love for your magazine and the Monsanto/beekeeping situation. Your answer of "keeping your friends close . . ." was brilliant. I am at peace over this situation, keep up the good work.

Ernie

•

As always I look forward to reading your column and articles in *Bee Culture*. Not only are they informative. They are quite insightful and astute.

Your article on Monsanto did make me aware of some of the benevolent action of Monsanto of which I was totally ignorant. Of course one has to ask oneself whether these actions were purely ⇨

altruistic or simply an attempt to buy good will and a favorable public perception amongst the societies they operate.

Time will tell. In the meantime let us hope that the health of millions of people around the world will not be compromised.

As for my distrust of BIG, I have to say that in Monsanto's case it goes beyond my "genes."

Love the work you do.

Raymond Curocher
Litchfield, NH

•

I will renew my subscription for many reasons, one being the fact you went to see the folks at Monsanto.

The debate will never end but not so much as a sneeze has been traced back to GMO crops. With Monsanto in the bee business we need to at least keep an eye on them, and you are. Good work.

You are a great editor of a great magazine, don't let anyone change your course.

Norm Adams
Freeland, MI

Wrapped For Winter

The thousands of honey bees in each of my hives can snuggle up thanks partly to warmth inducing black tar-paper wrappings on each hive helping them also to survive the Winter.

Wrapping is just one action taken to sustain some 90% survival of my colonies the past two Winters.

Here is a check-list of some other actions taken:

–Insulating inside over the inner cover flush with 2" Styrofoam, cutting an air channel from the inner cover hole to the 3/8" x 3/4" opening at front of inner cover for ventilation.

–Leaving ample stores of honey, using the three deep hive body system for food and early Spring population build-up. No nutrition-short corn syrup or sugar water is necessary.

–Breeding from our area's survival stock. No imported stock from out of our area.

–Avoiding use of chemicals.

–Assuring in-hive water availability during the flight season.

Benefits of these efforts include far above average honey crops and hive survival, both exceptions to media horror stories of colony collapse.

Dave Laney
North Liberty, IN

Beehive at the Laney Honey Farm, North Liberty. Red pines north of and behind the hives along with brush and arborvitae in the background serve as windbreak. photo by Kay Laney.

Isotope Analysis Of Pollen In Honey

The British government is using high-tech to confirm the geographic origin of foods including honey claiming to be from the UK.

Samples of food have been taken from retail, wholesale and food service outlets in England, Scotland, Wales and Northern Ireland to be tested using a technique known as stable isotope ratio analysis.

The Food Standards Agency is working with the Department for Environment, Food and Rural Affairs to check the accuracy of origin claims to ensure consumers can be confident food labelled as from the UK is what it claims to be.

More than 100 samples are being tested, made up of beef pork, lamb, tomatoes, apple juice and honey.

Stable isotope ratio analysis can be used to give an indication as to whether a certain food has come from a certain geographic location by comparing isotopes. It is a screening method that acts as a useful indicator of potential fraudulent activity.

An isotope is a variant of a chemical element – oxygen, hydrogen and carbon are all chemical elements and each has naturally occurring variants in slightly different forms. These isotopes can be distinguished by their mass, and used to compare a particular food of claimed provenance with authentic samples of the same food produced in different regions of the UK.

If there is not a good match in results then that would strongly suggest that the food was not produced in the UK and needs further investigation.

The agency says any results that suggest a problem will be followed up with an audit of traceability.

The proportion of an isotope or group of isotopes in a particular food might vary because of geological and climatic processes. Crops grown in the UK, for instance, have a higher proportion of heavy hydrogen and oxygen than the same crops grown in mainland Europe. This is because the proportion of heavy forms of hydrogen and oxygen diminishes with distance from the sea.

Another example is the way in which plants metabolize carbon dioxide results in certain plants being richer in heavy isotopes of carbon. This means the isotopic composition of animals, and meat derived from these animals, reflects where they were reared and the plant material they eat.

This project is expected to be completed by April 2014 and the full report will be published.

Alan Harman
MI

Response: Isotopes could work but there are lots of problems. First of all, like pollen, you need a database of "expected isotope signatures" from various regions under investigation as well as other regions of the world so you can be sure those signatures are not the same as the ones you have in your area. To date there are very few precise isotope signatures available for any region of the world. Second, isotope ratios can vary depending on the sources used to make the honey - water, nectar, pollen, etc. Therefore, you need to use a range to ID a specific region and those ranges could overlap with ranges from other regions. They have tried using isotopes to ID honey from locations on small islands. That works fine when you know the signatures for the isotopes on the whole island and you know that the honey came only from the island. I have not seen it used for honey for larger regions. However, they are now using isotopes to ID manuka honey from NZ, but again the government knows the isotopes signatures from the areas where the honey "should be produced" so they can then match those specific signatures with some unknown honey sample to determine if it was produced in the right area of NZ, but they can't tell you "where it may have come from" if it is not from NZ.

So, yes, this has potential but there are two big problems. First, it is going to take time and a lot of money to develop an isotope databank for the world. Second, depending on how similar some areas are to other areas in terms of isotope signatures, we may or may not be able to use this effectively to ID honey. Third, there is a cost involved for the equipment and personnel to do these tests. I don't see this being used in the U.S. for quite some time unless someone is willing to put a lot of funding into this.

Vaughn Bryant
College Station, TX

FFA Grant Sponsorship

I would like to take this moment to thank Monsanto for sponsoring the SAE grant I recently was selected to receive by the National FFA Organization. Your support and interest in the FFA program is helping me turn dreams into actual opportunities. I began raising bees about a year ago and have been focused on capturing feral hives instead of purchasing packaged bees. I have spent my time and resources building my own hives and purchasing the much needed equipment to be successful. My next step in my SAE is to begin raising queens. This is where the grant money will be used. I will use the $1000 to purchase equipment and building mating nucs to make this next step possible. Without your help, I would not have the funds to grow this part of my business. Thank you for wanting to make a difference in the youth of America.

Tyler Stewart
Leesburg, OH

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Thank you, Monsanto, for your sponsorship of my Supervised Agricultural Experience (SAE) in Specialty Animal production. This grant will be so helpful to me as I work to expand and diversify my small business. My beekeeping business currently consists of two beehives that produce a total of approximately 100 pounds of honey annually. I harvest and sell the honey locally. Through this grant, I will be able to increase the amount of products that I offer, such as beeswax candles, soap, etc. Not only am I excited to expand and improve my business, but I am passionate about increasing the fast-disappearing population of honey bees. It is important to me to conserve the declining species which plays such a vital role in our survival. The purchase of an observation hive will allow me to educate the public about the importance of conservation of honey bees, in addition to spreading the word about my business. It means a lot that you and your company have chosen to invest money in my SAE. I look forward to corresponding with you regarding the completion of my project at the end of my SAE plan.

Mikayla Ockels
Georgetown, DE

FFA Adds This

Regarding the possibility of other organizations supporting additional SAE grants on top of what Monsanto supports, we would welcome that! The number of applicants who had honey bees as their project definitely exceeded the number of grants we had available. There were 22 who specifically applied for the Monsanto grants but we may have had a few others apply for some general animal systems grants that were open to students with any type of animal project, including bees which fall under specialty animals for us.

If you have organizations interested in sponsoring a grant, the cost is $1,250 per grant - $1,000 for the grant and $250 for admin, promotion, etc. We are happy to visit with anyone who has an interest. You could either provide us with their contact information and we can have the appropriate person from the Foundation staff contact them or you can have them send me a note directly and I will direct them to the right person.

In terms of Monsanto or organizations you work with offering additional things, such as equipment, mentoring, paying for them to attend a honey bee conference/event, etc., we are open to that. For our role in that, we could make students and advisors aware of any opportunities like this through the grant information we provide during the application process. However, it would be up to Monsanto or the organizations offering these additional opportunities to work directly with the FFA advisor, student and their parents to coordinate details. We do not have the ability to manage the shipping of equipment, coordinate travel and logistics for a conference (please note that the teacher or a parent would need to accompany the student), etc. We would welcome these opportunities for the students and believe we could promote them, we just cannot be responsible for the management and coordination of them. We hope that makes sense.

Tyler Stewart
Leesburg, OH

MARCH – REGIONAL HONEY PRICE REPORT

Again this year we polled our reporters on where they sell their honey. We've been doing this for several years, and the pattern is fairly predictable. Our reporters are primarily sideline or small commercial beekeepers, with a few larger outfits represented that tend to be producer/packers.

If you are interested in expanding your honey (and other hive product) sales, look over this list of possible outlets. There are most likely some you are missing now and could investigate. Price is not the key to more sales so don't undersell your product. *Rather*, increase your exposure by increasing where your honey is sold.

By far the majority – over 70% - of our reporters sell some of their honey from home, either an inside or outside stand. Interestingly, however, the amount of their honey they sell there decreased this year dramatically. I suspect, but can't prove that this is price driven, because if you look at what venues have done since last year the trends becomes more clear. Farm markets have remained steady since last year…and with farm markets come price increases. Home sales have little investment in time…you're not standing all day talking, but farm markets have the advantage of one on one sales, encouraging repeat sales and meeting lots of new customers, plus a healthy price increase from those at-home sales. If you are just starting out, remember that if you are selling honey from home, your insurance may need tweaking since you are operating a business there. More businesses are requiring beekeepers to have some sort of liability insurance if they wish to sell honey at that outlet. Businesses don't want your problems to become their problems.

Overall, prices have increased since last year with home prices the lowest. But packer prices are up, as are sales.

Where Do They Sell Their Honey?

% of Reporters Selling at these locations						% of Their Honey Sales at these locations						Locations Honey Sold at
2009	2010	2011	2012	2013	2014	2009	2010	2011	2012	2013	2014	
82	81	71	77	77	72	40	43	51	36	73	31	Home (inside or roadside stand)
20	13	17	16	19	14	34	14	26	19	34	43	Local community - sponsored farm market (i.e. Sat. & Sun. sales)
26	23	19	29	28	26	26	27	31	40	31	29	Local Farm Market business that's seasonal (Fall only, for instance)
26	32	26	29	26	25	36	38	34	33	35	26	Local Farm Market business that's year-round
8	9	8	4	5	6	29	34	24	33	19	10	Flea Market
39	37	35	39	35	83	26	19	18	24	20	22	Health Food/Organic store
11	8	12	10	7	11	11	37	9	8	6	10	Gift Store
20	19	13	16	17	13	16	22	20	21	17	12	Bakeries/Food Establishments
15	13	17	14	5	10	15	13	13	28	5	16	Local High-End Retail Outlets (gourmet stores)
37	37	30	31	27	32	16	19	22	16	27	25	Local, Small 'Mom & Pop' Retail Outlets (grocery & gas)
16	13	14	17	4	7	30	26	32	35	13	28	Local Small Packer or Producer/Packer
3	0	5	2	3	3	63	0	42	100	67	78	Huge Packer, they pick up
8	9	13	11	9	8	42	30	38	41	51	37	Wholesale only to larger stores, you deliver to warehouse
13	11	14	11	5	13	6	3	4	9	5	5	Breweries/Beer or Mead makers
10	4	6	10	6	8	8	8	6	10	5	8	Internet, direct retail, mail order
22	17	29	41	41	33	15	11	20	21	18	13	Work, direct retail
8	8	8	6	16	10	8	25	8	6	16	13	Local/State Fair, with club

*Total percentage of sales does not come out to 100% because of multiple outlets.

REPORTING REGIONS

	1	2	3	4	5	6	7	8	9	10	11	12	SUMMARY Range	Avg.	$/lb	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																	
55 Gal. Drum, Light	2.04	2.45	2.04	2.05	2.03	2.05	2.00	1.30	1.80	2.18	2.02	2.75	1.30-2.75	2.05	2.05	2.19	1.95
55 Gal. Drum, Ambr	1.97	2.25	1.97	1.99	1.93	2.00	2.05	1.25	1.60	1.97	2.02	2.65	1.25-2.65	1.99	1.99	2.03	1.86
60# Light (retail)	217.00	191.67	172.50	182.60	180.00	180.00	178.57	177.50	150.00	171.00	177.50	220.00	136.00-270.00	183.97	3.07	182.59	160.97
60# Amber (retail)	217.00	185.00	172.50	180.00	180.00	170.00	174.80	160.00	152.50	190.29	179.00	210.00	130.00-270.00	180.58	3.01	177.52	162.75
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																	
1/2# 24/case	83.81	89.98	62.80	71.47	78.08	78.08	68.73	78.08	78.08	51.84	85.20	90.50	51.60-108.00	76.36	6.36	72.67	66.50
1# 24/case	125.92	105.38	96.00	86.40	96.00	112.20	94.70	99.67	84.00	106.32	114.00	139.00	20.00-172.80	108.19	4.51	110.18	101.34
2# 12/case	114.33	108.69	102.60	83.50	90.00	93.42	80.98	105.00	69.00	97.44	96.00	104.33	69.00-144.00	97.21	4.05	95.68	88.41
12.oz. Plas. 24/cs	107.36	82.63	71.40	78.24	74.40	96.00	73.08	87.93	72.00	74.40	106.80	92.00	62.00-134.40	85.20	4.73	84.83	79.70
5# 6/case	143.03	125.39	100.50	93.50	114.00	121.34	96.64	101.15	90.00	102.30	104.80	125.00	83.10-180.00	111.13	3.70	106.42	99.81
Quarts 12/case	150.67	161.22	133.17	120.00	144.00	114.80	120.78	116.93	133.17	125.64	133.80	154.50	90.00-180.00	131.34	3.65	124.69	120.95
Pints 12/case	107.25	86.95	102.00	85.50	68.00	69.50	70.03	64.30	52.00	81.52	87.40	92.00	50.00-115.00	80.54	4.47	80.39	75.87
RETAIL SHELF PRICES																	
1/2#	4.60	4.98	3.64	3.87	4.37	4.00	3.49	2.19	4.37	3.89	4.74	5.50	2.19-6.99	4.15	8.30	3.97	3.75
12 oz. Plastic	5.50	5.49	4.63	4.63	4.50	5.00	4.15	4.88	4.99	4.22	5.35	6.55	2.94-8.99	4.96	6.61	4.98	4.54
1# Glass/Plastic	6.50	6.37	5.73	5.86	6.00	7.58	5.25	5.91	5.99	5.98	6.11	8.87	3.00-10.00	6.23	6.23	6.34	5.77
2# Glass/Plastic	11.45	9.08	10.34	9.33	11.00	9.27	9.07	12.50	9.99	10.23	10.29	15.00	9.00-18.00	10.30	5.15	10.67	9.84
Pint	10.25	9.95	15.25	8.03	6.50	8.19	7.81	7.05	13.00	7.65	9.31	11.13	9.00-20.00	8.95	5.97	8.23	8.11
Quart	19.25	14.15	18.09	13.13	15.00	12.20	11.56	15.08	35.00	14.09	12.66	19.55	9.00-21.00	14.68	4.89	14.32	12.72
5# Glass/Plastic	25.33	23.91	25.90	22.30	25.00	23.86	20.72	23.30	21.99	19.75	21.44	30.00	14.99-35.00	22.73	4.55	23.47	20.90
1# Cream	8.75	7.05	9.13	6.92	7.33	7.33	6.36	5.99	7.33	6.22	7.27	9.00	4.90-10.00	7.21	7.21	7.61	7.18
1# Cut Comb	9.83	6.00	9.13	6.00	8.68	5.50	7.20	8.00	8.68	10.00	9.25	12.33	3.00-15.00	8.36	8.36	9.84	8.40
Ross Round	8.00	6.98	8.25	6.50	7.45	7.45	7.00	10.00	7.45	7.45	9.25	7.20	4.00-10.50	7.65	10.20	8.36	7.63
Wholesale Wax (Lt)	7.38	6.42	6.00	4.74	3.20	3.30	4.33	6.00	6.00	6.00	3.84	6.00	2.90-10.00	5.30	5.30	5.39	4.95
Wholesale Wax (Dk)	6.38	5.63	6.00	4.38	3.00	3.18	4.20	6.50	5.00	4.82	2.70	3.50	2.00-8.00	4.65	4.65	4.75	4.20
Pollination Fee/Col.	98.33	62.50	97.50	59.70	60.00	60.00	64.00	85.00	94.63	80.00	133.50	116.25	35.00-175.00	84.26	-	80.19	77.96

INNER COVER

It's been cold here this Winter. As it has in lots of places. Early February Winter losses were reported being about the same as last year. Maybe a bit higher, but most folks hadn't had a chance to look. Losses are measurable, but not yet devastating. I suspect that may have changed by now. Too cold, too long. It's a tough test for bees, and only the well prepared survive.

Enough healthy bees, enough good food in the right place, and exceptional protection from the elements. Put those three in a beehive and almost always you will have bees not only survive, but thrive.

So how many bees is enough bees? How much food is enough food? How much protection is enough protection? And how healthy is healthy enough? The standard answer to all of these is, of course, It Depends.

It depends on where you are, the kind of bees you have and the weather, the weather, the weather. If you always prepare for the worst, you will be ready for the worst and you won't be surprised.

If your bees are dead today you have four months, until July, to figure out the answers. That's when the first rule of wintering kicks in – Take Care Of The Bees That Take Care Of The Bees That Go Into Winter. Four months. Enough food is simply a function of weight, enough protection is even easier – wind breaks and wrapping. It's getting enough healthy bees that's tricky. Figure it out this Summer or you'll be cleaning those same hives again, a year from now.

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There are a host of issues going on that are bothering our bees – but there is also a host of things we can do to help. Some, including me, say that not enough food is one of the problems. Well we can certainly do something about that this month. Plant some food. Plant trees, shrubs, perennials. Plant more trees and shrubs. Plants that will last a lifetime.

Every year I order a bunch of trees and shrubs from my County Soil and Water Conservation office. I get mostly bee plants, but others too, for screening, for decoration, for butterflies, for the heck of it. They are inexpensive, usually come in bunches of eight or 10, one or two-year-old plants, 6" – 12" tall. You can plant them directly when you get them, but getting them established that way is a pain, and you'll lose about 50% of them right off. I plant mine in 4" pots on the deck and baby them until they get roots established and leaf out a little.

I usually plant them in my yard in a grouping, maybe several kinds together – a couple of trees a few yards apart maybe, with some forsythia or hawthorn kind of filling in the space between. Yes, I know, forsythia aren't bee plants, but that splash of bright yellow in late March is always a treat, but hawthorn are fantastic. Over there, maybe a grouping of butterfly bush, with some black cherry and choke cherry on either side. A couple more basswoods will fit there in the back, and this year some witch hazel for the first time just to see. And here's a trick I learned years ago about watering – just as important for your plants as for your bees (NO, don't assume because it rained last week they're fine, because they're probably not) . . . I bring a jug of water (cat litter comes in 2.5 gallon jugs and they are great) and simply leave it there. It'll last a month – these plants don't need a lot of water, but they need a little water a lot of times.

So I'll get a pack of each of those and get them started, but I don't have nearly enough room for all of them in my yard. So once they're off and growing, I'll plant a couple three of each at home and I'll give away some of them to folks I know who will get them going with a bit of TLC. The rest I'll keep around all Summer to get them big enough to make it on their own and next Spring I'll give those away, or maybe wander around a county park, or a neglected wood lot or field edge and set them in.

I usually manage to get at least 50% or more big enough to make it on their own after a few years, but that's a bunch more basswood out there my bees can feast on that weren't out there before. This year I'll probably get 20 chokecherry and that many black cherry going because they're small and I can do them two in a pot. I started 10 redbuds about 10 years ago and they have spread like weeds all over the yard and neighborhood, providing lots of good food in the spring time. Over the years I've probably planted more than a thousand trees and shrubs in nearby woods and fields or given to friends. There's not that many in my yard, but all I've planted are only a short flight away from where my bees live.

March is a tad late to get your order in and they might be out of some plants, but it's not too late to do this yourself this year. If you don't already know do a web search for your local SWCD office, call or go online for their tree and shrub list and get some ordered. And if your county doesn't have a good choice, check out the neighboring county. The choices between counties can be immense. You'll be able to pick them up in April and get them going. Get a couple bags of potting soil, some perlite and vermiculite and mix them 3:1:1. Get some inexpensive 4" or 6" pots and get them potted up just as soon as you can. I've found it helpful to soak the roots in water for a day to wake them up before planting (they almost always come dormant bare root). By June they'll be ready to stick in the ground. And giving a tree all ready to plant to a friend or neighbor is almost as good as giving away a jar of honey.

A tree in full bloom is a huge reservoir of food, freely given, available (almost) every year, good for bees and good for wildlife in general. And since you are doing the planting, you can choose the free lunch you are providing. So, what's the best tree? Well, there's lots of right

Let's Eat.

answers to that question. For starters, look at the list, and if you need to, go online and find out bloom time in your hardiness zone. One thing about SWCD lists is that they've done the research to know that the plants on their lists do well where you are.

So, look at bloom dates and get plants – trees and shrubs – that bloom early, mid and late in the season if you can. That's not always possible, but at least stagger the bloom from early Spring to early Summer. That's better than everything at once. And if you can, get plants that aren't only bee plants. Wildlife of all kinds love chokecherry and hawthorn fruit in the Fall, oaks, not a great bee plant, produce acorns and provide caterpillars by the million for baby birds, and raspberries are great on ice cream in the Summer. Crabapples are great for bees and birds, and last year I even tried some sourwood, just to see if I can get it to grow.

And if you're a budding horticulturist, here's a fund raiser for your club. Have the club buy a bunch of different bee plants and trees, pots and soil, you get them going then sell them to members for cheaper than a nursery later in the summer. The club makes money, bees get more good food than they can imagine, your members have something good in their yard, and you get to show off your green thumb – or, all 10 green fingers. Imagine what your county will look like 10 years, or 20 years from now if you do this every year! And another good thing is all the wildlife you're feeding, and that you are supporting your county SWCD. This seems to me to be a win:win: win situation.

Yes we can do something about providing enough good food all the time for our bees. And you can share the beauty and produce many of these plants offer. You, your bees and your neighbors will all be better off. And, it's a pleasant challenge to get all these different plants growing and keeping them alive the first few years. I have maples with an eight inch diameter trunk, tulip poplars nearly as big, several nice sized redbud, dogwoods, beauty bushes, crabapples and more, all feeding my bees, every Spring.

And there's one more thing. There's an old saying – I've seen it attributed to a lot of people over the years, but it goes something like this . . .

A society grows great when old men plant trees whose shade they know they shall never enjoy. Planting for bees is good for bees, good for people, and an investment in and a promise for our future.

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Speaking of enough good food... In April, a film crew based in Los Angles working for a Japanese TV show, is going to visit my home and make a short film of us tending our bees, and then doing some cooking with honey. They tuned in on the recipe sections of a couple of my books, and thought I was the best choice for a Honey Chef they could find. No, really, they did. I tried to persuade them that there must be someone, somewhere on the west coast that could tend bees and cook with honey, but they had their minds made up so Medina here they come.

So...the bee part of this is pretty straight forward. Open a few colonies, look at frames, bees, find the queen, maybe hope there's some honey to look at...you know, gouge the capped frame so the honey runs out and looks inviting. That's what they are interested in. I've watched a little of the program and it tends towards soft music, scenic beeyards, pastel colored hives, slow and easy beekeepers. You've seen that a hundred times but that's what they like, so that's what we'll set up for them.

Then, the cooking with honey part. Something definitely American they said. Hmmmm. OK, what about chicken wings on the grill out on the deck, and whip up some honey BBQ sauce right there on the table next to the grill to baste them in while cooking and then dip them in later? That's about as American as you can get, I think. The only thing more so would be doing that at Tailgating Party at some ball field somewhere. But on the deck, on a warm spring day is pretty good. And by then I'll have a lot of the plants I normally have every summer up and growing on so it's be a warm and fuzzy place to eat.

To go with those wings? Hmmmmmm. Something healthy, to make up for that extra strong, extra sweet BBQ sauce I'm dipping my wings into. What about... a fresh garden salad, with lots of honey bee pollinated veggies and fruit and what not in it, and a rich, tasty Honey Mustard dressing drizzled all over. I can cut up the veggies and such right there, mix up the dressing and make it all on camera. That's a good dish I think. Veggies, fruit and honey. Can't go wrong, and a classic American dish if there ever was one.

OK, what else? Well, it's a short show and I don't have a lot of time, but they asked for a dessert. A Pastry dessert. Or a cake. I'm going to have to think on that one. I don't have a recipe for cakes or cookies on the grill. If you have one, let me know because otherwise we'll have to go inside...and our kitchen is small, and cramped. It won't work at all.

What I wanted to do, but they said no, was to make a tall, cool, drink with honey in it somehow. Going with the tailgating theme here, it's gotta have a bit of a kick. No sweet tea for this show. Something at least 80 proof, maybe more. But even though I can't here's where you come in. You got a tall, cool, summertime drink that uses honey that you have to be at least 18, and should be at least 25 to drink? Gotta have 3, maybe 4 ingredients, will need to be poured and stirred and made in a pitcher and be photogenic as heck and a half glass should paralyze a grown man.

You got one of those, send me the recipe. But hurry. I have to try these you know. I don't want a second class glass of hootch for this show. It's got to be classy. So send me your recipes. I'll try them all...that'll be a happy Saturday afternoon I'll bet... and we'll pick the best of the bunch even if we can't use it on the show. Send in your killer drink concoction to me at Kim@Beeculture.com, with Tall, slow and cool in the subject line so I know what it is, and we'll collect them all and share the best in the April issue so we all have a chance to try. Then, when the film crew leaves, and the mess is cleaned up...I'll sit down with that pitcher and Bottoms Up.

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You know what? Spring is right over there. I can see it from here. Get your beesuit washed, your smoker cleaned and find that hive tool. It's time to go to work. There's bees to do.

Kim Flottum

It's Summers Time –

Spring, Weather and Chickens

It's Spring – at least the calendar says March officially brings Spring. This is a busy time for beekeepers for several reasons. If you're a new beekeeper you may have just completed, or still be in your beginner's class. You're probably feeling a bit overwhelmed right now. You're just about to get your bees – a package, a nuc or maybe someone is giving you a full sized hive. However it happens you're about to become a beekeeper. Are you ready? Do you have everything you need? Is there someone you can call when you have a question?

If you had bees going into Winter – whether it's your first Winter or you've been doing this awhile – it's time to see how things went. Will you have bees when you can finally get out there to check? Depending on where you live maybe you've already been in your hives. I hope you found healthy hives ready to start kicking.

Then there are all the Spring meetings. We get so many notices for Spring meetings from all over the country. We're very fortunate here in Ohio to have the largest one-day Spring meeting in the country – Tri-County Beekeepers in Wooster, Ohio. The meeting is March 1 and if you're anywhere at all close I urge you to sign up quickly – they only take 800 (I know – 800!). It fills up fast. All of the big bee supply companies will be there selling their merchandise. You'll get to hear Jim Tew as the keynote speaker and spend a day with 800 other folks who share your passion about beekeeping. Get there if you can. *Bee Culture* will be there – with our bells on.

Now, I want you to do me a favor. We receive so many notices for meetings for our Calendar section. Not just in the Spring but all through the year. And we want to put as many of them in as we can. We don't have a lot of room – only one page – but we want to get yours in. So if you're sending in a notice please keep it brief, use your web page to give all the details. But, please make sure you give us all of the really important information – the date, the state you're in (yes there is more than one Washington County in the U.S.), the location and most important your web page and/or email address and/or phone number so folks can find out what's for lunch. Often we take it for granted that people know who and where we are. It's *Bee Culture's* job to let people know you're having a meeting, it's your job to give them the details. Thanks!

Have you noticed that we talk a lot about the weather. Well, this Winter in Northeast Ohio and many other places, has given us even more stories about the weather. This will be one of those that we tell our grandchildren about – the Winter of 2014. It's just been downright cold here in Northeast Ohio – the coldest overall in 20 years. It was -2 when we got up this morning, but 20 in the chicken coop though. Our school kids in Medina County have not had a full week of school since before Christmas. They are very happy. Some grownups get whiny and complain, but it gives us something to talk about, something different. Weather talk takes up a good 20 minutes of the morning in the office while we're getting those nice warm cups of coffee. The internet and our IPhones allow us to monitor everyone else's weather also. So we know that the nephew in Duluth has it a lot worse than we do, it's -21 (actual temperature). And the brother in southern CA is enjoying 75 and sunny. In seconds we can know what it's doing anywhere in the world.

We have a friend in Vermont who says– "There's no such thing as bad weather, just poor choices in clothing."

The chickens still seem to be OK. They don't seem very stressed at all by this extreme cold. But we worry about them and keep a pretty close eye. The coldest it has gotten in the coop is 15, with no draft and we do have warming lights in there for them. I know some folks frown on this, but it keeps it a little nicer in there for them. They get scratch and worms every morning. Last week Kim gave them some cheese that had aged out a bit along with the worms and amazingly they went right for the cheese. I've read a little about giving chickens dairy products and so far, the consensus is moderation. I need to do some more reading. We have an article by Gail Damerow on page 73. Gail is the expert and I highly recommend that if you have chickens or are thinking about chickens, you need to read her book, *Guide To Raising Chickens.*

I'm headed to northern California at the end of March to visit family. I hope it will be warm, and some sun would be good. But they are having a whole different weather challenge out there – no rain. No rain in a very long time. Growing up out there often it would rain for months in the Winter. We walked around soggy all the time. But this year and for the last several years they have a real water problem. Some areas are already going to water rationing anticipating a long, hot Summer.

My niece has a landscaping business in the Bay Area, working for folks who don't have to worry too much about money. They really like their nice green lawns, with all of their exotic plants and she'll have a hard time convincing them that something has to give.

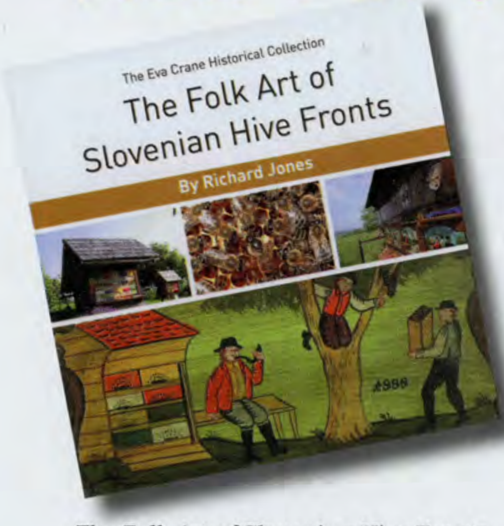
Too bad we can't figure out a way to gather up all of this snow and transport it out there to them. Hum!!! Although we did just check the extended forecast for the Sacramento area and they are supposed to get rain the next 11 out or 13 days. Keep a good thought.

But the hope of Spring is with us. We're getting seed catalogs on an almost daily basis. I love sitting with my blanket, my hot cup of tea, in my rocking chair, with a cat on my lap, marking up the pages of what new plants we should try. There are new tomatoes, new zinnias, new squash and yes we'll have to try them all.

Well I'm out of room, so enough rambling. Have a great Spring!

Kathy Summers

New For You –



The Folk Art of Slovenian Hive Fronts, by Richard Jones. Published and available from IBRA. ISBN 978-0-86098-276-0. 8-1/4" x 8-1/4". 84 pgs. Color. Soft cover. $17.00 plus post.

Slovenia. Carniolan bees. Bee houses. Centuries-old traditions. They all run together and result in the paintings on the fronts of the beehives in this country. The paintings are more than art...they are folk tales, religious stories, history, instructions, and art. Eva Crane had the foresight to collect samples of these for the educational museum IBRA maintains, and Richard Jones, former Director of IBRA has reproduced these works of art and history for this book. There are 54 in the collection and Richard, and collaborators in Slovenia, have unraveled each and shares the stories they tell. They are, basically, primitive art samples, that illustrate the subjects the beekeepers wanted to express...both biblical and secular. They fall into groupings – biblical, old and new testament; folklore; rural life; history; women; and an upside down world. Bears, the devil, wives, and swarms are commonly depicted.

A.I. Root, with the help of some of his resident beekeepers devised the first package to ship bees in the mail more than 130 years ago. It has been modified a tad, but the package we ship bees in today is essentially the same. Wood top, bottom, and ends, screened sides, with a hole in the top for the feeder can. Several years ago a plastic cage, made in Europe came ashore, but it was roundly rejected as too expensive and unworkable. It wasn't and it didn't leak bees. And then there's the tube the they use in NZ and OZ with the food a solid instead of liquid. Ships in a plane just fine when the pressure changes and doesn't leak bees.

Well, Charles Linder has come up with a cage that I think is better than the one from Europe and the tube. All plastic, molded to hold the can and queen cage so they are easily removed. Small hive beetles fall out the bottom, you can't get stung through the thick screen (a real treat for post office people), there's no wire screen to punch out, better ventilated, a reusable cover, and, with two twists of your hive tool one entire end comes opens to empty the package so you don't have to shake and shake and shake to get the bees out. It folds flat for storage and return. There are spacers on the side so you can't seal it from ventilation, and those spacers lock together so you can gang them without bending the traditional slats.

It's about time this came to be. If you buy packages, ask the producer to send you one in this package. You might pay a bit more, but the peace of mind is worth the cost – and you can send it back for a refund.

For more info contact Charles Linder at 618.662.8165, or email at **gm_charlie@frontier.com**.

The Chicken Fountain

These automatic chicken waterers will change your life! The Chicken Fountain™ will keep your chickens healthier by providing, clean, fresh water every time! No more daily cleaning of dirty chicken waterers, this semi-sealed system keeps every drop of water fresh and clean!

We build The Chicken Fountain™ here in the USA on our small farm in Davidson NC. We can customize The Chicken Fountain™ to serve YOUR backyard flock of chickens, peacocks, guinea hens, turkeys, ducks, quail and more! Many people are using our systems for much more then poultry.

I have also developed our new Brooder Bottle Cap™! This unit will turn any standard recycled soda bottle into a safe and healthy source of water for your brooder or isolation cage. No more messy brooder waterers and no chance of an accidental drowning. It's also the perfect solution to mixing medications or supplements.

Visit us at **www.chickenfountain.com** to check out our entire product line. Stop by our Facebook page at **www.facebook.com/thechickenfountain** and see what our customers are saying about the new way to water their flocks.

REPORT BEE KILLS

The Pollinator Stewardship Council needs your input to help save your bees.

The EPA has stated they receive few complaints concerning pesticides causing harm to bees. This is the result of years of beekeepers being investigated, intimidated, and retaliated against for reporting their bee kills. Low reporting data is also the result of the State Lead Agencies (SLA's) and the EPA doing little or nothing to remedy bee losses. The revised Bee Kill Investigation guidelines set forth by EPA still investigate the beekeeper as the culprit. A bee kill, just like a fish or bird kill is the evidence of pesticide misuse or negligence.

From April through September last year thirty-seven bee kills were reported to the Pollinator Stewardship Council. The bee kills occurred in agriculture, as well as suburban areas. Beekeepers reported bee kills while their bees were in or surrounded by corn, alfalfa, apples, berries, pasture, hay fields, wetland, woods, cotton, soybeans, watermelons, rice, and wheat. We want to change the bee kill reporting paradigm. We believe beekeepers should be supported in their efforts to work with growers and applicators for good agricultural and pollinator stewardship, not condemned. The Pollinator Stewardship Council believes the EPA cannot make good decisions with poor or no data.

During 2013 the Pollinator Stewardship Council received reports of bee kills in New Jersey, West Virginia, California, Arizona, New York, Pennsylvania, Utah, North Carolina, Arkansas, Missouri, and Minnesota with losses or severe damage to more than 11,000 hives.

Three bee kill incidents were notable. The first and second weeks of June pesticide was applied to alfalfa during the daytime, while bees were actively foraging, on a windy day – against the pesticide label guidelines. The pesticide meant for pests in the alfalfa field was blown on the wind, killing the foraging bees and severely damaging the health of over 560 honey bee colonies. This beekeeper had colonies scattered across two counties placed on pasture land, an organic berry field, and native land. Due to the timing of the pesticide application directed at alfalfa and yellow clover, the wind blew it far beyond its target. The loss of the foraging bees in these hives, and their ability to pollinate and make honey cost this beekeeper $283,000.

The State of Utah did respond to this bee kill, coming out to investigate five days after receiving the call from the beekeeper. The Pollinator Stewardship Council is working to secure adequate compensation for beekeepers who sustain damage from pesticide use in violation of the product label. We are working to ensure SLA's perform their requirements under FIFRA in a timely fashion.

June 6, 2013 a bee kill was reported by a county bee inspector in Utah. Thirty-two colonies, a queen bank, and nine to 10 small nucs were damaged due to deliberate misuse of the pesticide in clear violation of the label. The County bee inspector had received a call the area would be sprayed, *but with only 30 minutes notice.* The County bee inspector confronted the pesticide applicator who was driving through the field opposite the bee hives in the middle of the day. The applicator stated to the County bee inspector, "I figured the bees would die in the field and never make it back to the hive." This beekeeper lost 32 hives, nucs, and a queen bank of hives with a value of $20,000. If a rancher lost livestock of this number, compensation would be made for the losses. The monetary losses that are not accounted for, however, are the loss of income in honey production, and unmet crop pollination services. The Pollinator Stewardship Council is working to secure compensation for the actual AND anticipated losses for beekeepers who sustain damage from pesticide use in violation of the product label. We are working to improve communication between applicators, growers, and beekeepers.

A third notable incident occurred in Minnesota during corn planting. Thirteen hundred colonies placed near blooming willows was a delicious treat for the bees, until the pesticide-contaminated dust from corn planting drifted across the nectar filled willow blossoms, and other natural forage which started the death spasms for these colonies. This beekeeper took a video of his suffering bees. He had a lab report showing the concentration of pesticides within the bee remains. He notified his State EPA, and they investigated. The State EPA report on this bee kill due to pesticide laced dust from corn planting reported to the beekeeper: *"The observed bee mortalities may fall within EPA's acceptable boundaries of impact."* Over 1300 weakened and dead hives *"may fall within EPA's acceptable boundaries of impact."* Would this be an acceptable loss in any other agricultural business? Would 1300 weakened and dead cattle, sheep, or crop acres be within an acceptable boundary of impact for those ranchers or farmers? The Pollinator Stewardship Council is working to ensure beekeepers are treated the same as every other farmer or rancher and are adequately and appropriately compensated for losses beyond their control.

Not every beekeeper recognizes nor realizes the significance of a bee kill from insecticides, fungicides, herbicides, and exposure to pesticides from coated seeds. The new types of pesticides do not necessarily result in recognizable bee kills – with piles of dead bees in front of the hive.

Honey bees make a multitude visits to a blossom to help the plant fully form its fruit, seed, or nut. What berries, apples, squash, nuts, seed crops will not fully form due to the death of these pollinators? Honey bees are assisted in pollination by native pollinators: butterflies, moths, beetles, and a myriad of native bees. Managed honey bees reflect what is occurring to all pollinators. If pesticide misuse killed and severely damaged hives in pasture, berry fields, and near alfalfa, then native pollinators were killed as well.

Beekeepers must report their losses due to the misuse of pesticides, in order to inform the regulatory agencies the system is not protecting bees and beekeeping. The Pollinator Stewardship Council understands your grief, anger, and frustration due to your loss of bees: *the reporting process with us is confidential and easy.*

You can email us directly or through our website concerning a bee kill you have experienced: www.pollinatorstewardship.org. We will work with you to collect the needed information to report the incident. *Your privacy will be maintained.* If you want to report the bee kill to the EPA, we can assist you in that process. Statistics collected from submitted bee kill reports may be posted on our website, used in presentations, or compiled with other bee kill related data, but the *privacy of each individual beekeeper will be maintained.*

The Pollinator Stewardship Council is working for beekeepers. Help us protect your bees! *Your financial support of this nonprofit is the key to our success.* Together we can make a difference for beekeeping operations, for pollinators, for a sustainable and affordable food supply. For more information about the Pollinator Stewardship Council visit our website at **www.pollinatorstewardship.org**. BC

A Closer Look

WORKER POLICING

Clarence **Collison**

The main mechanism that limits successful worker reproduction is a behavior known as worker policing.

Worker reproduction is low in honey bee colonies with a queen (Visscher 1989; Page and Erickson 1988) because a suite of pheromones derived from the queen and the brood inhibits ovarian development in workers. In addition, workers with developed ovaries are attacked by other workers (Visscher and Dukas 1995) and worker-laid eggs are less viable than queen-laid eggs (Pirk et al. 2004). Nevertheless, a considerable proportion (~4%) of workers can have functional ovaries (Jay 1968) and can lay a substantial number (7%) of male eggs; less than 1% of those eggs develop into adult males (Visscher 1996). The main mechanism that limits successful worker reproduction is a behavior known as worker policing; the removal of worker-laid eggs by other workers (Dampney et al. 2002). Workers inspect brood cells, leave most eggs laid by the queen, but eat virtually all eggs laid by other workers. By eating worker-laid eggs, nest-mate workers prevent each other from reproducing (Ratnieks and Visscher 1989).

Behavioral bioassays have shown that worker honey bees can distinguish between worker-laid and queen-laid eggs. However, the recognition cue(s) used by policing workers to discriminate between worker-laid and queen-laid eggs remains elusive. Martin et al. (2005) conducted a series of experiments attempting to elucidate the nature of the recognition cue. No visually apparent physical differences were found between worker-laid and queen-laid eggs using scanning electron micrographs magnified up to 2500 times, which indicate that the cue is probably chemical in nature. They confirmed that the signal probably resides on the queen-laid and not the worker-laid eggs, since a worker-laid egg is protected when placed in contact with a queen-laid egg. A series of standard egg-removal bioassays in queenright colonies using queen-laid and worker-laid eggs treated with a wide range of potential recognition chemicals, solvents, buffers or gland extracts was conducted. The aim was either to disrupt or remove the egg-marking signal from queen-laid eggs, or to add the signal to worker-laid eggs. Despite a comprehensive set of experiments, they were unable to alter the egg-marking signal on queen-laid eggs or transfer the signal from queen-laid eggs to worker-laid eggs. Furthermore, two candidate signals, esters from queens and eicosenol from workers, were shown not to be the cues used by workers. This demonstrates that the egg-marking signal in honey bees is remarkably robust and consists of a chemical or group of chemicals not previously associated with chemical signaling in social insects.

"Behavioral bioassays have shown that worker honey bees can distinguish between worker-laid and queen-laid eggs."

Queen-laid and worker-laid unfertilized eggs were compared to see if there were basic biological differences that could be used by policing workers to distinguish between the two egg types (Wegener et al. 2010). Initially, the capacity of queen- and worker-laid male eggs to withstand dry conditions was tested by incubating samples at 30.0, 74.9 and 98.7 % relative humidity. Worker-laid eggs were found to be more sensitive to desiccation. Secondly, the weight and quantities of vitellin, total protein, lipid, glycogen, and free carbohydrate in queen-and worker-laid eggs were measured. Although worker-laid eggs were found to be heavier than queen-laid eggs in two of the four replicates, no systematic differences were found regarding nutrient content. Finally, they compared the duration of embryo development in the two egg types. Worker-laid eggs developed more slowly than queen-laid eggs in two out of three replicates suggesting that they may only be partly mature at the moment they are laid.

In queenless colonies that have failed to rear a replacement queen, worker reproduction is normal. In this situation, worker policing is switched off, many workers have active ovaries and lay eggs. The colony rears a last batch of male brood before dying out. However, Châline et al. (2004) report on a colony which, when hopelessly queenless, did not stop policing, although a high proportion of workers had active ovaries (12.6%) and many eggs were laid.

However, all these eggs and also worker-laid eggs transferred from another colony were policed. This unusual pattern was repeated eight weeks later by a second queenless colony made using worker bees from the same mother colony, which strongly suggests genetic determination.

Since the source of the egg-marking signal used by policing workers is thought to be produced by the queen, Beekman et al. (2004) investigated whether mating is necessary for the queen to produce this egg-marking signal. They compared the removal rate of eggs laid by virgin queens and compared this rate with that of eggs laid by mated queens. They showed that mating does not affect the acceptability of eggs, suggesting that physiological changes linked to the act of mating do not play a role in the production of the queen's egg-marking signal.

Unlike normal (wild type) colonies, anarchistic colonies are characterized by workers that activate their ovaries in the presence of the queen and brood and by the ability of their workers to lay eggs that evade worker policing. The level of worker reproduction in these anarchic colonies is far greater than in a normal queenright colony. Anarchy is a counterstrategy against worker policing (Barron et al. 2001). In the Cape honey bee (*Apis mellifera capensis*), female larvae can manipulate non- capensis nurse bees so that they receive more larval food and develop into worker-queen intermediates or intercastes. Beekman and Oldroyd (2003b) speculated that possibly in anarchistic colonies, the larvae might produce signals that results in excessive feeding of female larvae. Excessively fed female larvae may then develop into reproductively active workers. They cross-fostered anarchistic and wild type brood and investigated the effect of cross-fostering on the amount of food fed to larvae and on the morphology of the resulting workers. The anarchistic larvae did not manipulate wild type nurse bees into feeding them more and the anarchistic workers did not develop into worker-queen intermediates. On the contrary, anarchistic larvae were fed less than wild type larvae and anarchistic workers seem to be poor nurses in that they feed larvae less, irrespective of brood genotype.

Workers use the absence of the postulated queen egg-marking signal to enforce the queen's reproductive monopoly by policing any worker-laid eggs. In contrast to wild-type colonies, the majority of the males arise from worker-laid rather than queen-laid eggs in anarchistic colonies. Anarchistic worker-laid eggs escape policing because workers perceive anarchistic eggs as queen-laid. However, Beekman and Oldroyd (2003a) showed that eggs laid by queenless anarchistic workers do not escape policing and have very similar removal rates to worker-laid eggs from queenless wild-type (i.e. non-anarchistic) colonies. This suggests that under queenless conditions eggs laid by anarchistic workers lose their chemical protection and are therefore no longer perceived as queen-laid. Hence, the egg-marking signal seems to be only applied to eggs when queen and brood are present. This suggests that in the absence of queen and brood, the biosynthetic pathway that produces the egg-marking signal is switched off.

Dufour's gland secretion may allow worker honey bees to discriminate between queen-laid and worker-laid eggs. To investigate this, Martin et al. (2002) combined the chemical analysis of individually treated eggs with an egg removal bioassay. They partitioned queen Dufour's gland into hydrocarbon and ester fractions. The bioassay showed that worker-laid eggs treated with either whole gland extract, ester fraction or synthetic gland esters were removed more slowly than untreated worker-laid eggs. However, the effect only lasted up to 20 hours. Worker-laid eggs treated with the hydrocarbon fraction were removed at the same rate as untreated eggs. The amount of ester which reduced the egg removal rate was far higher than that naturally found on queen-laid or worker-laid eggs, and at natural ester levels no effect was found. These results indicate that esters or hydrocarbons probably do not function as the signal by which eggs can be distinguished.

Worker-laid and queen-laid male eggs were transferred into combs of empty drone cells in four colonies. Worker-laid eggs treated with an ethanol extract of queen Dufour's gland were removed by workers (working policing) at a significantly lower rate than either untreated or ethanol-treated worker-laid eggs, but this effect was less when a 1:10 dilution was used and it disappeared at a 1:100 dilution (Ratnieks 1995). Worker-laid eggs that had been touched to an area of a queen at the base of the sting and between the sting sheaths ('stingwipe' treatment) were also removed at a significantly lower rate than untreated worker laid control eggs. In all trials, the removal rate of worker-laid exceeded that of queen-laid eggs. Queen-laid eggs treated with the polar solvents methanol and ethanol were removed more rapidly than those treated with the less polar hexane and methylene chloride, but it was not possible to determine if this was because methanol and ethanol were more effective at removing a possible pheromone or because they caused more damage to the eggs. The results support the hypothesis that recognition of worker-laid eggs during worker policing is via a queen-produced egg-marking pheromone.

The ability of honey bees to discriminate between worker-laid and queen-laid eggs was used to investigate the role of cuticular hydrocarbons in the egg-recognition system (Martin et al. 2004ab). Odd chain-length linear alkanes (C23-C31) were the dominant hydrocarbons on the surfaces of both queen and worker-derived eggs. Significant differences were found in the profile of the linear alkanes between full-sized worker and queen eggs just before being laid (dissected from the ovaries). In egg-discrimination bioassays, only queen-laid eggs were not removed, whereas all worker-laid eggs and all full-sized eggs taken from the ovaries were removed within two hours. Despite worker-laid and queen-laid honey bee eggs having significantly different hydrocarbon profiles, bioassays and chemical supplementation studies show that changing the hydrocarbon profile does not affect egg identity. Furthermore, full-sized eggs in the queen's ovary that was tested just before being laid or just after being laid have similar hydrocarbon patterns but are treated differently in egg-discrimination bioassays with only the laid eggs surviving.

The initial caste differences in hydrocarbon profiles of eggs disappear as their profiles merge during the first 24 hours in the colony, although this fails to protect the worker-laid eggs because they are always removed. In addition, even when the hydrocarbon profile of worker-laid eggs was artificially changed to be queen-like by the addition of a hexane extract of a queen Dufour's gland, these treated eggs were still removed (Martin et al. 2002). The correlational studies suggest that fluctuations in the proportion of C25 and C27 may be critical in allowing honey bees to discriminate between egg types. However, this is not supported by the egg-discrimination bioassays or the chemical supplementation studies (Martin et al. 2002). This strongly suggests that the cuticular hydrocarbons, and specifically the linear alkanes, do not play a role in egg discrimination. Other studies have provided similar findings. BC

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Field Level Sublethal Effects Of Approved Beehive Chemicals On Honey Bees

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After adjusting for the mite covariate, exotic hive chemicals significantly decreased three-day brood survivorship and increased construction of queen supercedure cells compared to non-treated controls.

The article was edited for length. The origianal, along with references and figures, can be assessed by going to the following site: **http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0076536**

Abstract

In a study replicated across two states and two years, we tested the sublethal effects on honey bees of the miticides Apistan (tau fluvalinate) and Check Mite+ (coumaphos) and the wood preservative copper naphthenate applied at label rates in field conditions. A continuous covariate, a colony *Varroa* mite index, helped us disambiguate the effects of the chemicals on bees while adjusting for a presumed benefit of controlling mites. Mite levels in colonies treated with Apistan or Check Mite+ were not different from levels in non-treated controls. Experimental chemicals significantly decreased three-day brood survivorship and increased construction of queen supercedure cells compared to non-treated controls. Bees exposed to Check Mite+ as immatures had higher legacy mortality as adults relative to non-treated controls, whereas bees exposed to Apistan had improved legacy mortality relative to non-treated controls. Relative to non-treated controls, Check Mite+ increased adult emergence weight. Although there was a treatment effect on a test of associative learning, it was not possible to statistically separate the treatment means, but bees treated with Apistan performed comparatively well. And finally, there were no detected effects of beehive chemical on colony bee population, amount of brood, amount of honey, foraging rate, time required for marked released bees to return to their nest, percentage of released bees that return to the nest, and colony Nosema spore loads. To our knowledge, this is the first study to examine sublethal effects of beehive chemicals applied at label rates under field conditions while disambiguating the results from mite control benefits realized from the chemicals. Given the poor performance of the miticides at reducing mites and their inconsistent effects on the host, these results defend the use of bee health management practices that minimize use of exotic hive chemicals.

INTRODUCTION

The parasitic honey bee mite, *Varroa destructor* (Anderson and Trueman) has been responsible for transitioning beekeeping from one of the world's most chemical-averse agricultural industries to one of its most chemical-dependent. In the United States, the synthetic acaricides tau-fluvalinate (Apistan™) and coumaphos (Check Mite+™) are routinely used to control this exotic honey bee pest. It is generally believed that *Varroa*-related losses would be unacceptably high without these inputs. Although these products have low acute toxicity (high LD_{50}s) to honey bees, there is growing evidence that they are not entirely benign. Rinderer et al. showed that drones exposed to fluvalinate during immature development have increased mortality and reduced body weight and tend toward lower sperm counts, and Burley et al. showed that drones similarly exposed to coumaphos have lower sperm viability. Haarmann et al. showed that queens have reduced body weight if reared in the presence of elevated levels of fluvalinate. At beeswax coumaphos levels equal to the legal tolerance of 100 ppm >50% of queen cells were rejected by nurse bees in a rearing colony, and those queens that survived to adulthood weighed less than control queens and at six months expressed only 31% survival compared to control group survival of 48%. Coumaphos has been shown to alter honey bee gene expression for detoxification pathways and may down-regulate gene products associated with cellular or humoral immunity. There is evidence that acaricides alter physiological functions, immune responses, and detoxification functions in the host bees rendering them more susceptible to pathogens and pesticides. And finally, the active ingredients fluvalinate and coumaphos have been shown to synergize in the company of each other, elevating the honey bee toxicity of each to potentially injurious levels.

Honey bee exposure to toxins has been a subject of increasing scrutiny as colony numbers continue to decline in the United States and Europe. Survey analyses of bees and hive matrices show a high degree of pesticide exposure, both in diversity of compounds and level of residues. But it has not proven easy to assign direct causation to pesticides or to any single factor, and the prevailing thinking is that bee decline is a product of many interacting stressors including but not exclusive to environmental toxins. Field pesticide symptoms sometimes lack clear indication, raising interest in sublethal effects on bees – morbidities that escape casual observation but nevertheless add up to colony-killing effects. The fact that beekeeper-applied chemicals top the list of compounds found in hive matrices underscores the need to examine these chemicals for their sublethal effects and potential contributions to bee health problems.

In this paper we report a two-year (2008, 2009) study replicated across two states (Georgia, South Carolina) looking for sublethal effects on bees at labeled rates of compounds registered for use by beekeepers in the United States: the synthetic acaricides tau-fluvalinate (Apistan™) and coumaphos (Check Mite+™) used to control *Varroa* mites and, in Georgia only, copper naphthenate (Jasco™) used to protect wooden hive parts from termites and decay fungi. Key to our purposes was a simultaneous statistical control for the effects (presumably beneficial) of the miticides Apistan and Check Mite+. In other words, we wanted to parse out the benefits of miticides so that we could unambiguously examine them for their sublethal effects on the insects they are designed to protect. We did this by tracking colony mite level with three independent measures and using a combined colony mite index score as a covariate with the fixed effect colony chemical treatment. This implies the non-controversial assumption that mite depredations are lower in colonies in which mites are controlled with miticides.

RESULTS AND DISCUSSION

In this study we attempted to identify sublethal effects on bees from field label rates of in-hive chemicals commonly used by beekeepers in the United States. The challenge was to do this while controlling for health benefits presumably derived from using these chemicals to control mites. We attempted to control this confounding variable by constructing a continuous covariate – a mite index score – from three independent measures of relative colony mite level. This covariate strengthens our argument that the colony strength measures reported below are relatively unambiguous indicators of the effects of these chemicals on the insects they are designed to protect.

Chemical residue analysis of brood comb wax after the first season confirms that the experimental active ingredients were the predominate exposures in their respective test colonies (Table 1). However, it was not unusual for low levels of non-target active ingredient to occur. For example, whereas fluvalinate was predictably the predominate exposure in Georgia colonies receiving ApistanTM (16,600 ppb), there were also detectable amounts of coumaphos (429 ppb). As no beeswax foundation was used to start these colonies, these exotic residues are likely the work of drifting bees or other unknown environmental exposures. More surprising was the high levels of coumaphos detected in colonies treated with Check Mite+TM at label rates. Comb residues of coumaphos at the end of year one in both Georgia and South Carolina were over five times the EPA tolerance of 45,000 ppb (Table 1). We analyzed Georgia Check Mite+TM colonies again at the end of year two, and residues had more than doubled after a second season's use. These high residues are unexpected given that (1) treatments were applied at label rates, (2) experimental chemicals were not in hives at time of sampling, and (3) samples were taken from

It has not proven easy to assign direct causation to pesticides or to any single factor, and the prevailing thinking is that bee decline is a product of many interacting stressors including but not exclusive to environmental toxins.

brood combs at the edge of the brood super and furthest from the site of treatment. Analytic standards were not available for copper naphthenate, but elemental copper was predictably detected in colonies receiving the wood preservative in Georgia.

Field measurements: colony *Varroa* levels

Chemical hive treatment had significant effects on natural 24-hr colony mite drop and powder sugar-assisted mite drop, but no significant effects on mites per 100 bees (P=0.36). The miticidal properties of Apistan and Check Mite+ were weak or not evident, in neither case differing from non-treated controls; this is consistent with evidence for *Varroa* resistance to both these chemicals in the United States. It is worth noting, however, that mite control although never different from non-treated controls was numerically optimized in colonies receiving ApistanTM. With both measurements mite levels were significantly lower in colonies treated with the miticide Apistan than in colonies treated with the wood preservative copper naphthenate.

It is important to note here that when the mite covariate was significant in the results reported below, the direction of the effect was always negative such that increasing mite levels were associated with decreasing measures of colony strength, with one exception – time for marked bees to return to the nest. Mite levels were therefore important in these measures, but it seems that mite levels varied independently of the experimental chemicals, two of which were commercial miticides.

Field measurements: colony strength measures adjusted for mite level

In all these dependent variables the effect of colony mite level was controlled as an independent covariate. There were no significant effects of chemical hive treatment nor mite covariate on frames of honey, foraging rate, and percentage of marked released bees that return to the nest (P>0.05).

Brood survivorship was significantly affected by hive chemical regime, whilst it was not significantly affected by the mite covariate. Brood survivorship was significantly higher in non-treated controls than in colonies receiving bee hive chemicals. These results provide context to the work of Wu et al. who housed bees on brood combs with a known history of high pesticide residues or on combs that were relatively non-contaminated. The "high" combs contained an average of ten different pesticide residues, the three most common being fluvalinate, coumaphos, and coumaphos oxon – a breakdown metabolite. Although brood survivorship was not different between the two comb types, these authors detected delayed larval development in young bees reared on the "high" residue combs. Our present data suggest that negative effects such as these translate into reduced larval survivorship with bee hive chemicals at label rates in field conditions.

The number of queen cells under construction was significantly affected by hive chemical regime, whilst it was not significantly affected by the mite covariate. The number of queen cells under construction was significantly higher in colonies receiving bee hive chemicals than in non-treated controls. We included this variable as a proxy measure of the queen's state, as her supersedure is generally considered an indicator of suboptimal distribution of queen mandibular pheromone within the colony. Without suggesting a mechanism, our results indicate that exotic chemicals in the nest matrix are associated with higher rates of queen replacement.

Adult bee population (frames of bees) was not significantly affected by hive chemical regime after adjusting for the mite covariate. However, the effect of the covariate was significantly negative so that increasing mites were associated with decreasing bee populations, an effect shown before. There was a significant interaction between chemical regime and the mite covariate; however, the direction of the effect was always negative, whether for the three chemicals (P<0.01 in each case) or untreated control (P=0.025). Therefore, mite levels were influential in these results, but they varied independently of colony chemical treatment. Our most important finding here is that bee hive chemicals, in isolation from confounding effects of mites, did not affect colony bee populations.

The amount of brood (frames of brood) was not significantly affected by hive chemical regime after adjusting for the mite covariate. However, the effect of the covariate was significantly negative so that the amount of brood decreased as mite level increased, a phenomenon known from previous authors. There was a significant interaction between chemical regime and the mite covariate; however, the direction of the effect was always negative, whether for the three chemicals (P<0.01 in each case) or untreated control (P=0.049).

Time (sec) for marked, released bees to return to the nest was not significantly affected by hive chemical regime after adjusting for the mite covariate. However, the effect of the covariate was significant and negative so that the length of time for a bee to return to the nest decreased as colony mite level increased. These results stand in contrast to earlier experiments dedicated to the hypothesis that phoretic mites affect homing behavior of foraging bees. In that work, foragers were released at different distances, and mite-infested individuals took over twice as long as non-infested individuals to return to their nests. The differences in our designs are considerable and include different release distances (5-400 m vs. 500 m in present study) and comparisons of individual mite levels vs. colony mite levels (present study). These are enough to render comparisons difficult, but the collective evidence suggests that *Varroa* may act differently on individual behaviors vs. mean colony effects. For our present purposes, however, we have no evidence that bee hive chemicals at field rates affected honey bee homing.

The incidence of colony Nosema spore loads scoring "medium," "medium high," or "high" was not significantly affected by hive chemical regime after adjusting for the mite covariate. However, the effect of the covariate was significantly positive so that spore count increased as colony mite level increased. A similar correlative association was shown in Argentina where investigators found that colonies more heavily loaded with *Varroa* sustained higher Nosema spore loads after the seasonal peak in spore formation occurred. This contributes to a mounting database that managed honey bees are increasingly subject to multiple stressors. But our main conclusion here is that bee hive chemicals at field rates did not significantly affect colony Nosema spore load.

Conditioned learning and memory

No mite covariate was included in these analyses

Table 1. Beeswax chemical residue analysis (ppb) in experimental colonies after first season.

Georgia					
	Experimental Treatments				
Active ingredients screened	Non-Treated	Apistan™	Check Mite+™c		Cu naphthenate
			Year 1	Year 2	
2,4-dimethylaniline	ND	ND	ND	ND	ND
2,4-dimethylphenyl formamide	ND	ND	ND	ND	ND
Amitraz	ND	ND	ND	ND	ND
Coumaphos	392	429	256,000	514,000	212
Fluvalinate	18	16,600	219	1,700	trace
Elemental Cu	NA	NA	NA	NA	58.5
South Carolina					
Active ingredients screened	Non-Treated	Apistan™	Check Mite+™c		Cu naphthenate
2,4-dimethylaniline	ND	ND	ND		NA
2,4-dimethylphenyl formamide	ND	ND	ND		NA
Amitraz	ND	ND	ND		NA
Coumaphos	9310	24.7	271,000		NA
Fluvalinate	ND	3290	ND		NA
Elemental Cu	NA	NA	NA		NA

because we were forced to pool colonies by treatment, state, year, and season to create one replicate due to small numbers of responding bees in some colonies; therefore, we could not associate response data to unique colony mite levels. There were no significant effects of chemical hive treatment nor post-conditioning time interval (seven, 14, 28, or 56 min) on the percentage of bees expressing retained memory from the learning conditioning trials ($P=0.39$). For percentage of bees learning, however, there were significant ($P<0.001$) effects of hive chemical regime on learning trials 2-5 (trial 1 was discarded as described in Methods). But despite the significant effect of treatment as shown by the chi-square value, it is not possible to identify which groups are significantly different from one another. Nevertheless, bees from the Apistan-treated group performed comparatively well. These results provide field-level context to earlier work on the effects of acaricides on honey bee cognition. Although topical applications of fluvalinate at sublethal rates are known to reduce movement of individuals and their social exchanges with nest-mates, there is no similar evidence for an effect of fluvalinate on bee response to the PER assay. This raises the possibility that the present results are indicating heightened cognitive performance by bees for whom *Varroa* control has been optimized by fluvalinate. For these PER data we were not able to partition out a mite covariate; however it is worth noting that mite control, although never different from non-treated controls, was nevertheless optimized in colonies receiving ApistanTM. This interpretation is consistent with evidence that *Varroa* parasitism changes the expression of genes responsible for host embryonic development and that bees known to be mite tolerant have measurable differences in the expression of genes controlling neuronal development and sensitivity.

Adult bee emergence weight and longevity

Adult bee emergence weight (mg) was significantly affected by hive chemical regime after adjusting for the mite covariate. The effect of the covariate was significantly negative so that increasing mite levels were associated with decreasing bee weight. Bee weight was significantly higher in colonies treated with Check Mite+ or copper naphthenate than in non-treated controls; colonies treated with Apistan were intermediate. Decreased bee weight has long been known to be an artifact of Varroa parasisitm, and these data are weak evidence for a measure of mite mitigation with Check Mite+.

Cumulative daily mortality was analyzed by analysis of deviance using a hazard function – the probability of an individual dying at a fixed time point relative to a control group baseline. Hazard function was significantly affected by hive chemical regimen (change of deviance=202.5; $df=3$; $P<0.001$), whilst the mite covariate did not have any significant effect on the hazard function (change of deviance=0.29; $df=1$; $P=0.59$). Pairwise separation tests of the three test chemicals (Apistan, Check Mite+, and Cu napthenate) showed that hazard function followed the pattern Check Mite+ > (Cu naphthenate > non-treated control) > Apistan. These data, adjusted for the mite covariate, are unambiguous evidence that bee hive chemicals are associated with legacy survival effects on the bees exposed to them as immatures. Check Mite+ caused higher legacy mortality than non-treated controls, and Apistan improved legacy mortality relative to non-treated controls; however, evidence that these two molecules synergize to cause lethal effects in bees strengthens the argument for honey bee health management approaches that deemphasize synthetic miticides.

SUMMARY AND CONCLUSIONS

Exotic chemicals are routinely and legally inserted into hive matrices as part of honey bee health management strategies. Key to understanding the effects of these chemicals on the host is disambiguating their sublethal effects from their purported benefits – in our case, killing parasitic *Varroa* mites. We attempted to do this by adjusting our analyses for a continuous covariate – a colony *Varroa* level index. We included copper naphthenate wood preservative as an outgroup chemical. Even though it has no known or suspected miticidal properties, we nevertheless subjected it to covariate adjustment so we could unambiguously compare it alongside the miticides for its impact on bees.

After adjusting for the mite covariate, exotic hive chemicals significantly decreased three-day brood survivorship and increased construction of queen supercedure cells compared to non-treated controls. Bees exposed to Check Mite+ as immatures had higher legacy mortality as adults relative to non-treated controls, whereas bees exposed to Apistan had improved legacy mortality relative to non-treated controls; bees exposed to Cu naphthenate were intermediate and not significantly different from controls. In contrast to these morbidities, Check Mite+ significantly improved adult emergence weight over non-treated controls, and Apistan-treated bees performed comparatively well on tests of associative learning. And finally, there were no effects of bee hive chemical detected for frames of bees, frames of brood, frames of honey, foraging rate, time required for marked released bees to return to their nest, percentage of released bees that return to the nest, and colony Nosema spore loads.

To our knowledge, this is the first study to examine sublethal effects of bee hive chemicals applied at label rates under field conditions while disambiguating the results from any mite control benefits realized from the chemicals. Given the poor performance of the miticides at reducing mite levels and their inconsistent effects on the host, these results emphasize the importance of minimizing use of exotic hive chemicals in honey bee management. BC

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MOVING COLONIES LOSING BEES

J.L. **Harris**

Every time a colony is moved a large number of bees become disorientated and "drift" into nearby colonies at the new apiary location. Many others just simply become so disorientated that they fail to return to any of the colonies at the new apiary. If you ask a beekeeper whether or not this is a problem in their beekeeping operation, the response would likely be, "some bees may get lost or drift into other colonies after I move my bees but the losses are so small that it does not affect my colonies significantly." **Not!**

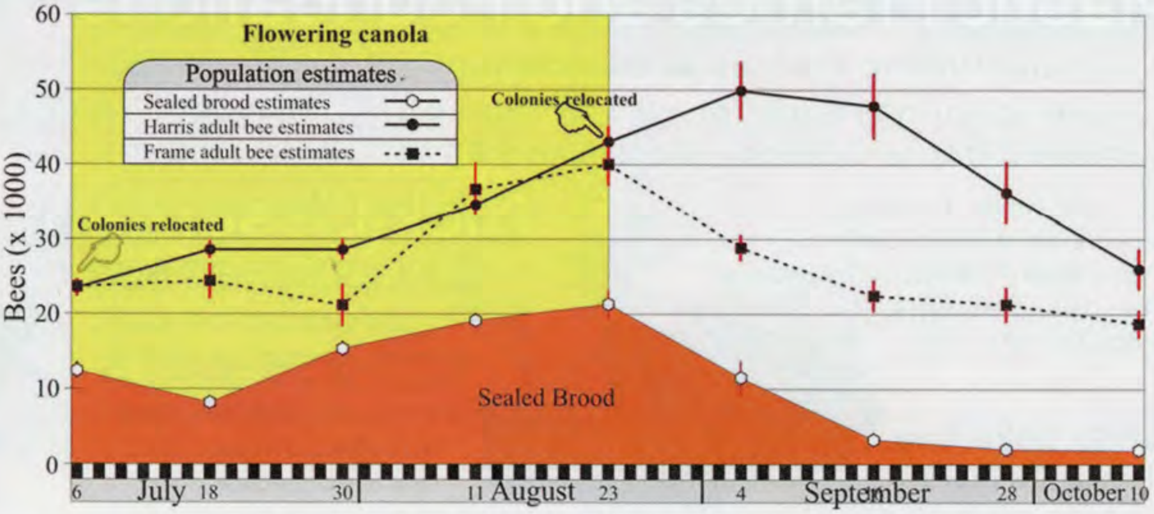
Researchers that have investigated this phenomenon have observed something else. In package initiated colonies, Jay (1969, 1970) reported loses that ranged up to 25 - 40 percent within a day of colonies being hived. In colonies removed from Winter storage, colonies loses can be as high as 23 - 65 percent (Jay and Harris, 1979). Colonies relocated to a new apiary during the Summer also appear to suffer the same fate. Nelson and Jay (1989) reported that within seven days of moving colonies containing a 21 day old cohort of marked bees that these colonies lost 23 percent more bees than colonies that had not been moved. This is in addition to the normal movement of bees between colonies which may almost double after colonies are relocated to a new apiary. "Drifting" or the movement of bees between colonies will almost certainly accelerate the spread of *Varroa* mite infections within an apiary.

This study was conducted in 2013 to investigate the development of honey bee colonies foraging on canola. However, while analyzing the data, it became apparent that relocating colonies to a new apiary site may have had a significant adverse effect on colony populations.

Methods and Materials: On 6 July, nine overwintered colonies were equalized; their queens replaced with newly mated queens; their sealed brood area measured; and their adult populations estimated. Groups of three colonies were then relocated after dark to three apiaries that were separated by least 10 kilometres from each other near Markinch, Saskatchewan, Canada. On the evening of 27 August, after the canola had ceased flowering, these colonies were relocated to a central apiary where they were supplied with 12 litres of sugar syrup and treated with Apistan® mite strips and prepared for Winter.

Sealed brood assessments: Sealed brood in each colony was measured every 12th day throughout the experiment beginning on 6 July 2013 (Day 0) using a Plexiglas® measuring grid delineated with an array of 2.5 cm squares/quadrates. The Plexiglas® grid was placed over the sealed brood and the area occupied with sealed brood estimated. The sealed brood area estimates were then converted to cell estimates by multiplying the area estimates by 27.75 cells per quadrate.

Figure 1. Seasonal changes in adult bee populations following their relocation to and from canola fields.



Adult worker bee assessments: Adult bee populations were estimated every twelfth day beginning on 6 July 2013 (Day 0) using a combination of three estimation procedures, the Harris method, the Frame method and the weight method. The Harris method estimates show what the population should have been based on the survival of adult bees produced by the sealed brood, while the Frame method and the weight method attempt to show what actually was.

On 6 July, the initial colony populations were estimated using the weight method (Moeller, 1952) and the Frame estimate method (Imdorf & Gerig, 1999).

The weight method estimated adult colony populations by shaking the bees from the hives and converting these weights into population estimates based on an assumption that there were approximately 7733 bees per kilogram of bees (~3500 bees per pound) (Hambleton, 1940; Moeller, 1952; Sammataro and Avitabile, 1998).

The Frame estimation method calculated the adult bee population as the summation of individual frame estimates based on: 1) the percentage of the frame that the bees would have covered if they had been densely covering the frame and 2) the number of bees that were deemed to cover one side of a densely covered Langstroth frame.

After the initial population estimates, subsequent adult populations were estimated using the Frame method and the Harris population method (Harris 1980, 2010). The Harris population estimation method calculated a colony's adult bee population as: 1) the survival of the founding adult bee population plus 2) the summation of the survival estimates for adult bees emerging from sealed brood measured at twelve day intervals as determined from worker bee life tables (Harris unpublished).

Results: Seasonal changes in sealed brood and colony adult population predictions produced by the Frame estimation method and the Harris population estimation method are shown in Figure 1.

Discussion: Sealed brood production and adult colony development followed the developmental pattern that would have been expected for "normal" colonies foraging on canola in Saskatchewan.

Sealed brood: Colonies contained 12,429 ± 1,112 cells of sealed brood when the experiment began on 6 July. Twelve days later there was a decline in sealed brood production, which was likely directly attributable to the replacement of the actively laying queens with newly mated queens at the beginning of the experiment.

Following this temporary dip in sealed brood production on 18 July, sealed brood steadily increased during the next 24 days, which coincided with when canola and other major crops where flowering profusely. By 23 August, sealed brood production peaked at approximately 21,244 ± 1,906 sealed brood cells per colony. This would have required colonies to have had an average effective daily egg laying rate of approximately 1,770 eggs per day. After 23 August, when the canola ceased flowering, there was a steady decline in sealed brood production. By 10 October, colonies contained approximately 1,721 ± 1,045 cells of sealed brood.

". . . the losses are so small it doesn't affect the colonies." May be very wrong.

Adult colony populations: Adult bee populations were estimated using a combination of the three estimation procedures. Each adult bee population estimation method makes assumptions that can potentially affect their respective population estimates.

Model assumptions: *The weight method* assumes that the average bee weighs approximately 129.3159 milligrams per bee. If an average bee weighs less than this, colony adult populations will be underestimated. A honey bee pupa weighs between 119.2 and 146.6 milligrams (Nelson, 1971).

The Frame method assumes that a single layer of bees densely congregated on one side of a standard Langstroth frame will contain approximately 1100 bees. However, Burgett and Burikam (1995) estimated the holding capacity of one side of a standard Langstroth frame to be 1,215 bees, while Sammataro and Avitabile (1998) and Kauffeld (1975) estimated it to be 875 to 950-1000 bees respectively. Nelson (1971) noted that worker bee occupancy on one side of a frame seldom exceeds 1,350 bees per frame surface. When the weight estimates were compared to the Frame estimates on 6 July, the weight estimates were consistently larger than the Frame estimated based on 1100 bee per frame (Imdorf and Gerig, 1999). Consequently, a frame carrying capacity of 1,528.17 bees was used rather than 1100 bees per frame surface recommended by Imdorf and Gerig since this value reduced the average difference between the two estimation procedures to zero. Using bee density per frame surface that was proposed by Imdorf and Gerig (1999) would have decreased the Frame population estimates and increased the spread between the Frame population estimates and the Harris population estimates.

The Harris method, assumed an average worker bee's life expectancy of: 36.52 days in July, 34.99 days in August, 59.73 days in early September, 83.51 days for bees emerging in mid-September (Harris unpublished). If worker longevity is lower than these estimates, this method will overestimate colony adult populations unless survivorship data is available from the experimental colonies.

Adult bee Populations: Adult population estimates produced by the Frame method and the Harris method should have been reasonably similar provided that the longevity estimates used by the Harris method approximated the actual worker bee longevity in these colonies and that the Frame method estimator produced reasonably consistent adult population estimates.

On 18 July, 12 days after the colonies were relocated to their new apiaries, there was a slight but non-statistical difference in the population estimates produced by the two population estimation procedures. On 30 July, the differences were larger and statistically different with the Harris method producing the larger estimates. It should be noted that the Harris population estimates

Beekeepers should be aware that moved colonies will lose a substantial number of bees.

for 30 July accounted for the dip in sealed brood production that was observed on 18 July. The amount of sealed brood produced on 18 July was approximately equal to the number of bees that would be required to replace the bees that would normally be expected to die during this 12 day period.

On 11 August and 23 August the two procedures were reasonably similar. After the colonies were removed from the canola fields on 27 August and returned to a central apiary for Winter, the two population methods produced large statistically different population estimates. The Harris method estimates exceeded the Frame method estimates for 24 days in July and for more than 24 days after the colonies were relocated to a different apiary in September.

The Frame method estimates are point estimates while the Harris method allows population estimates that are defined by sealed brood estimates and the average longevity of the bees after they emerge. In the Harris method changes in sealed brood are predictive of pending changes in the colony adult populations. If the quantity of sealed brood increased between two time periods, then a similar change would likely occur in the subsequent adult population estimate 12 days later unless there was a significant change in honey bee longevity or the change was not large enough to compensate for the number of bees dying during the time interval. By altering the shape of the survival curve associated with each sealed brood estimate, it was possible to estimate what the worker bee longevity would have had to have been for the Harris population estimates to approximate the Frame derived population estimates. It would appear that relocating colonies reduced average worker longevity of selective worker bee cohorts by five to 20 days.

Conclusions: Relocating colonies from one apiary to another causes a significant loss of worker bees immediately following their relocation to the new apiary. Relocating colonies affects normal colony development directly by significantly reducing average worker bee longevity and indirectly by reducing the amount of sealed brood a colony can rear. The effect appears to be more pronounced in large colonies and in the absence of an intense honey flow.

Beekeepers that relocate bees should be aware that their colonies will lose a substantial number of bees when colonies are moved to take advantage of a honey flow at a different apiary location or to supply pollination services. Likewise, researchers studying colony development or modelling colony development need to account for the worker bee loss effect upon colony relocation. BC

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Trees For Bees

Why we should plant yards, parks and forests of nectar and pollen producing tree species!

Larry **Connor**

Trees are an essential part of a healthy planet. They are a dominate part of the planet's ecological balance and contribute significantly to the health and success of many bee colonies as well as countless other animals and birds. In many parts of Northern America, where rainfall amounts support the growth of deciduous trees, honey bees benefit from the pollen, nectar, honeydew, resin and nest sites these trees often provide. Trees scrub the air of carbon dioxide and produce oxygen needed by the fauna of the planet.

Bees, including honey bees, are key pollinators of some, but not all, tree species. Many are wind-pollinated, but in their never-ending search for protein bees visit the flowers to collect the often abundant pollen produced by these trees. Some tree pollen proteins are low compared to other plants, but these trees often open early in the season when little else is available and the bees, so desperate for protein, collect poorer food stores to keep them alive until they find something richer in food value.

Colony buildup in most parts of North America depend on the early blooming trees and shrubs, from the December bloom of the maples in south Florida to the abundant willows from Florida that spread across the continent, reaching into the far upper regions of the Northern Hemisphere, ending in the near Arctic flowering of willows in June and July. Often found in swamps and thermally moderate riparian areas of streams and rivers, the willows produce their protein rich pollen over a long period of Winter and Spring, and may be one of the single most important pollen sources beekeepers unknowingly depend upon. In some areas various species have hybridized to generate a long blooming period, ideal for bees.

In California, Florida and other states, various Eucaluptus are planted for timber. Some beekeepers plant them for nectar and pollen production during the colder months.

Some trees have extra-floral nectaries that support bee visits even when the flowers are absent or past blooming. Other trees support huge populations of aphids, scale and other insects that excrete honeydew, the highly concentrated sap of the tree that has passed through the insect (during which tiny amounts of protein and nutrients and water are removed), and the remaining sugary material is excreted. Honeydew is gathered by ants and bees, and will support mildew development. Honeydew will fall from trees onto the ground, or onto cars parked in the shade of the tree in parking lots. Recently huge bumble bee losses have been documented due to the chemical treatment of such trees with insecticides used to control the aphids and scale insects. Using insecticides in this manner is ecologically repulsive and is illegal. Simple warning signs that keep people from parking vehicles under their cars while the trees and their aphids do their work would serve just as well and would protect tens of thousands of pollinating insects in search of food.

Honeydew is a valuable product and beekeepers in many countries seek out the honey from this source. The final product, which I call honeydew honey to distinguish it from honey made from the nectar of flowers, is often a prime and highly valuable product, yet I have seen honey that was as dark as tar that was attributed to honeydew. This may reflect the rate of mold development, as it is unlikely bees are able to filter out mold spores in their honey stomachs as effectively as they filer pollen grains.

The removal of fence rows and groups of trees from the environment to establish monoculture plants results in a much less diverse ecosystem. I have visited the highly unique and diverse 'brush' country of south Texas, where a diversity of native, low-moisture plants support a complex ecosystem, including honey bees. Nearby these ecosystems have been removed, only to be turned into pasture land for cattle, where there may be just one legume in the forage mix that secretes nectar a few days a year, creating a desert for bees. This is the true crime of monoculture: the lack of diversity in both plant and animal species.

Beekeepers must be part of the effort to provide tree-lined roadways and city developments. They should promote the preservation of wetlands and riparian areas along rivers and streams, and encourage the conversion of or maintenance of a minimum of ten percent of all active farm land into conservation regions where native insects and other fauna are able to thrive. Those with faith-based giving practices often give up 10 percent of their income to charity, yet many farmers and most users of farm-based food materials would be mortified to consider giving up ten percent of their land holdings solely for the preservation of the earth's complex ecosystem and its occupants. Earth-based faith systems are more in tune with these concepts. Ten percent is a start, but when you look at the growing dominance of monoculture and the removal of conservation lands in the attempt to produce more corn and beans, you realize that a ten percent 'safe' zone is simply too little for the maintenance of our pollinator complex in North America. As we look at the removal of conservation lands in the Dakotas and nearby states, we cannot but wonder where these beekeepers will feed their bees that are needed to pollinate so many crops, especially the almonds in California. Or will the growers ask to throw open the U.S. borders, using their deep connections in state houses and Washington DC to bring in honey bee colonies from other countries in an unrestricted madhouse of regulatory battles and influx of new diseases and pest species.

One late Winter very soon I expect we will experience a tipping point in our ability to supply even a low percentage of the necessary pollinator hives because of a failure of the infrastructure that produces the bees that supports the beekeepers who supply these pollinator colonies. When the people who produce the packages and increase nuclei are unable to supply hundreds of thousands of bee colonies in time for pollination of key American agriculture crops, we will experience what has been long feared: a total collapse of pollination services in major parts of the United States. These suppliers may not have colonies due to continued pesticide use, especially when protein uptake thwarts colony build up as a result of contaminated bee bread in colonies as a result of extensive, long term exposure to herbicides. These will be acerbated by low protein levels due to monoculture and complex and chronic synergism of bee mites, bee diseases and pesticides causing a generalized failure of bee colonies to thrive. Or even survive. Only colonies in protected zones of zero pesticide use and diverse forage will survive. Hope to be located in an area of diverse forests if you want your colonies to survive and grow when this happens.

The concept of planting nectar- and pollen-producing trees to support honey bee colony production by is not new, but, with few exceptions, the practice has not been extensively researched. Generally when beekeepers look at a field of nectar-rich clover plants they mentally see combs of honey from the nectar the bees will collect. Yet put them into an ecologically diverse woodlot, they often fail to see the huge honey crop possible from trees and shrubs that are nectar and pollen producers. Also, when you consider the physical architecture of a nectar-producing tree, with flowers everywhere on a highly branched and often very tall tree, beekeepers should marvel at the potential of the nectar production. Likewise, a pollen-producing tree like elm, alder or oak may reward local colonies with protein unavailable elsewhere at that point in the seasonal development of the hive.

Mesquite is commonly found in southern Texas, parts of the southwest and in Hawaii. Beekeepers prize it's honey and pollen. Birds and animals feed on the seeds, spreading them throughout the environment, making human cultivation the limiting factor in its spread.

Following the publicity of bee death due to Colony Collapse Disorder (CCD) people frequently asked "What can I do the help the bees?" An ideal reply is – "Plant a tree that helps the bees." Now, facing what we do in our likely pollination crisis, we need to insist that we all "plant a diverse forest of nectar and pollen producing tree species."

These tree species should produce food for the colony for a major part of the season, starting with early witch hazel, willows, alder and early maples to the Summer sumacs. Some trees support the development of aphid populations and these small insects secrete honeydew bees and other pollinators collect. A few trees have extra-

The Eastern and Western redbuds cover a vast part of the United States. A legume, the flowers are popular with bees in the spring. They are a common landscape tree and are often included in conservation tree packets.

Tulip popular is an excellent nectar source, with large, colorful flowers. The trees are straight and handsome landscape and forest specimens, and produce good timber.

floral nectaries, secreting nectar when the flowers are no longer present – the tulip poplar (yellow poplar) – is an example of such a tree species.

More people should consider planting a hedgerow of trees for bees or line their suburban street with nectar producers, or fill city parks with bee friendly trees and shrubs. Every suburban gardener may put in a few basswood trees (Tilia), and plant some low-growing fragrant sumac (Rhus aromatic, zone 3 to 9) as a weed barrier and ground cover around these nectar producing trees. This short sumac grows only 1.5 to 2 feet tall and attracts bees, butterflies and birds. All sumacs are clonal, and spread underground, creating a four to six foot expanse of dense foliage, flowers and later, sumac berries. Remove the fescue in your yard and put in these plants that feed the bees in the Spring and turn red leaves in the Fall. With just a little research you can find some amazing trees, shrubs and ground cover that help pollinator and help retire the lawn mower.

Warn people not to rely upon the list of showy flowers they may find posted or as a handout at the garden centers, from the extension service, or online, unless the list has been reviewed by someone who actually knows something about honey bees and the flowers they visit. For example, the flowering dogwood (Cornus florida) is a wonderful small tree, well adapted for understory growth, but it produces no nectar and is only a very minor pollen source. An excellent substitution would be to plant redbud, as there are both native eastern and western species. The eastern redbud (Cercis canadensis grows in zones 4-9, and is a large deciduous shrub or small tree, native to eastern North America from Southern Ontario, Canada south to northern Florida but can thrive as far west as California.

The western or California redbud (Cercis orbiculata or Cercis occidentalis) grows in zones 7-9. It is found across the American Southwest, from California to Utah and Arizona Cercis occidentalis is cultivated as an ornamental plant and tree, planted in parks and gardens, and as a street tree. It is also used in drought tolerant, native plant, survives periodic burning and is successful in gardens planted for wildlife.

There are many wonderful things said about trees. They offer a renewable resource, housing for wild animals and partially domesticated children. From the mighty oak where we helped our parents build our treehouse to the choke cherries we picked to help daddy make his wine, we know that trees are an important part of our world. Even when trees are scarce, or because they are so scarce, trees become precious to us, and even sacred. We should all look at the planting of basswood, tulip popular, black locust, sumac, mesquite (if the birds don't do it for you}, fruit trees, willow, eucalyputus, rabbit brush and other tree and shrub species as an investment in our planet, and as a way to help support hungry honey bee colonies as they seek to make a living in an ever weary world of bleakness and increasingly failed diversity. BC

Eastern Redbud: http://plants.usda.gov/factsheet/pdf/fs_ceca4.pdf

Western Redbud: daviswiki.org/Western_Redbud

Fragrant Sumac: http://plants.usda.gov/core/profile?symbol=rhar4

Do you have all six of the books in the Wicwas Press Essentials series? The latest is Swarm Essentials, *and may be found at your local bee supply company or at* ***www.wicwas.com***.

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

Send your questions to Phil at
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A beekeeper in Kentucky writes:

I'm planning on buying some queens this Spring. My beekeeper friends tell me to only buy local queens, but I'm having problems finding someone local to supply me any. What if I order queens from further away? Any suggestions?

Phil replies:

Recent years have seen an increase in interest both in purchasing and in rearing local queens. I consider this a healthy development. When I want to buy queens, as I do from time to time, I much prefer to visit a nearby beekeeper with whose reputation and beekeeping skills I'm familiar. In addition to making it possible to know the source and see the conditions under which a queen is raised, buying locally eliminates concerns about importing pests or bees with Africanized traits into regions where they have not yet penetrated. It also minimizes the time queens spend in cages, which is directly related to their health at the time of installation. A local queen breeder will remove queens from mating nucs and place them in queen cages at the time of purchase. I can take them home and install them in my hives or nucs the same day or the next, and in the meantime, I control the conditions under which they are kept. This is the ideal situation.

Queens in plastic cages.

Unfortunately, like you, I have no one near me rearing more than a few queens at a time for sale, so I usually have to look farther from home. This is typical in many parts of the country. Often, when a local source is available, all their queens are committed or pre-sold. Producing quality queens is complicated, and even experienced beekeepers require study, time, and practice to become proficient at the art. As beekeepers discover the advantages of locally raised queens, supply has not kept up with demand. However, in some states, like West Virginia and Ohio to mention two near you, state beekeeping associations have established successful queen rearing programs and local sources are more abundant.

If local queens are not available, there is nothing wrong with buying from non-local suppliers. I always say that the most important variables in choosing queens are the conditions under which they were bred and reared, regardless of where they come from. To find quality queens, local or non-local, seek the advice of other beekeepers in your local or state association. Ask them where they buy and what kinds of experiences they've had. Happy customers can be a good indicator of a quality source. Pay special attention to beekeepers whom you know to be successful. These are often the ones selling nucs instead of buying bees to replace losses.

If you order queens from a distant supplier, the amount of time that they are kept in cages during shipping can be mitigated by joining together with other beekeepers in your local association to buy in quantity. The shipping process is stressful, especially as temperatures climb in late Spring; I believe that the maximum time a queen should spend in a cage is four or five days. Considering standard shipping time, Sundays and holidays, and the amount of time the queen might have to stay in the cage before she can be installed, overnight shipping is a better option, but it's expensive. By combining your order with a group's, the cost per queen of overnight shipping drops, and many suppliers reduce the price of the queens themselves on large orders. Most suppliers also ship larger orders in a battery – a much healthier method.

Most regional and some state beekeeping education programs now offer queen rearing tracks for experienced beekeepers. Perhaps, in time, supply will catch up with demand and you will find it easier to follow your friends' advice.

The beekeeper in Kentucky writes with a follow-up question:

Thanks! But what is a battery?

Phil replies:

The word "battery" has several meanings. One, which dates from the late 1800s, is "... a set of things connected or used together" (Webster's New World Dictionary). As it applies to beekeeping, it refers to a common method of shipping multiple queens – usually 15 or more – in a set of individual cages contained in a single box. The queen cages, either wood or plastic, are the same as for queens shipped individually. The difference is in the attendant bees. In a battery, there are no attendants in the cages, each of which contains a solitary queen. The queen cages are placed in a cardboard box (typical if the queen cages are wood) or in a plastic container (if the cages are plastic), and the attendant bees (from a hundred to several hundred, depending on the number of queens in the shipment) are in outer containers, or battery boxes. A piece of sponge soaked in sugar syrup often provides a food source for the bees during shipping.

The attendants care for all the queens, meaning that they feed them and cluster around them to keep them warm. It's as if they think, "*We don't have a queen, one of you will become our queen, so we'll care for all of you until one emerges from her cage*". This behavior is similar to that exhibited when honey bees care for a large number of queen cells. Queens shipped by this method arrive in better condition, and stay healthy for longer periods, than queens shipped individually with attendants inside the cages. The latter should be installed in hives very soon after arrival (within two or three days); queens may be held in batteries upwards of two weeks, though I prefer to do so no more than a week.

When I receive a battery of queens and don't plan to install them immediately, I open the battery box to allow the attendants to fly. (My wife insists that I do this outdoors.) I like to set it inside an empty nuc box and place a glass feeder jar inside with it. The attendants are free to fly, defecate, and gather nectar, with the syrup in the feeder as a backup food source if necessary. Normally, I leave the nuc box on our front porch (my family is used to bees flying around) and bring it inside the house in the evening (after closing the entrance of the nuc box) if the nights are cool.

The battery you see in my photos does not contain 15 queens. I usually go together with several friends to place an order for 50 or more at a time as described in my answer to the previous question. When they arrive, I move mine into the smaller battery box you see here.


Queen cages in a battery box.

A beekeeper in Tennessee writes:

As per my last experience with our local bee club – [one member] had opposite views from those of – [another] pertaining to Winter feeding; one said top feed with syrup and the other said sugar patties. I followed the example as shown from Walter Kelley November newsletter and simply poured a bunch of sugar on a couple sheets of newspaper on the back two-thirds of the frames. Checking the hive on a warm day, without disturbing anything, the sugar was hardened by humidity (isn't that the same outcome as a sugar patty?). My question for you – [should I be afraid to attempt doing this again?

Phil replies:

Last year, in my February 2013 "Ask Phil" column in *Bee Culture*, I answered a question about Winter feeding. I think that the first part of that reply, pertaining to feeding with sugar syrup, bears repeating.

> First of all, any winter feeding should be considered EMERGENCY feeding, as in, "I think the bees will starve if I do not do something." That said, it's possible to use sugar syrup in Kentucky [or Tennessee] during the Winter, where you can expect some warm periods in which the temperature reaches the 50s during the day. In locations where it does not get that warm, bees will not leave the cluster to seek food in a feeder, so Winter feeding with liquid syrup is of limited value. Top feeders and frame feeders work best in cold weather, because they put the syrup closer to the cluster. The down side of using syrup is the introduction of additional moisture into the hive – always a consideration, but especially in Winter. To minimize this problem, use only as much syrup in the feeders as the bees can take in during a brief warm spell, and make it thick (two parts sugar to one part water.)

One alternative to winter feeding with sugar syrup is a very old method: simply placing granulated sugar on the inner cover. This is similar to the procedure you followed from the WT Kelley Company newsletter, and I think it is fine. The fact that the sugar hardened is not a problem. It is, in fact, the same thing as a sugar patty or sugar cake. The caking can even be beneficial, because it is the result of excess moisture inside the hive being absorbed by the sugar. This is a perfectly good method to use again if Winter feeding is absolutely necessary.

If you are interested in experimenting with another alternative, I have a number of beekeeping friends in Missouri who make use of a recipe originated by the late Ted Jansen, a well-respected St. Louis beekeeper. He called it *sugar mush*, a low moisture sugar/water mixture for use in Winter. It introduces slightly more moisture into the hive than does fondant, or bee candy, (also discussed in the aforementioned "Ask Phil" column), but it involves no cooking and is much easier to make. It is closer to using pure sugar than is fondant, and has an advantage over sugar granules or sugar cake in that the small amount of water added makes it easier for the bees to process it.

To make Sugar Mush, mix 4lbs of sugar to 1 cup of water in a small pail, a 1gal zip lock bag, or a plastic grocery bag. If using a grocery bag, it's best to use a heavy one. A grocery bag will hold up to 8lbs of sugar if you want to supersize it with two cups of water. The mix will be thick and heavy. The Eastern Missouri Beekeepers Association recommends offering it in a plastic bag using a rim

Feed dry sugar.

extension with a couple of slits cut into the bag for access by the bees. I see no reason why it could not also be offered in a top feeder or even a division board feeder (which replaces a frame in the brood box.) Because of its slushiness, it should not be placed directly on the frames except in a bag. You may find Ted's complete sugar mush recipe and directions on my webpage at: **http://philcrafthivecraft.com/wp-content/uploads/2013/01/Winter-Feeding-Mush-2011-1.doc.** BC

Bee Shrubs For Warm Climates

Connie **Krochmal**

A much wider selection than those in the colder areas.

Camellia.

Beekeepers in warm climates can choose from a wide selection of shrubs that are unsuitable for colder areas. The group includes bay laurel, tree heath, and camellias – some of which bloom during the Winter.

Bay laurel (*Laurus nobilis*)

Hardy to zone seven, this is also called laurel and sweet bay. Native to the Mediterranean, this dense, pyramidal evergreen was much loved by the ancients. It reaches 40 feet in height in its native habitat. When grown in pots, bay laurel is typically pruned to keep it compact.

The stiff, deep green, sweetly scented leaves are oblong to lance-like. They're 3½ inches in length. The leaves and berries are used as spices.

During mild Spring weather, bay laurel is a mass of blooms. The yellowish or greenish-yellow flowers open in clusters or umbels from the leaf axils mostly from April to June. The deep purple berries are ¾ inch long. For berry production, a male and female plant is required.

Bay laurel thrives along the seaside. Often used as hedges and topiaries, this adapts to full sun and partial shade. If damaged by light frost, this shrub will usually come back from the roots. Various cultivars are available.

The blossoms yield lots of nectar and pollen for bees. The nectar flow is heaviest during mild weather.

Camellia (*Camellia spp.*)

Named for Georg Joseph Kamel or Camellus, a Moravian Jesuit priest, these members of the tea family are evergreen shrubs or trees. Worldwide, there are perhaps 200 species as well as hundreds of cultivars and hybrids. Some are suitable for zone seven.

Camellias can vary greatly in height and growth habit, depending on the species or cultivar. They're widely grown for the large, handsome, shiny, evergreen foliage. The alternate, thick, leathery leaves are four inches long.

These are popular flowering shrubs with the bloom time and flower shape varying widely. Some blossoms resemble peonies or anemones. For bee gardens, avoid varieties with double or semi-double blossoms. The flowers open singly in the leaf axils. With five to seven petals, they're two to five inches in diameter. Colors are mostly white and red.

Camellias prefer a neutral to acid pH. A rich, peaty soil is ideal. These plants like even moisture throughout the year. They can be grown from seeds and cuttings or grafted. Some species prefer full sun, while others need partial or full shade. Some cultivars are small enough to grow in containers.

Several species are commonly cultivated. The **common camellia** (*Camellia japonica*), native to Japan and China, is a popular garden plant. Introduced to the U.S. in 1739, this is hardy to zone seven. It is especially popular in the Southeast from North Carolina southward and along the Pacific Coast to California. This tree-like species can reach 40 feet in height. It is less dense than sasanqua camellia.

Because it typically blooms October to May, it is sometimes called Winter-blooming camellia. This has very large, waxy blooms with rounded petals and prominent yellow stamens. The flowers are usually pink, red, or white. Several hundred cultivars can be found.

Sasanqua camellia (*Camellia sasanqua*) is about 25 feet tall. Native to India, China and Japan, this loose, scraggly plant appears less formal than the common camellia. Its stems and young branches are hairy. The shiny, deep green, elliptic, blunt-tipped leaves are three inches in length. Two inches wide, the white blossoms appear for three months during the Fall. While it normally prefers full sun in most locations, partial shade is best in zone seven.

The **tea plant** (*Camellia sinensis or Thea* sinensis) is related to the flowering camellias. Worldwide, a number of varieties are available. This rounded, upright, evergreen shrub is typically considered hardy to zone nine or so. However, the hardiness recommendations vary widely from one source to another. One landscape book recommends it for zones six through nine, which would make it hardier than sasanqua camellia and common camellia. The 2014 Territorial Seeds catalog lists one they say is hardy to zone seven.

With a moderate growth rate, it can grow several feet a year. Although the tea plant can reach 20 to 30 feet in height under very favorable growing conditions in Asia, it is typically five to six feet tall and equally wide in America. Generally, this is kept compact by plucking the tips of the stems for use in tea.

Up to five inches long, the alternate, shiny, toothed foliage resembles that of the ornamental camellias. Flowering in the Fall, the tea plant bears two-inch-wide, scented, white blossoms with large, very prominent, yellow stamens. These flowers open singly or in five-inch-wide clusters.

The tea plant was introduced to America around 1848. The U.S. Patent Office and USDA imported and distributed these to growers in the South. For a time, tea became a successful crop in the region. Nowadays, the only remaining commercial American tea garden is the Charleston Tea Plantation in South Carolina.

Tea requires the same care as camellia. Little pruning is generally needed. Preferring partial to full shade, it grows reasonably well in full sun. Adapted to clay, this favors an acid to slightly alkaline soil that is rich, loamy, moist, and well drained. Generally, this species is relatively free of pests and diseases other than root rot and scale.

All of the camellias are suitable for bee gardens. Bees are extremely fond of the blossoms, which provide nectar and pollen.

Heliotrope (*Heliotropium arborescens*)

A member of the borage family, this species was introduced from Peru in 1757. The name refers to the fact that the plants turn in the direction of the sun. This bushy shrub can be short lived. Hardy to zone ten, it is available as bedding plants and is often trained as standards. When grown in pots, heliotrope can be brought indoors for the Winter.

Around four to six feet in height and 1½ feet across, this plant features alternate, heavily veined foliage, three inches long. The leaves are oval or lance-like to oblong. Deep to medium green, they sometimes sport purplish tinges.

This free flowering plant blooms throughout the growing season, but is most floriferous during the Fall. The tiny, tubular, vanilla-scented flowers arise terminally and from the axils. They can be white, purple, or violet. The blossoms open in dense, coiled, flattened, or rounded clusters, which are four inches across.

In addition to this commonly grown species, a number of other similar heliotrope species are either native or naturalized in some regions. These include **European heliotrope** (*Heliotropium europaeum*). This occurs in California, Texas, and Arkansas to Florida and the Southeast northward to Ohio, Illinois, Tennessee, Virginia, West Virginia, Pennsylvania, New Jersey, and Massachusetts. It is found in waste places, cultivated ground, and along roadsides. This annual is sometimes cultivated.

Heliotrope (helotopium nagano).

Seaside heliotrope (*Heliotropium curassavicum)* is also called salt heliotrope. Considered an excellent bee plant, it occurs in most states except Wisconsin, Minnesota, Iowa, Michigan, Tennessee, Kentucky, West Virginia, Massachusetts, Connecticut, Rhode Island, and Vermont. It prefers moist places along stream beds, sandy seashores, and marshes. Native to Peru, this creeping annual is six inches tall. It features smooth, hairless, weak stems and pale green leaves, which vary in shape. This blooms from June through October.

Heliotropes are grown from seeds and cuttings. The plants can also be layered or grafted. A number of cultivars can be found with their flower color varying.

These plants generally suffer from few pest or disease problems other than leaf spot, rust, and whiteflies. They prefer a sunny spot with moist, rich, well drained soil. Fertilize monthly unless a time release formula is applied at planting time.

Bees are fond of all the heliotropes. They will desert other nectar sources for these plants. Very rich in nectar, the blossoms are a source of surplus honey.

Myrtle (*Myrtus communis*)

There are around a hundred species of myrtle. Although a few are trees, most are shrubs. Members of the myrtle family, they're native to the Near East and Southern Europe.

The most widely grown species is the common myrtle, hardy to zone eight. Widely popular among the ancients, this upright, bushy, evergreen shrub is grown for its attractive, scented foliage.

The common myrtle of the classical era has naturalized over a large area in Europe, especially in the Mediterranean. Many varieties and types of this plant are available with the size, growth habit, and leaf size varying widely. Some have variegated foliage.

This dense leafy plant reaches three to 10 feet in height with a matching width. Two inches long, the oval, shiny, opposite leaves have a rich, juniper-like fragrance. The Greeks used them in jellies and drinks. The foliage is also used as a spice and an ingredient in pot pourri.

Myrtle is typically grown for the pure white, richly scented blooms, ¾ inch wide, which open during July and August. They often develop rose tinges. These solitary blossoms open in the leaf axils or occasionally in few flowered cymes. They feature four to five spreading petals and long, brush-like stamens. Some cultivars have double blooms, which are unsuitable for bee gardens.

The blackish-blue berries are ½ inch long. These edible fruits have been eaten by the Greeks since ancient times. One variety bears white fruits.

Introduced to England in the 16th century, myrtle is suitable for temperate and sub-tropical climates. Adapted to full sun and light shade, it needs protection from strong wind. Any well drained soil is suitable. Tolerant of hot, dry situations, this is also excellent for seaside gardens, hedges, and topiary. Propagate myrtle from cuttings.

Myrtle is a source of nectar and pollen for bees.

Tree Heath (*Erica arborea)*

Tree heath is native from Southwest Europe and the Mediterranean to adjoining areas of Africa where it is found in woods and along streams. It was introduced to

Myrtle (Myrtus communis)

England in 1658. The plants are sometimes called briar, which refers to the fact that the roots were once used to make briar pipes.

Although this plant is typically a shrub, it can be a tree. As a shrub, tree heath varies from medium to large in height. While it can be 20 feet tall in the wild, it is generally only ten to 15 feet in height and about ten feet across when cultivated.

This free flowering shrub has hairy stems that are mostly upright. The foliage occurs in whorls that can contain three to six leaves. Densely covering the stems, these tiny, dark green, needle-like leaves are grooved on the underside.

Tree heath is covered with tiny, gray-white blossoms, only 1/8 inch long. They can vary from globular to bell-like. Very aromatic with a honey-like scent, these open from March to May terminally and from the axils. Featuring prominent corollas, the flowers form pyramidal racemes, up to 1¼ feet long.

A number of cultivars of tree heath are available. Several naturally occurring varieties have been discovered and introduced to cultivation over the years.

Alpine tree heath (*Erica arborea var. alpina)* was introduced in 1899. This received the Royal Horticultural Society Award of Garden Merit. A medium sized shrub, it is more erect than the species and only half the size. This plant is usually six feet tall and half as wide. The more compact stems are densely covered with tiny, bright green leaves. The plant is a mass of pale white blooms. The anise-scented flowers are borne in dense cylindrical racemes.

Tree heath limbs are prone to wind and snow damage. If necessary, provide the plants with a sheltered location. Full sun is best. The plant grows best in a moist, rich, light, acid soil that is free of lime. Prune tree heath after it quits blooming. This can be grown from cuttings.

Bees are very fond of tree heath blossoms from which they collect both nectar and pollen. The flowers are good sources of surplus honey in their native lands, especially in Algeria, France, Italy, and Greece. The yellow to gold honey has a strong, intense aroma. BC

Connie Krochmal is a writer and beekeeper in Black Mountain, NC.

Distillery Lane Ciderworks

Get Them To Make Mead, And You Will Always Have A Customer

Jack **Blackford**

This Fall me, a second year beekeeper with only 10 hives so far, and Charles Walters, who breeds Russian honey bees with his wife Maxine who were both voted Beekeepers of the year in WV, took a trip to find some new and interesting customers. We decided to pick a clear potential customer at Orchid Cellar Winery (**http://orchidcellar.com**) in Middletown Maryland which focuses on Polish style meads. Me and my wife Toni had previously found Distillery Lane Ciderworks (**http://distillerylaneciderworks.com**) which crafts ciders from vintage European and American apple varieties, we had floated the idea to them about making a cyser from some local honey and their cider apples. I wanted to take this trip with Charles who is a sideliner and because we are both interested in making meads and ciders. Charles has more beehives but I have more apple trees. Orchid Cellar relies on locally produced raw honey for their wonderfully rich meads. The folks at the DLC have an intimate relationship with the bees pollinating their apple trees. Traveling around with a bee breeder is fun, we always get good discussions going about beekeeping and honey with meaders and ciderists.

Distillery Lane Ciderworks is Founded

Rob Miller and family bought a small diary farm right on the edge of the town of Burkittsville Maryland. They decided to begin a cidery, but not just any cidery. They wanted to craft old world style cider made from a blend of apples grown specifically for cider. DLC grows, harvests and presses their own apples. They grow both vintage European cultivars like Kingston Black, Dabinett, Ashmead's Kernel and vintage early American cider varieties such Newtown Pippin that were grown by Thomas Jefferson in his orchard at Monticello in Virginia. They also grow several modern disease resistant stocks such as Liberty, Freedom and Goldrush. Rob also practices IPM with an eye out to protect the bees in his orchard.

We also have a few apples in our Wineyard so it was fun to take their public tour of the orchard and observe how they pruned their trees, the training and spacing and the distribution of the crabapple pollinators. They even use the Hewes Crabapple in their ciders to add a bit of acid bite and tannins. It's very interesting to walk around and see every possible color and shape and size of all the apple that they grow. From the bright yellows and reds to the mixed red stripes over green and yellow backgrounds to the russets, which have a bronze colored skin that feels like sharks skin but tastes so sweet.

A very important part of making cider like this is to pick the apples at just the right stage of maturity. The apples are then sweated, stored under the right conditions, to further ripen. During this process more of the starches in the apple are broken down into sugars. The apples also dry a little, loosing some water content further concentrates the sugars and ripening flavors. During this process the acid levels also drop compared to the sugar content producing a ripe apple higher is sweetness and apple aromatics which greatly contributes to this style of cider.

DLC ferment and bottle on premise. They have a stainless steel apple grinder that feeds the huge rack and cloth press that together gobbles up bushes of apples at a time. The rack and cloth press is different from the typical basket press most people pressing grapes are familiar with. The crushed apple pulp is layered in special pressing cloths which are folded over to seal the pulp inside, and then layered between pressing plates specifically designed for pressing apples. These "apple cheeses" as they are called greatly increase the efficiency of the press, each plate acts as a press versus just trying to press one big pile of apples with a single plate. The multiple cheeses also give the juice more channels to escape. At home with your basket press, this effect can be copied by layering your pulp between some round polypropylene cutting boards, this greatly increases the effectiveness of a basket press.

A New Cider Crafter is Born

Tim Rose, the head ciderist, started his cider making journey in his basement brewing cider from locally available store bought mass produced cider. He eventually got pretty good at it and medaled in a large local brewing competition. Tim found DLC and started making cider with this wonderful mix of tannic and sweet apples. After every batch Tim would share some with the owners of DLC. They were so impressed with Tim's cider, plus he was already hanging around all the time, that they

Orchid Cellars Meads and Distillery Lane Ciders.

decided to make him their head cider maker.

Tim uses white wine yeasts instead of beer yeasts, this gives a different flavor profile to the cider as well as allowing them do ferment to dryness. Tim has a unique lab to analyze his cider musts, it's in an old milking parlor. With plenty of room for experimental batches and a lab bench and a few smaller fermentors, it makes for a very nice work area for test batches. Previously I had visited DLC with my wife, she greatly enjoyed their ciders and we got to talk with Tim for a few minutes and shared that we raise bees. Tim expressed his interest in making a cyser from local honey. One my return trip I bought along Charles Walters of Walters Wholesome Goods (**http://walterswholesomegoods.com**) who has an apiary full of Russian bees he breeds himself. Charles is about as local as you can get with bees on both sides of the mountains surrounding DLC. I bought Charles along to talk more about bees and honey. Tim decided right then and there to begin a big batch of cyser using Charles's honey. I have made mead with Charles's honey, and tasted the cider from DLC, so I know this is going to be a good matchup of cider and honey.

Tim gets to play with huge stainless steel fermentation tanks that hold hundreds of gallons of cider at a time.

Robs Rack and Press cider press. Ground apples are layered in cheeses between pressing plates wrapped in special pressing cloths. Some of this cider is being fermented with Charles local raw honey for the first time at DLC.

Scaling up was a learning process, its hard to go from five gallon carboys to 300 gallon fermentors overnight so together Tim and Rob put it together to get the best cider they could. Besides blending the correct apples and adding the right yeast, everything from temperature control to stirring the cider is more critical when you have 300 gallons fermenting at one time. On a more traditional side, they also age some of their ciders very successfully in oak barrels.

The Cider

If the only hard ciders you have tried came in a six-pack these craft cider makers have a surprise for you. These ciders are the next level of cider making. Tim and Rob focuses on blending these different cider apple varieties that have a higher tannin levels, the bittersweets and bittersharps, with sharps, which have higher acid levels and with sweets that bring in more sugar and flavor to the cider. This is much different than the typical supermarket or even farmers stand cider which is typically made from culinary apples that are sweet and acidic but lack tannins. Most people would have a hard time eating a bittersharp apple, some crabapples fall into this category, if they are strong enough! This style of cider is more similar to the British ciders, lower in acid and higher in tannins. The tannins add body and mouthfeel to the cider. These ciders are more like a refined well balanced white wine than the typical over sweetened carbonated style popular in six-packs. This is not saying six-pack ciders don't taste good also, they do, anyone fermenting apples is doing something good and giving bees a job.

DLC has up to 10 different ciders to taste in their cozy tasting room. You can look right through their tasting room into the press room and see the huge apple press and crusher. They also have a nice patio with views of the Catoctin mountain. They of course have a wide range of cider from the sweeter Celebration all the way to the American Extra Dry. Their Winter Fest is on ice style wine that they create themselves, it's perfect for putting in a snowdrift before you go out to play in the snow and then open it to warm back up. Our favorite is the vintage Kingstons Black, aged in oak, one of the few apples to have all the qualities on its own to make this style of cider. It has the perfect balance of apple flavor and oak together, not something you are likely to find outside of craft cider makers.

The Followers of DLC

DLC is very connected to the local home cidermakers, they sell a cidermakers cider, the same blend they use for their ciders depending on what was pressed that week. We tasted some of their cider makers blend, it is very different than their sweet cider blend they also sell to customers who want to drink regular cider. It has a very pronounced body and balanced acidity to the sweetness. We decided to become followers and bought six gallons of cidermakers cider to take home to experiment with.

Tim also teaches a class in modern cidermaking. Students get all the basic equipment such as a fermentation bucket and airlocks plus three gallons of cidermakers cider to make their own batch of cider. The classes meet the first Saturday of every month starting in January.

One of Maryland's premier Brewery in Frederick, the Flying Dog Brewery, has created a Belgian style Orchard

Author Jack enjoying a smooth glass of Monk Polish mead. The Wilks family, Andrzej, his wife Marzanna and Meadmaker son Andrzej, Jr. The senior Andrzej hand-built their bar.

Andrezij, Jr., the Master Meadmaker. The aromas of oak barrels, aged mead and fermentation fills this cellar. Their meads match so well with the oak barrels they are aged in.

Ale using DLC cider. Several local restaurants also use their apples and ciders on their menu. Their Bramley's Seedling apples are huge bakers, they are big enough to core with a pineapple corer and stuff with sausage, Tim's special lunchtime treat. The day we visited DLC Rob had a big trailer with barrels of raw cider strapped to it. We asked him where he was headed, he told us he was going to Orchid Cellars on the other side of the mountains. That is where our trip took us next.

Orchid Cellar Winery – a Polish Meadery

Orchid Cellars is a small family owned winery that produces a little Merlot wine. More interesting to us is that they mainly make mead. Polish style mead. Mead that starts off traditionally with one part honey and two parts water or juice, and a very strong wine yeast. Andrzej and Marzanna Wilks and their son, Andrzej Jr., the master meadmaker, operate the meadery. This was a very fitting stop for our trip, we followed the cider to Orchid, now we wanted to see as beekeepers what they did with it.

In Search of Polish Style Mead

Andrzej and Marzanna came to this country many years ago from Poland. The one thing they longed for was a taste of their traditional Polish style mead. They bought mead from all over the states, it was good but not the style they were looking for. They decided that if they couldn't find it here in the USA that they were just going to make their own and share it with us. They experimented on a small scale with local raw honey to refine their methods until they came up with a way to recreate their wonderful mead in the traditional style. This was not just random trails. The Wilks scoured the libraries in Poland and all over Europe together researching and validating recipes and seeking out any information that would help them recreate a wonderful mead here in the USA.

Old World Ingredients

The Wilks needed some special ingredients to make their traditional meads. They have to return to Europe to find the right kind of rose petals, not available here in the states, to create the Monk, a mead based on an ancient Bernadine monk recipe. Other special spices are also brought back from Europe.

Polish Style vs Traditional Style Meads

The main difference, of many, between a Polish style mead and a traditional mead is the ratio of honey. The Polish meads start at 1 part honey to two parts water or juice and spices and the ratio of honey can go even higher. Our traditional meads typically start out at around 12 to 16 pounds of honey in a five gallon batch. The Polish meads start out with a much higher concentration of honey than a traditional. This presents some problems to overcome. The higher osmotic pressure from all that sugar requires especially strong yeast to ferment in such a hostile environment. The Polish meads finish very sweet, around 1.050 in gravity. Traditional meads can be started with a higher gravity but are designed to stall at a lower gravity if made correctly, if not made correctly they will stall our early and produce a dull oversweet mead with the potential for some strange tastes produced by over stressed yeasts. Some people have tried to ferment to dry and keep step feeding the yeasts until they give up and then they end up with a high alcohol sweet dessert mead, these are very good but not the same thing as a Polish style mead. There is something in the style and the management of the fermentation that allows this style of meads to be made without producing off flavors due to stressed out yeast. Anyone can make a sweet mead, but making one in balance with bold smooth tastes is artistry.

The Meadery

The tasting room is very nicely done. Andrzej built the bar himself and just that is impressive enough. Just past the tasting room in the barrel aging room. We stepped into the barrel room. Andrzei Jr. was racking a 60 gallon French oak barrel. There is always something nice about being in a barrel room, the smell of the oak and the meads together is enticing.

The Meads

We tasted all the meads, sometimes more than once. The apple cider from DLC is crafted into the Lumberjack cyser. The flavor of the apple cider pairs up with the sweetness of the honey. The honey is not just sweetness though, it has a lot of body to contribute, and the Wilks barrel age their meads for up to three years, some of it in French oak barrels. The combination of their yeast and honey, their fermentation management and or course aging for so long in an oak barrel all contribute to the absolute smoothness of these meads. I think this is a big part of their success, you at first get that sweetness from the honey but the smoothness of it all together is what really makes it all come together. The Ambrosia, a chardonnay honey pyment blended grapes with honey very smoothly. The have won two Mazer cup international commercial awards in 2013, hosted by GotMead.com, for the Archer. The Archer has cinnamon, cloves, lemon and other spices layered on top of the bold honey, all of it blended together just right so nothing is out of balance. The other winner, Hunter, is really a capsicumel, a hot pepper mead. Its not Ghost Pepper hot, the heat lights up your lips and the tip of your tongue for a minute then fades. The heat does not hide the honey and the two go boldly where many have tried and where most people have put in way to much pepper, this is just right. Since both me and Charles are Chileheads, we appreciated the next heat level, the Big Game Hunter and its balance of even more heat and sweet together.

Future Meads

Me and Charles were very lucky to taste some of the future meads in the making. In the works is a peach melomel, we got to taste it before it was even cleared, rarely have we tasted a peach wine with so much peachiness in it. I think the honey really boosts the peach flavors, this is going to be a favorite of everyone who loves peaches. We also tasted their Tej, a hopped spiced mead, it tasted perfectly ready to us, but Andrzej Jr. said at least another 18 months before he considers it done. I thought I had patience waiting a year before bottling, these guys are experts are being patient.

A conversation me and Charles had with the Wilk's in their barrel cellar. "Why yes I think we would like to have a taste of that, yes I think it might be ready, no, you are going to age it another year until its ready?". I will be back next year then.

Potential Markets for Your Honey?

Meaderies are always looking for sources of local raw honey, search for them since they might not know you have honey to sell. Also check into your local Ciderworks, you might encourage them to venture into making a cyser from their apples, or even a pear mead, and that might open the door to another customer. Get them making mead and you will always have a steady customer! BC

Jack and his wife Toni live on a small farm in WV.
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BUILD A TELESCOPING TOP

Ed **Simon**

We've finally made it to the top of the hive. You need to have something to protect the bees from the weather. Bees don't have any problem with the weather when they are in a tree or in the walls of your house, but sitting in the middle of a hay field exposes them to all sorts of adverse conditions.

Over the years, hives become warped, weather beaten and outright cruddy, regardless of the best intentions of the beekeeper. It's extremely embarrassing when you are showing your hives to a group of students and you can't get the cover off because it is warped. The point I'm trying to make is that attention to size and detail now can save you a lot of time in the future. See the notes at the end of this chapter that will give you some guidelines you might not have considered when making your telescoping cover.

Parts (Thickness x Width x Length)

1. ??" x 18¾" x 22 ⅜" – Top (1) (or multiple boards) (any thickness will work)
2. ¾" x 2" x 22⅜" – Sides (2)
3. ¾" x 2" x 17¼" – Ends (2)
4. ??" x 25" x 22" – Metal top (1) – (Larger than required)

?? - The thickness is immaterial, it is whatever you have handy.

Note: See the calculator in this chapter for your dimensions

Calculator

Use this set of calculations to provide the dimensions for your top.

Defaults are provided for an example – measurements are in ⅛" for easy calculations

Step	Usage	Length	Width	Note
A	Measure a hive body	19 7/8	16 2/8	Standard Langstroth hive dimensions
B	Add board thickness	1 4/8	1 4/8	¾" * 2 – Drop down sides
C	Add clearance for easy removal	1 0/8	1 0/8	½" * 2
D	Top size	21 11/8	18 6/8	This is the size for part #1
		22 3/8	18 3/4	This is the size for part #1 (reduced fraction)
E	Metal overhang	2 0/8	2 0/8	1" * 2
F	Metal cover size	24 3/8	20 6/8	Part #1 size + overhang (drip edge)
G	Part #2 length	22 3/8		Step D Length (reduced 21 11/8")
H	Part #3 length	17 1/4		Step D Width – (¾" * 2)

Construction

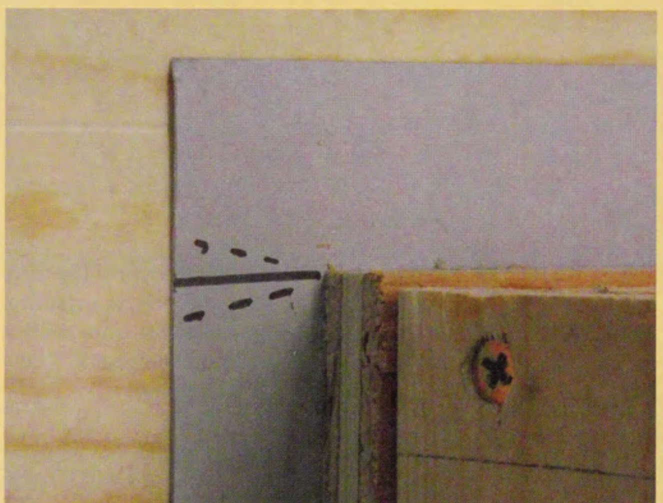
A top can last a long time if constructed with care and kept painted.

Step 1: Cut parts 1, 2 and 3 from your stock lumber. Be extremely careful that the parts are cut square (90 degree corners).

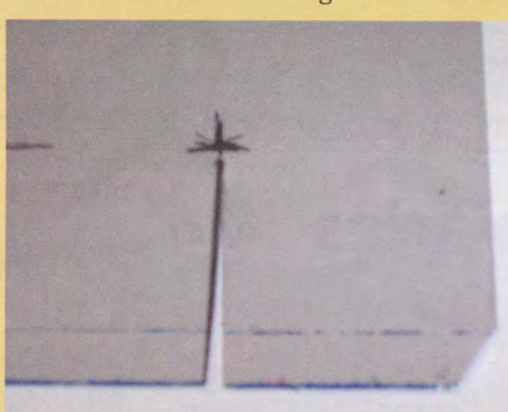
Step 2: Glue and screw the sides and ends to the top (part 1). The top (part 1) sits on top of the sides and end pieces.

Note: Now would be a good time to paint the cover.

Step 3: For an exact fit, lay the metal on a flat surface and place your new wooden cover on the metal. Align one of the corners of the wood top with one of the corners of the metal. Then mark a 2" border on the side and end that were not aligned. This will give you a 1" drip edge for the metal top. Cut the metal to the marked size.



Step 4: Lay the metal top on a flat surface and center the wood top leaving an equal border surrounding the wood top (1" for this example). Mark this with a pencil. Extend the corner lines to the edge of the metal.



Step 5: Using the tin snips, cut on one of the two extended edge line on each of the corners.

Note: If you make a shallow "V" cut on each side of the line, the corner fold will be a little neater.

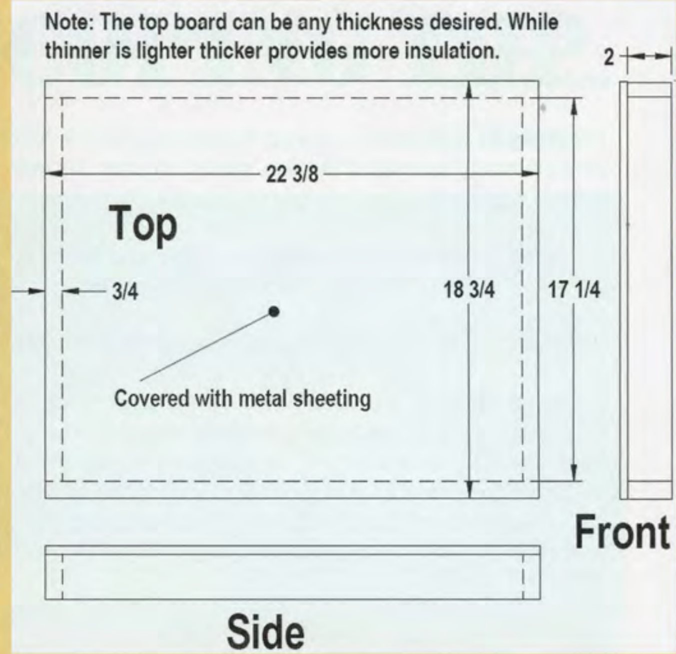
Note: Cutting the exposed corners at a 45 degree angle removes some of the sharpness and finger cutting potential of the completed top.

Step 6: Bend the edges of the metal over to form the lip of the cover.

Step 7: Bend the corner tabs that wàs formed in step 4 around the corners and tuck them under the adjacent sides.

Step 8: Screw or nail the lips in place on the wooden cover.

Note: I use #8 x ½" slotted hex washer head sheet metal screws to hold the metal in place. A nut driver on an electric drill allows the screw to be screwed in without drilling a pilot hole.



Step 9: When finished the top corners may be sharp. Use your trusty hammer to give the corners a rounded shape..

Note: A metal top can be a pain in the neck as well as expensive and time consuming during construction. Consider using an exterior grade of plywood. For some tops I used a wood called Texture 1-11 (T 1-11) that was left over from a barn I built and it worked great. Just be sure when you paint it to cover all the end grains and joints.

Note: The inside dimensions of the top must greater than the outside dimensions of your hive bodies. I recommend leaving a minimum of ½" around each edge. If you are going to wrap your hives in the winter, you may want to increase this to accommodate your insulation material. Remember hive bodies and tops get old, warp and lose their shape.

Note: The more your cover weighs the harder it is to manipulate. ¼" or ⅜" wood for the top is sufficient.

Note: The depth needed for the lip is your decision. Some things to take into account are:
- Local wind conditions
- Where your hand holds are on your hive bodies
- Will you put insulation or fiber board under the cover in the Winter
- When you wrap your hives do you have extra wrapping material to hold in place

Hint: A trip to a local printing business may provide you with some aluminum plates that they use on the printing presses. The plates come in various widths and thicknesses depending on the size required by the press. They are used only one time and are then recycled.

Usage

Take care of your telescoping tops and they will take care of and protect your hive. BC

This article is the sixth in a series that provide instructions on how to build a complete bee hive. Get a copy of Ed Simon's book Bee Equipment Essentials *with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from* ***www.wicwas.com****. Ed can be contacted through* ***Ed@TheBeeShed.com****. Now available are all of Ed's* Bee Culture *magazine articles. They can be accessed through The Bee Shed website at* ***http://www.thebeeshed.com/publications.html****.*

Construct A Bait Hive And Jib

Dennis **LaMonica**

With Spring come swarms. The traditional methods of capturing swarms are either collecting the swarm by some method and placing into a hive or using swarm traps. The problem with the commercial swarm traps or bait hives is that they are lightly constructed, a truncated cone shape constructed of a material reminiscent of paper mâché-like material and mounting to a tree or other structure is not straight forward or secure. But the biggest drawback is that you must hive this swarm soon after it arrives in the bait hive. If you don't the bees will build comb to their dimensions and direction. No straight comb here. And the bait hive is heavy and carrying a two-piece hive that may separate down a ladder has real safety issues. Then, to remove this free form comb is essentially doing a "cut out." You have to deal with the comb and your frames.

So this Winter I've made an improved bait hive and a lift to safely hoist and lower the bait hive. The advantages are that it can be built with aging equipment and if you do not move the captured swarm immediately you just safely lower the hive and transfer the frames to the new hive and move the bees to the new location.

1 Eight-frame Bait Hive. Using a standard hive you can be less concerned about the bees building irregular comb that cannot be easily transferred to a permanent hive in your apiary.

2 Components Ready for Assembly.

3 After attaching a solid bottom board with staples, drill a 1¼" entrance hole and plug the original entrance with a strip of wood ¾" x 1" by the length of the slot. With two staples, make an X inside to keep out birds and squirrels.

4 Attach the Unistrut® to the hive with 1½" carriage bolts. Epoxy bolts into holes.

5 A couple of washers and a nut attach the Unistrut® to the hive body.

6 Insert the spring nuts into the Unistrut®. They can be positioned to accommodate trees of differing diameters.

7 Install 5/15 X 2½" eyebolts with washers into spring nuts.

8 Attach entrance disk. Epoxy the bolt into hole.

9 Install foundation and one or more drawn comb so the hive smells like home (Home to the bees not like my home).

10 Install 4 small frame nails, one in each corner, to keep the frames from shifting in the box.

11 Construct a cover with at least a 2" rim and a 5/16" X 1½" carriage bolt in the center. The rim should not interfere with the Unistrut®.

12 Add a ¼" shim on each end to maintain the bee space above the top bars. No shims on the sides for ventilation.

13 Install a washer and nut on the outside of the cover to act as a stud for the coupling nut and eye bolt (lifting eye).

14 Note the nut used to lock the eye bolt (lifting eye) to the coupling nut.

15 Attach the cover to the hive body with 1½" deck screws through the rim. Use plenty of screws, the hive may get heavy. Note that there should be a ¼" gap between the rim and the hive body on the sides. Do not over tighten the screws or use a ¼" shim between the rim and hive at the screw locations.

16 Install 1½" X 1½" X 12" spacer so that the hive hangs straight against the tree.

17 Side opposite of the bait hive Unistrut® ready for reverse mounting.

Bait Hive Parts List

- 1 @ used deep super (use a used one so that it smells like home to the bees and eight-frame preferred)
- 1 @ used solid bottom board
- 1 @ ¾" X 1" +/- filler to fill in the gap (old entrance) between the bottom board and hive body
- 1 @ nuc disc entrance
- 1 @ 1¼" spade drill bit
- 6 @ hive staples (to attach the bottom board and mouse/bird guard at the new entrance)
- 1 @ length of 1½" X 1½" Unistrut® or similar three-sided channel system about 19" long
- 2 @ 5/16" spring nuts to fit the Unistrut®
- 4 @ 5/16" X 1-1/4 carriage bolts with nuts to mount the Unistrut®
- 4 @ 5/16" flat washers and 4 @ ½" flat washers to mount the Unistrut®
- 2 @ 5/16" X 2½" eye bolts, and 4 @ 5/16 Fender washers to mount the eye bolts to the spring washers for the attachment eyes to fasten the bait hive to a tree
- 1 @ 1½" X 1½" wood block spacer

18 Installed bait hive.

below Unistrut® and above bottom board
1 @ ½" pressure treated plywood cover (1½" longer and 2" wider than the hive body you are using)
4 @ ¾" X 2½"+/- lumber for the rim of the cover. 2 @ the same length as the plywood cover and the 2 ends @ 1½" shorter than the width of the cover)
A hand full of 1½" deck screws to assemble the cover and some 2" deck screws to attach the sides of the rim to the hive body (remember the ¼" air space at the sides)
2 @ ¼" shim spacers for the underside of the cover to maintain the bee space
1 @ 5/16" X 1½" carriage bolt, washer and nut for the "stud" to mount the lifting eye
1 @ 5/16" (rod) coupling nut to connect the carriage bolt stud to the lifting eye
1@ 5/16" X 2½" eye bolt and jamb nut for the lifting eye
8 or 10 deep frames with foundation or comb
1 @ 6' ratchet strap for attaching to a tree

Jib Parts List
1 @ 2 x 4 x 16' for the upright
1 @ 2 x 4 x 24" for the out rigger
2 @ ½" x 12" x 18" plywood for the gussets
1 @ ½" x 12" x 24" plywood for the cradle that supports the jib to the tree
2 @ 5/16" x 4" eye bolts to support the pulleys
2 @ ¼" shackles to attach the pulleys to the eye bolts
2 @ 1½" awning pulleys sized to fit your rope
1 @ deck (rope) cleat sized to fit your rope
1 @ 34' of 3/8" rope
Small handful of 1½" deck screws to attach the gussets

1 The jib is a 16' 2 X 4 with an out rigger and plywood gussets. The plywood that is to stabilize the assembly on a tree is cut in a hyperbolic profile to provide a better fit on trees of small and large diameters.

2 The outrigger extends 24" Note the 2 pulleys and eye hook with a safety latch to prevent accidental unhooking. Don't skimp on rope diameter. Note the 1-1/4" holes that are used to attach the friction strap to secure the jib to the tree.

3 A deck cleat is used to secure the hive in the raised position. This is 3/8" rope and is easier on the hands than smaller rope.

4 Raise the jib against a tree and lean a ladder on the other side of the tree

5 Secure the jib to the tree with a friction strap.

6 Attach the bait hive to the hook on the rope and . . .

7 Hoist the hive.

8 Attach the eyes in the bait hive to the hooks on a ratchet strap.

9 Tighten the strap drawing the bait hive tight against the tree.

10 Double check the attachments and unhook the hive and remove the jib and ladder.

11 You are ready for a swarm to move in . . .

References

Bait Hives for Honey Bees, Thomas Seeley, Rodger A. Morse, Richard Nowogrodzki, Information Bulletin No. 187, A Cornell Cooperative Extension Publication

Photos by Laura LaMonica

Dennis is the VP of the Chautauqua County Beekeeper Association and Laura is the Secretary.

Water –

Russ **Gilmore**

I live in Southwest Ohio. Here's my water garden in two seasons. The water lily plant shown in the picture is seven or eight years old and even though the water in the container freezes each Winter, the plant is able to "Winter over" and begin sprouting the following Spring.

The proper ingredients to my successful water gardens are as follows:

Container – 30 to 50 gallons or more

Water lily – only use hardy water lilies, not hybrid

Fish – five or six cheap feeder goldfish (I get mine at Wal-Mart)

The planting process:

- The initial water fill is the most difficult part, as my remote apiary locations do not have water hose access. I may add water once or twice. Obtain a container whose opening is wide enough to capture maximum rainwater.
- Water lilies require full sun. Water lilies do not "like" much movement in the water and the system, as described, does not require oxidation or mechanical filtering.
- Hardy water lily plants are purchased from a nursery. Place in a plastic wash pan packed with good quality topsoil, with a minimum of mulch or compostable matter. Submerge the planted pans to about 18". As the plant grows, the leaves spread and cover the surface of the water providing two key benefits:
1. A landing pad for bees
2. A cover over the surface of the water to restrict algae growth and evaporation
- At the beginning of the following season, remove the pan, divide the lily, replant in the pan and the other half can be utilized in another container or discarded. I dump the container, rinse out the gunk and start over with a fresh water load.

The fish:

- The goldfish are an important element in the loop as they keep the system in balance by consuming mosquito larvae and other microscopic entities. I do not feed the goldfish. I purchase five or six inexpensive "feeder" fish per container and most of them remain alive throughout the warmer months of the year. Occasionally, gold fish "Winter over"; however, I do not count on that.

The results:

- Water that stays clear through the year and is available to the bees without the introduction of chemicals and without the need to service the water supply on a regular basis.

My system. Three containers. The large one on the bottom holds small stones and is partially filled with water. In the center is a smaller pot that houses the water pump. On top of that is another pot. The pump fills the top pot from the water in the bottom, which is filled with a slow drip hose. The cloth provides footing for the bees to get their drink.

Larry **Shreffler**

John **Smith**

I feed crysalix to my cows, so its container is part one – water reservoir. An automatic tank waterer to keep the water level constant is part two. A plastic bucket that fits between auto waterer and container wall, is part three. The inside bucket has to have holes drilled in its lower sides, and a strip of screen placed inside to keep the sand from falling out. Add sand to ¾" above the water height, attach a hose and level. Adjust sand height to compensate for evaporation and bees will not have to dig too deep.

The downside is it grows grass, moss and whatever. Will not work in freezing temperatures, in fact. The bucket of sand has to really be drained before Winter/ Fall.

If someone comes up with a better system write of it in *Bee Culture.* don't forget illustrations and description. I'm interested!

Ann **Harman**

You do have to make a few things but it works, is easy and also can be used successfully in an outyard.

It's easy to demonstrate but a bit difficult to describe but here goes –

You need a bucket (your choice of a three-gallon or a five-gallon) with lid, A brick or rock to hold lid down – you do NOT want to press the lid in place – it would end up with a vacuum and not work.

You need either: a faucet OR an IV drip line (obtain from friendly veterinarian). The drip line can be trimmed to desired lengths keeping the control of course.

A board – the ideal board is an old oak fence board (not with lots of paint) – farmers usually have some lying around and are glad to give you one.

Make a stand for the bucket – height not too important but three feet high is a convenient height for ease of refilling bucket.

Install either the faucet or the IV drip line on the side of the bucket close to the bottom of the bucket.

Take some tool and scrape or mill or otherwise create a zigzag pattern down the length of the old fence board – shallow in depth since the bees will be standing on the edges of the zigzag drinking from the channel.

Prop and fasten old fence board at a slant (about 45° or a bit more is good) so the top is under the faucet or end of trimmed drip line.

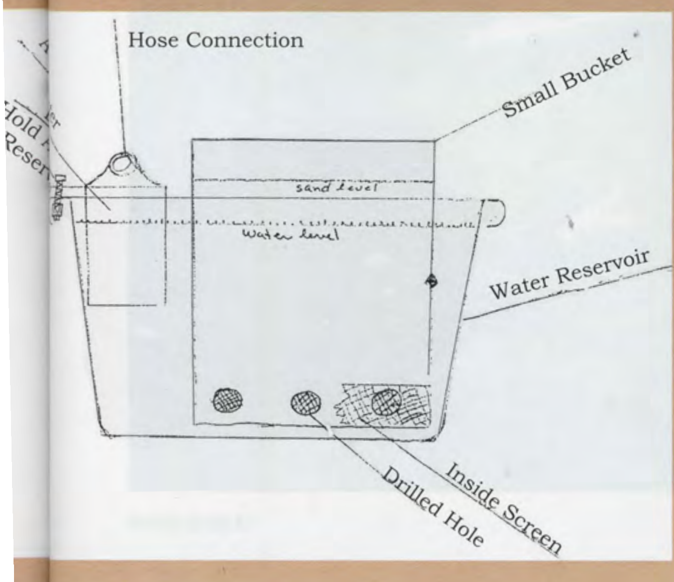
Fill bucket with water. Put lid on so leaves and junk don't fall into bucket. Put rock on top to keep lid from flying off in a wind.

Adjust drip so that the water enters the zigzag and trickles a bit down the zigzag but the board is dry at the bottom.

For an outyard a five-gallon bucket means you won't have to refill it very often.

If a suburbanite objects to the appearance of such an item in or close to beeyard, plant bee flowers around it.

If you have trouble figuring my instructions out, let me know.

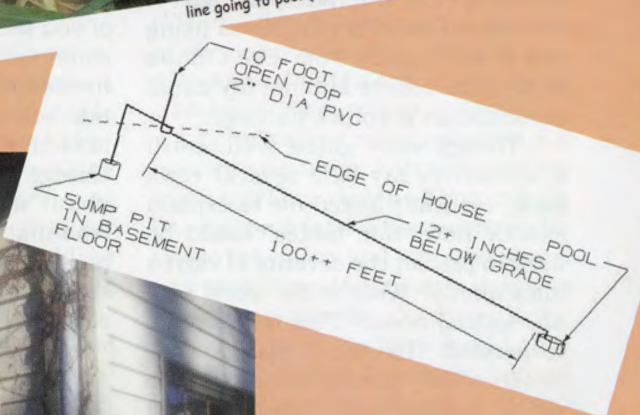


Patrick **Driscoll**

I believe I have developed a solution to the problem of providing water for bees (and birds) year round, that I have been using for nearly 15 years. It uses water from the sump pump, which evacuates water from around your house without burning up the sump pump.

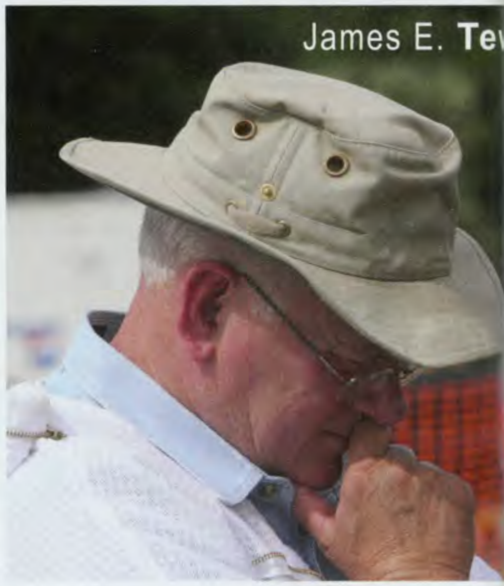
I buried a 2" PVC line about a foot deep going back over a hundred feet from my house to a plastic pool in the ground. It works all year long because the groundwater around a home is warmed by the heat of the house. Note well: When I first hooked up this system, the sump pump choked, having to push water up from the basement, then out back over one hundred feet. I added a vertical ten foot high OPEN ENDED two inch PVC pipe line at the point where the pipe exits the house, which allows the water column to rise and evacuate air, then gradually fall as the water is pushed out to the back yard. It does not ever flow over the top of the open pipe. I have an ordinary sump pump which has been working the entire time!

The snow always melts above ground along the top of this line. Bees are drinking water there year round!



THE BIG FREEZE – JANUARY, 2014

How can any honey bee colony withstand such low temperatures?



But first – *It was only a dream*

My job description has always required that I present occasional discussions at bee meetings. Through the years, I have grown to feel that it's important to be prepared, have graphics, know your material and finish on time – no matter how late you start. But my most important principle is to *never be at ease before the group.* In all but a precious few ways, the group has more *general* knowledge than the speaker, so I feel I should always be alert and responsive.

So there I was in this bee meeting dream world, standing before a group – everyone looking at me – expecting me to say something worthy of the time we were expending. I was making good eye contact, speaking clearly and feeling a bit insecure, which is normal for me. But the oddest part of this dream event is that, I was using one of my articles from *Bee Culture* as my note source and not my usual presentation graphics package.

Things were going well, until a woman to my left, several rows back, earnestly asked me to explain exactly how "tide tables" could be used to predict the severity of varroa infestations? *What in the world was she talking about? Tide tables?* She responded, *"Yes, it's in your article."* As I frantically tried to speed-read the article -- that I had authored – and realizing that I now had the undivided attention of everyone else in the room, I began to have a sinking feeling in the bottom of my stomach. She further responded, *"Yes, it's in the call-out along the bottom edge of the page"* and it was there – strangely positioned along the bottom edge of the page. I had never seen the statement in my life. Was this a senior moment for me? Did Editor Kim put it there? All eyes were upon me. The audience was wondering if I was going to sink or swim. *Say something – you're the speaker.* I began – hesitantly – *"well when the tide comes in, it . . . er . . . raises the water level and uh . . . and the uh . . . moon is also full . . ."* Which must mean something but for the life of me I didn't know what. Clearly I was sinking and the tide had a lot to do with it. I stammered that I would have to review this and get back to them. In hangdog fashion, I and my *Bee Culture* article left the podium. Dream that it was, the angst I felt was real. And in my dream, *no one* cut me any slack.

Now that I'm awake

It seems that every conceivable control technique has been fired at *Varroa*, but I have never heard of tide schedules and moon phases having anything to do with *Varroa* control or bee biology. To quote me from my first paragraph, *".....the group has more general knowledge than the speaker."* So I ask you, do any of you see a way that these concepts could be related to either *Varroa* or beekeeping? I honestly looked at tide schedule information. There is tons of it – mostly related to climate change and historical levels. What about moon phases? I have only read that during Summer months on bright moonlit nights, bees have been known to forage, but I have never seen that behavior. It was a strange dream with an even stranger idea. I have no idea why my mind came up with this bizarre story line.

It has truly been cold

Of the 204 articles that I have written since 1997, 24 of them had some reference to wintering bee colonies and Winter management. During the 20 years before that, my articles have not been digitized, but I suspect a similar number of wintering pieces were published. Throughout all those articles, I don't think I have ever had the opportunity to write about my bees being subjected to such low temperatures as they were in January, 2014. Some of the country had even colder temperatures, but my outdoor temperature was low enough.

Years ago, my Dad would occasionally remove bees from the wall of a house. He purchased a stethoscope to help ferret out where a bee colony was in the wall. To my knowledge, he never used this device very many

May look a bit silly, but it's quick, easy and enjoyable.

times, and it recently came to be mine. Yesterday, in the harsh cold, on a simple whim, I took the low-quality device to my deep frozen beehives in my deep frozen apiary. I positioned the apparatus and touched the outside wall of the colony. I immediately heard a steady drone – a consistent and regulated sound – that just absolutely electrified me. This was the sound of functional wintering bee biology at work.

During warm months, we have all seen and heard bees fanning and ventilating, but this was the sound of a tightly clustered mass of bees mysteriously maintaining their core temperature during a really cold time within their dark hive. I had two colonies that were weak with a poor chance for survival. In fact, I suspect they were already dead before the cold snap. When I tested the apparatus on the suspect hives, there was a loud, obvious silence. The difference was clear. I must say that I was having a great time playing doctor and immediately wanted you to hear the sound, too.

It's on YouTube

So I captured the sound of Winter heat generation, raised the volume and posted the three-minute piece at: **http://goo.gl/fV8eEi**. In order to post it to YouTube, I had to have video so I simply shot the outside of some of my wintering colonies to paste over the audio. The video part of this piece is inconsequential. What I wanted you to hear was the sound of wintering biology at work. The incessant, steady drone of bees working night and day to maintain heat in their profoundly reduced environment was mesmerizing. In a way, the sound was much like the air handler on a heating system.

Are we doing the right thing?

When I started beekeeping in 1973, it appears the bee industry was in the final phases of no longer packing colonies for the Winter. Tarpaper wraps and wax corrugated boxes were the most common and are still available today from suppliers. Then (and now) there were innumerable ways to pack the top of the colony with "quilts" to help tolerate the cold. In previous articles, I published photos showing various procedures for packing Winter colonies.

I suspect that there were two primary arguments against winter packing colonies. Even lightly packing colonies was a laborious task, and the expense required could not be ignored. Secondly, there was concern that the insulation would work to the detriment the colony on those occasional Winter days when the temperature warmed. On that day, the insulation would in fact, keep the colony cool. When those management decisions were abandoned, bees were everywhere and swarms were plentiful. Not now.

Surely some of you can figure out how to creatively insulate a colony – both Winter and Summer – that will help raise the R-value of the wooden box. About three decades ago, a Canadian beekeeper designed a bi-metal valve that would open and close upper inner cover entrances based on ambient temperature. Was he ahead of his time? As bee colonies die so easily now, it seems to me that it is time review the traditional *"bees in the box"* management scheme that worked so well for so long and begin to explore ways to upgrade modern bees' artificial domiciles. These changes and improvements will be on us – beekeepers. This type of work is rarely done by traditional research institutions now.

Warm-way vs cold-way entrances

Beekeepers, many decades ago, had more options for hive entrances than are generally available today. One style of hive entrance along the side was called the *warm-way* entrance. It was thought that air entering the brood body would be slowed by having cross baffles formed by the bottoms of the frames. The entrances, now universally used on beehives, are called *cold-way* entrances because the wind can enter the colony and blow straight up to the compacted cluster.

Indeed, should the wintering colony even have the entrance at the bottom in the traditional location? Would a higher entrance be nearer the wintering cluster and not become jammed with snow and ice? Would dying Winter bees be able to get farther away from the colony before succumbing? Yesterday, when I was tinkering with Dad's stethoscope, I noticed that there a few dead bees on the ground in front of a colony, an observation that is not uncommon. Today, something – a raccoon I suppose – had eaten everything and had been on the landing board harassing the cluster. Raising the entrance would help eliminate that pest. But – if I positioned a higher upper entrance, the hive would accumulate the Winter's dead bees. How bad would that be?

Great minds can occasionally have bad ideas

At a meeting a year or so ago, I was taking with Clint Walker, a commercial beekeeper from Rogers, Texas, and the odd subject of *"hive composters"* came up. He and I agreed that very little (nothing) was known about the composters and degraders that live in the unique ecosystem in the bottom of a feral honey bee nest. I don't know the inventory of critters there – maybe beetles (not necessarily small hive beetles), various insect larvae, possibly roaches or earwigs, and I have no idea what macro- or microscopic life is there. We have always assumed these organisms are bad. Are they?

On several occasions, reports have been published that our society bathes too much and that we are essentially too clean. Sounds preposterous, I know. Is there a chance we are keeping our colonies too clean? *(Clearly, this conversation is a series of rhetorical questions. There are no facts here. This is a conversation – not a technical discussion.)*

So this hypothetical colony is in a hive with an upper entrance and the lower entrance closed off completely. During the Winter, litter accumulates inside the colony and – if not removed – an ecosystem of degraders develops that composts the detritus. If the entrance were higher, would that obviate the need for screen bottom boards? Would the degraders munch on any *Varroa* clumsy enough to fall from their host? How high can a mite climb? I truly do not know.

Yet another questionable idea

It has always bothered me that bees rarely (never) build perfectly straight combs in natural nests. Yet we steadfastly require them to do just that in our *modern* hives. It makes our management lives easier, but I have no idea if the bees are frustrated by such perfect order. I entered "cross comb bee colonies" in a Google search and found many photographic examples of cross comb photos. It's not

Looking through my observation hive in the cold Winter.

hard to show that bees are not big on beautiful straight combs.

As I enter my shop, I can easily see my nine-frame observation hive (three on three on three all deep frames) located in my enclosed porch. The vent holes and the straight frames allow me to see right through the colony. Can this be good for that little colony?

My observation gives me an idea what the inside of my wintering colonies look like right now. Would my bees winter more efficiently if I removed a few center frames to give more clustering space? Maybe I could remove every other frame in the center of the two wintering deeps and make sure all nearby frames were packed with honey. Hypothetically, I would remove the frames sometime after the Fall flow was over. *Absolutely*, the frames would need to be replaced before the Spring flow starts. Would that open space improve the wintering cluster dynamics of my bees? I'm only speculating. Indeed, do honey bee wintering dynamics even need improving? What do you think?

Much like a kid destroying his Lincoln Log project

Now that I have bemoaned the artificial state of our artificial hive domiciles, I pose yet another *"what if."* What if all this cold is actually good for the bees? What if cold reduces various infectious pathogens within a colony and all my efforts to restyle the colony would yet again upset the natural balance? I'm like a kid who builds a nice Lincoln Log house and then kicks it down when tired of playing with it.

At long last...the point of this piece

My real point is that we are currently not surprised to be forced to withstand Winter-kills as high as 40%. How long can beekeepers and their bees sustain that much loss? I'm comfortable primarily blaming predaceous mites and possibly pesticides as the main villains, but I am also concerned about habitat loss and the standardization of our environment.

In my lifetime, basic beekeeping protocols have clearly changed. I hope you feel empowered to explore – question – and experiment with some of beekeeping's time-honored recommendations even delving into tide tables and wintering procedures. Losing nearly half of our bees each year cries for new and restructured management recommendations. Beekeeping is our passion so beekeeping adaptation is our challenge. BC

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The Birds And The Bees

Gail **Damerow**

How Chickens And Honey Bees Are The Same, Only Different

The other day my husband Allan and I were cleaning out our chicken coop and I got to thinking about how the latest crop of back-to-landers have enthusiastically embraced both chickens and honey bees. Cleaning our sizable coop takes several hours, giving me a lot of time to wonder what chickens and bees have in common that makes them equally attractive to newbies.

Bees and chickens are both social creatures that prefer to live in groups, yet neither needs much by way of spacious housing. Even though a hive is home to many thousands of bees compared to a dozen or so chickens in a coop, the hive is much smaller and therefore easier to hide behind a fence or a few strategically placed bushes. Oh, sure, you can hide a chicken coop, too, but some hen always gives it away by cackling every time she lays an egg.

And what does she have to boast about? After all, at best she lays only one egg a day. A queen bee busily lays a couple thousand or so eggs a day, leaving her little time to think about bragging. If she did holler after every egg, she'd have laryngitis in no time.

So why do we hide our hives and coops, anyway? Well, here's where bees and chickens definitely have something in common. People who haven't spent much time around either one know everything they need to know – that bees sting and chickens smell.

Well, yeah. But cats scratch and dogs poop on sidewalks, yet I haven't noticed any shortage of cats and dogs. Still, there's always some neighborhood crank who'll loudly proclaim opposition at the mere mention that you might be thinking of getting bees or chickens.

When you start out with either birds or bees, the first decision is what kind to get. Honey bees come in a few different races, chickens come in many different breeds. As with bees, some kinds of chickens are more excitable than others and some are more productive than others.

Bees and chickens both come in a choice of black or designer stripes. But chickens have the edge here, because they come in many other colors, including red, white, and blue as well as in fancy-pants patterns like crele and porcelain.

Chickens and bees both attract predators, and some of the same predators, too. Skunks. Bears! Human ne'er-do-wells.

Both are subject to theft, which serves to emphasize their respective desirability – at least among robbers who don't worry the bees might sting or the chickens might smell.

Bees and chickens both forage, but bees travel farther than chickens. Where a bee might look for nectar a couple of miles from the hive, the conservative chicken won't travel much farther than a few hundred feet from the coop. Less, if no trees or shrubs offer protective cover.

Both bees and chickens need a steady supply of drinking water. If you don't furnish it, they (bees and chickens alike) are apt to drown in some neighbor's swimming pool.

Both make sounds that reveal their status, if you take time to stop, look, and listen. With a flock of chickens, let out a whistle and they'll stop whatever they're doing and become quiet so you can hear coughs or sneezes. With bees, tap on the side of the hive and you will hear the bees buzz in response. A short buzz means all is well; a longer, sustained buzz means something's going on – like your colony might be queenless – so you'd better check.

Birds and bees both fall prey to parasitic mites, although chicken mites are a heck of a lot easier to avoid and to treat than *Varroa* mites. Both also attract beneficial scavenger mites that help keep their housing clean.

Speaking of clean, bees have the good sense to go outside to do their business. Chickens, on the other hand, don't mind messing in their own house. And not just on the floor – on the walls and ceiling, too. How on earth do they do that?

As big a chore as cleaning out all that chicken manure can be, it has the advantage that it may be composted and used in the garden to grow next Summer's vegetables. Bees, on the other hand, spread their wealth around where, I suppose, it does end up fertilizing something, unless it lands on your windshield.

Birds and bees both molt. A chicken molts four times before it reaches maturity. A bee molts six times, but gets all its molting done before it matures and doesn't scatter feathers all over the place.

Both hatch in about three weeks – 20 days for bees, 21 days for chicks. But the bee emerges as an adult, while the chick takes another four to five months to grow up.

A queen bee mates a week or so after emerging and has only a few days during which to mate, otherwise she'll lay infertile eggs that hatch into drones. A hen doesn't start laying until she's nearly five months old, and must mate about every two weeks to lay fertile eggs. If her eggs aren't fertile, they won't hatch. Period.

Hens and queen bees both lay decently well for a year or two before tapering off, which is why both are replaced by economy-minded keepers every year or so. If you get attached to your layers, you could easily end up running a old-fowl home for geriatric hens. With honey bees, however, if you don't replace a negligent queen, the other bees will do it for you.

Bees have a much more complicated society and a stricter social structure than chickens. Each bee has a job and goes about it industriously for the betterment of the group. With chickens, it's every hen for herself. Hens spend a lot of time in such self-indulgent activities as sunbathing, taking dirt baths, pecking tasty treats from the ground, and stealing tasty treats from other hens. You can spend a day in the chicken yard watching the activities of each individual chicken, but try spending a day keeping your eye on a single bee.

With a few hens, you're likely to get daily rewarded with eggs. With a whole colony of bees, you don't get rewarded with honey until the time is right, if at all. When you take a hen's eggs, you don't rob her of important nutrition and expect her to survive on something less healthy, like sugar water. On the other hand, some chicken keepers indulge their hens by feeding them corn or scratch grains – the chicken equivalent of junk food.

A colony of bees will rob honey from another colony. A flock of chickens won't rob eggs from a neighboring flock, but a hen with maternal urges might increase the size of her brood by pilfering eggs (or even chicks) from another hen's nest.

Both bees and chickens get confused when their house is moved. Move it more than a couple of feet and they will stubbornly fixate on the old location. Confining them inside for two or three days gives them time to reorient before you let them back out. For chickens, you keep the door shut. For bees, you stuff the entrance with grass or something similar; in the process of clearing out the stuffing, the bees reorient themselves.

If you summarily move their house, come nightfall chickens will go back to the old place and huddle in the dark. If it's raining, they'll huddle in a puddle. Bees are smarter. After circling the old place and finding the hive gone, they will circle in an ever widening spiral until they locate the hive by its odor – that is, unless the weather is cold, in which case bees, like chickens, may chill and die.

Regardless of the cause, if one chicken dies, up goes the red flag. But bees die routinely and constantly make replacements, so you're unlikely to notice a serious problem until the problem gets serious. Chickens don't mysteriously die in droves. Instead, they usually give you some advanced notice like coughing and sneezing or just hanging around looking perfectly miserable.

How chickens communicate is just as controversial a subject as how bees communicate. Some chicken keepers like to believe chicken sounds have abstract meanings, like the cackling hen is saying, "Woo-hoo! I laid another egg!" Others believe the cackle is just an instinctive survival mechanism through which the hen draws attention to herself, hoping any lurking predator will follow her and leave her defenseless egg alone.

Similarly, some beekeepers believe the waggle dancing bee is saying, "Woo-hoo! I found some nifty new nectar!" and communicates such abstract information as the direction and distance of the nectar discovered. Others believe the dance is merely an instinctive survival mechanism that piques the curiosity of workers and sends them on their own odor search.

Much as a bee waggle dances to indicate a new food source, a hen utters the food call to show her chicks she's found something yummy. A rooster uses the same food call to gather hens around himself, and then sometimes shows his true intent by segueing into a mating dance. If another rooster tries to horn in on the action, the two will duke it out until one gives up or is mortally wounded.

Drones are much more civil. They congregate at a singles bar, waiting for a willing queen to swish through. The fastest Eddie gets the action, then dies happy and the next fastest takes over. No deceit and no squabbles.

A bee colony revolves around the queen. If more than one queen is present, either one queen kills the other or one queen leaves in a swarm. Hens live in groups and don't swarm, unless someone left the gate open and they spot freshly sprouted seedlings or succulent ripening strawberries in the yard next door.

A flock of chickens revolves around the kingpin rooster. His functions (aside from fertilizing eggs) are to swagger around the yard, periodically crow to announce his presence, take full credit for every treat you bring your flock, and protect his hens from predators. Alas, most municipalities don't allow roosters, which means a lot of today's chicken keepers never have the pleasure of enjoying the antics of the hens' better half.

On the other hand, not all roosters are fun. Some roosters, and even an occasional hen, will attack its keeper. A mean rooster can stab repeatedly with his sharp spurs. A bee that stabs you with its sharp stinger dies. An attack rooster doesn't die unless someone fetches the ax and transforms him into fricassee.

The clinical conditions of being afraid of bees and of chickens both start with an "A." Apiphobia is a fear of bees. Alektorophobia is a fear of chickens. I'm afraid of bees, but not of chickens. As a kid I got stung plenty of times, but most likely not by honey bees. Try telling that to a little kid who hears something buzz and then gets a nasty sting. I hear a buzzing sound and right away the hairs raise on the back of my neck and I instinctively start swatting. I can't help myself. Turns out, too, I'm allergic to bee stings (just as some unfortunate souls are allergic to chicken eggs).

When Allan decided to get honey bees I told him he'd have to take care of them himself. He elected me to keep the smoker going in case he needed it, which he rarely did. We both figured I'd be safe if I stayed far enough away and kept pumping the smoker.

One day Allan was working his bees in the orchard when I wasn't around to man the smoker. Suddenly one of his colonies boiled out of the hive and pursued him as he hotfooted the eighth mile to the house. That day I pulled 32 stingers out of his hide, but amazingly he suffered no ill effects. If that had been me, I'd be dead. Which is why we no longer have honey bees, but we still have chickens. BC

Gail Damerow is the author of The Chicken Encyclopedia, The Chicken Health Handbook, Storey's Guide to Raising Chickens, *and a flock of other books on poultry and related subjects.*

Drawings by Bethany Caskey.

Jessica **Louque**

To Seed, Or Not To Seed

Swiss chard from seed.

Tomatoes planted from seed.

The time has come for gardens to start! WHO. IS. EXCITED??? Obviously, I am. After perusing the catalogs from so many places, only to fall back on my "old haunts" of Johnny's Seeds and High Mowing Seeds. Mice ruined all of my seed reserves from last year during the Great Outage of 2013, so everything needed to be replenished. If you happen to be looking at Johnny's website, I'm sure you saw the new artisan tomato collection. Who could resist buying a package of seeds that had three different types of bumble bee tomatoes? I certainly couldn't. It has 10 seeds for each of the seven varieties included. They are also indeterminate tomatoes – as opposed to determinate tomatoes. I prefer indeterminate tomato plants because they have ripening fruit for a lot longer than a determinate plant, even though the determinates are a lot smaller and don't have to be staked or pruned.

I have discussed my tomato obsession previously, but I really would plant my entire garden in tomato varieties and maybe a few basil plants if I didn't have (a tiny bit of) self-control. Luckily, or unluckily as space may be, I like nearly all vegetables so it's easy to convince myself to plant a large variety without mourning the loss of tomato space. Usually, I like to start seeds inside before the first frost so they can start growing, but it never occurred to me why some plants did better than others, so I started doing some research.

I always envy the nurseries and greenhouses that sell the two-foot tall German Johnson tomato plants at the same time that my babies are a little over three inches. Somehow the plants end up in my garden (they must hitchhike to my house) and some years the direct seeded or transplanted previous ones never catch up, or barely catch the newbies by the end of the year. It took me awhile to realize that these were coming out of greenhouses that were much better equipped to grow plants than my back porch with a grow light. They always have big pretty plants, but only certain kinds... why can't you buy all your vegetables there instead of seeding?

Direct seeding has a lot of benefits. It cuts out a lot of steps, like having a light or heat mat, having to plant seeds somewhere in your house (unless you are blessed enough to have your own greenhouse), hardening off the seedlings and then having to transplant them in the garden. I don't know why, but I hate transplanting seedlings. The smaller they are, the more I dislike it. I always feel like I've been cheated because why couldn't they grow like that outside? Being thwarted by a measly three degree difference for a frost warning is never fun and makes me cranky.

The downsides to direct seeding is the shorter growing season and having to thin out the plants. It seems like such a waste of extra little baby plants that I could have either saved the seed, or put elsewhere except it probably wouldn't do well being transplanted. As luck would have it, if I tried to be skimpy with my seeds half of them wouldn't come up at all and I would be short half of what I thought I would have.

One other downside of direct seeding is also a poor planning choice on my behalf and runs throughout the gardening phase – the bees! When I direct seed, I usually like to till one additional round in the long garden in front of my bees. Do you know how much bees like tillers? It seems to have a resemblance to a bear and they range from mildly upset to Demons of Death chasing me out of the garden. In general, this area was a bad place to put my bees (or the garden, depending on how you look at it) because they not only dislike people working in the area in front of them, but because they sort of ignore the space altogether if no one is bothering them within the general vicinity. There will be tons of alternative pollinators in the area, but few honey bees unless I plant strips of buckwheat or vetch inbetween the vegetables. This garden site has been slowly converted into fruit trees with annual groundcovers to avoid this conundrum.

There are some plants that only work with direct seeding, which I have learned the hard way. It's not necessarily that they "only work" as in "they only live" but they are not particularly successful if they are transplanted. One would think that it would be common sense to direct seed things like carrots, beets, rad-

Hives near the long garden, now planted in buckwheat at the edges.

Vetch planted in border rows for the bees.

ishes, turnips, or other root crops, but I have tried to transplant all of these before, to varying degrees of success. I used to wonder why my carrots never panned out until I direct seeded and Lo! . . . beautiful carrots to behold. The kids pulled up some dragon carrots (purple on the outside) while cleaning out the garden this year and I cut them up and sautéed them with cream and honey. Having a longer root system in a shallow growing area stunts the growth of the plant overall, even if the roots don't reach the bottom. I had cabbage this year that I transplanted (supposedly a good transplant crop) into two different beds. One was a shallow bed and one was a deep bed. The deep bed cabbage grew almost twice the size of the shallow bed cabbage, even though pulling them up showed that the root system wasn't close to any of the edges. Beans and peas also do well with direct seeding, as well as corn and most cucurbits (squash, watermelons, cucumbers, etc.). Lettuce and most leafy greens also can be direct seeded because it will grow just fine in colder temperatures and is usually a fast harvest. Some of these like the squash or the lettuce aren't going to save you any time from transplanting because they grow so quickly on their own that they will catch up to a transplant.

For my tomatoes, they get babied from the start. I am a transplanting fiend with tomato plants. I think I planted 30 Brandywines this past year, not counting any of the other varieties. I want them to be as big as I can make them before they go out alone into the wilderness of the garden. Sometimes there's a "special" plant that gets put into a pot and treated with vermicompost and super awesome compost and homemade soil. Once its tender little roots fill through the cracks, then I find the perfect garden spot. The Tomato Heaven of all garden spots! This particular plant will also have a companion plant that's treated in the same manner to have a suitable match for pollination (a consort, if you will). They will be enthroned in glorious media and shaded by nothing, lovingly hand watered with weekly organic fertilizer, and mightily defended from the evil weeds that try to steal their nutrients. If you ever are playing a trivia game and need to know what tomato would ever be worthy of this sort of treatment, you should always answer "German Johnson" because they are the greatest tomato to ever be in existence. The Brix scale may tell you otherwise, but in our heart of hearts, we all know everyone is a German Johnson lover.

Besides my love of tomatoes, I have a fondness for all of the nightshade plants. Not surprisingly, all of these make for excellent transplants. With the exception of tomatoes, most of them are slower in their growth. It usually takes around 14 days for a pepper plant to germinate. These little guys are much better suited to being raised indoors, starting in March and letting them get some size before you put them out in April/May. Eggplants do fairly well as a transplant as long as you put them in a little bit bigger pots than you normally use to start seedlings. In my history of eggplants, if you give them the bigger pot to germinate, then you get better fruit. This could just be some freak of science at my house that I don't understand, but I'm going with it.

The biggest boon to transplanting is having a head start on the season. Depending on your zone (I'm in zone 7), you may have a shorter growing season and that extra time for your plants to grow can mean a huge difference in your harvest. If you grow a decent-sized garden, it may mean the loss of a couple hundred pounds of produce. One of my benefits from transplanting is that it gives me some "gardening" to do while it's still too cold outside to be digging in the dirt. It's much better for me to be preoccupied during the Winter fever with pre-gardening than suddenly deciding that I think spineless burgundy okra could grow just fine when it's 40° outside, and why don't I go plant some just to see?

For those of you who are also impatient, there's always the option of putting a hoop house on your garden. I make mine out of PVC pipe. Put a 2" piece on the inside of the raised bed on each side and run a 1.5" piece over, then stick it in the first pieces to make the rib. Throw some plastic over and voila! A handy, dandy hoop house! This will only work on cold-hardy plants, but it still gives you a couple extra weeks on each end of the growing season.

I hope everyone picked up a little something or at least maybe these ideas have sparked interest for your gardening plans for 2014. Get those gardens rolling so the bees (and you) have Summer playgrounds! BC

Jessica Louque is a Research Entomologist for Eurofins Scientific, an avid gardener, beekeeper and tattoo collector.

DOWNTOWN

Showing Your Colors

Welcome, lucky downtown beekeepers, to an article that concerns itself with watching paint dry. Here in the Northeast, a lot of exterior latex gets applied in March, and the newbees will have started asking all those paint questions again ("Yes, you should paint both sides of the bottom board; no, not the insides of the boxes")

But soon enough come the questions about what colors to use. The answers can actually connect people and bees, once again, in one of those dances of intended and unintended consequences, experiments, surprises, and (sometimes) fun.

As excited as you may already be with this topic, it's also a chance for us to think about where we want our bees to be in the daily lives of our neighbors, as well as one of the great investments we can make in their care and security before they are even buzzing about the place.

Since beeks everywhere paint their hives, it's also fair to ask why this is an urban beekeeping topic. Here's the thing: the color you choose, the concoction you use, the number of coats you daub on – and whether you actually get around to painting stuff at all – each play a role in the footprint of your hives along our crowded, busy streets. And you are in a position to put a lot of your own thought and motivation into that, with the swipe of a paintbrush.

Your choice of paint can actually play a role in your overall downtown beekeeping strategy. Do you want to hide your hive in plain site? Do you want it obvious and interesting? Do you have a marketing need? Would a pretty hive be an asset to a school, garden or church group? Are you worried about vandals, or about being ignored? Do you need your paint to be cheap, or do you want to tweak your shade specifically in the direction of what the bees themselves seem to like? Or could the color itself send a message that connects people and bees?

Please note: I have nothing against using wood stains, or the many linseed oil and propolis concoctions, though I am essentially too lazy to mess with them. The really "organic" preparations seem to need to be brewed and reapplied more frequently, and I am not convinced that the off-gassing of a couple of coats of latex adds much of a blip to the fumes rising from every other painted object on my block. Truth is, when newbees decide to go the linseed route, they seem more likely to be conscientious, careful beekeepers at heart, though there's also the worry that goes with making the initial learning and set up curve that much more difficult. And, beekeeping being what it is these days, there's the possibility that they might be even more overwhelmed and discouraged when going the extra mile fails to protect from everything a bad weather year can do.

You can break down a decision about what to paint your city hive like this: you are making a decision (about color, about material used, about frequency of application, about your own priorities) and considering how it affects you, your bees, your neighbors, and maybe the season ahead. When you look at it this way, you and your paintbrush are working out problems with variables that are really similar to those in "whether and what to feed," "whether or not to treat," and "where and how to site your apiary." Not too surprisingly, people in the city take this in many different directions.

Safety First

If you looked at my woodenware, you'd call me a hypocrite: the stuff on the porch now is a ghastly batch of warped, chipping, stained and cracking junk. The reason for this is that many of my mentees start out with used gear they got from a grandparent, or are sold a bill of goods that their new turn-key hive needs no weatherizing. New carpenters also have been known to go too light on the glue, or to use interior paint. It's easier for me to trade, sell at cost, or just give a well-meaning newbee a sound, well-painted box (and use it as a learning opportunity), and get the beater out of circulation, than it is to harangue them like I do you folks here. And it is worth it to me, because old, poorly constructed, and unprotected boxes leak bees, promote

What Color *Does* Make A Difference

Toni **Burnham**

Nuc photo by David Clark.

robbing, contribute to colony failures, create confidence-robbing eyesores, may spread disease, and significantly increase the number of emergency phone calls I receive. Most years at this time, I take a stab at repairing and repainting what I can. If I had a fireplace, I would not even do that.

Color Choice

If your approach is to head over to the paint store and take whatever bucket may have ended up on the "oops" shelf, this really is not the article for you. If you are into planning, however, read on.

So two things: color matters to people, and color also matters to bees. All those flowers out there vie with each other via hue and odor and nutrition and abundance to get pollinator attention, and the first act is color. We also know that bee vision is different from ours, focused on a flower-centered color space, and they even have favorites.

Bees at the hotel apiary orient via color and shape. (photo by Ian Bens)

Color and the world of bees

My friend David has been painting his gear this year, and though he goes with classic white in the main, he is painting the hand holds on each stack a different bee-friendly color to help his bees navigate and to reduce drift. Our friend Bob goes with painting Xs and Os and so on, instead.

According to separate experiments by von Frisch, Menzel and Kuhn, honey bees see and differentiate only four color groups: orange-yellow-green; a narrow blue-green range; blue-violet-purple; and ultraviolet. We can't see the latter, but I am tempted to mess with UV paint, if I can find it. Bees seem to have the easiest time identifying colors near the purple end of the spectrum (proving that most of them are pre-reproductive females) and the hardest time learning green.

So, if you want to go easy on your bees, forget red, go easy on the green, and indulge your inner pastel lover.

Color and People: the Down Low

It's a wonder I still have bees at home, since I started out with Kelly green hives. My goal was for the girls to literally fly under the radar by putting them in woodenware that matched the trim color of my house. I was in a legal gray area, and besides, people do not fear (and complain about) what they do not know to exist.

This is really not a joke. We have a persistent problem with vandalism here, and out of site is out of mind. For many of our ground level, public hive sites we choose an unlovable color, one I call "Rubbermaid Beige" (something like Pantone 7502). Most community gardens feature plastic shed and storage containers in that nondescript light tan, and we've discovered that the uneducated eye tends to pass right over structures in the same shade. If your site has yellow water barrels or blue compost tarps you, too, may be able to hide in plain sight.

Color and People: Reasons to Go Loud and Proud

Color can help people identify with and advocate for your bees, and can even help beekeeping education projects work better.

At the Walker-Jones Community Farm, which is associated with a public school in one of our toughest neighborhoods, honey bee hives were added a few years ago to provide an additional harvest and educational opportunity. It's hard to give lots of very young children an opportunity to interact with the bees on a regular basis, but building out and painting loud, beautiful hive bodies was one way to do it. We did it a bit like a cooking program: some boxes in pieces, some boxes ready for a primer coat, some boxes ready for major decoration, and some hives with totally grotty woodenware just begging for a swap out. The local paint store donated most of the crazy colors and brushes we needed, and we talked a lot about bee vision, about how the bees would use the boxes and frames we were adding, and even which hammers and brushes worked best at each stage of the game. The kids painted what they learned on the sides of those boxes, and look with pride on them every day as they walk past to class. They own those hives, they love those bees. Our biggest problem is organizing enough sessions like this to meet their demand.

And color can mean business, too. The Fairmont Hotel walks the green walk with beehives on the roof, and many folks want to visit them. They had better be good looking! As a result, that woodenware is a cheery bright yellow with a white honeycomb stencil: clever, clean, persuasive, and ready for a photo op. Those hives have to pay for themselves in one way or another, and keeping a low profile *is not* the way to do that.

Finally, at one of our apiaries here, 2014 brings a very special color choice with historical and neighborly implications. My cemetery bee yard started a couple of years ago as a jumble of colored boxes. By the time you read this, however, the woodenware will be "Haint Blue." Many of DC's residents, especially people of color, have roots in South Carolina, and folk wisdom there dictates that "haints" (ghosts) can be dissuaded from entering your home if you paint a shade of sky blue over the door. Apparently, the disembodied spirits look up, see daylight, and figure, "Drat! Gotta go!" Before the area started to gentrify, the porch ceilings across the street from the boneyard were all painted Dutch Boy "Haint Blue" (it's now hit or miss) and I figure my bees should enjoy a ghost-free lifestyle, as well. Plus it's a symbolic hug for their longtime neighbors!

Boring, thy name is beige.

Wield a brush, color the world

So you are actually doing a bunch of things as you spread that rainbow of latex across your woodenware. You are interacting with the senses and the activities of your bees, and giving them a safer, more secure home. You could be protecting yourself from prying eyes, or promoting the contributions your bees are making to the environment, the neighborhood, or the economy. You can learn a bit of science, or maybe do some citizen science around what works best for your girls in your apiary. You are investing with hope, and maybe some creativity and humor, in the year ahead, and the many sweet benefits it may bring. BC

Toni Burnham keeps bees on rooftops in the Washington, DC area where she lives.

WHY BEES STARVE

Ross **Conrad**

Why do we keep bees that don't have enough to eat?

March, it comes in like a lion and goes out like a lamb. This idiom has a special meaning to beekeepers whose hives, bursting with bees in the beginning of March become weak or dead by month's end. The killer during this time of transition from Winter to Spring is often starvation.

There are numerous reasons that starvation visits our beeyards at this time of year. One common cause of starvation is a colony with too small a population to maintain warmth within the cluster. Often *Varroa* mites weaken the bee's immunity leading to diseases that are a leading cause of decreased hive populations over Winter.

Another source of disease are old combs contaminated by toxic pesticides and their residues that can overwhelm the immune response of the bees within the hive. Old comb is also a major source of pathogens that can infect the colony directly. When the health of a hive is compromised the colony's population can decline to the point where the temperature of the Winter cluster cannot be maintained. As temperatures drop, the bees eat up the honey in the comb sitting within the cluster and a margin of empty comb is created around the outer edges of the contracting cluster of bees. As the accessible honey gets used up, small clusters are unable to generate enough warmth to allow workers to reach honey stored in other areas of the hive, sometimes only inches away.

A cause of overwintering starvation that is entirely preventable is starting out with not enough honey on the hives as they head into the Winter months. This happens when colonies that were unable to store enough honey for Winter are either not fed enough, or when too much honey is taken from the bees during harvesting. The former reason for the lack of sufficient honey stores can be resolved easily by feeding early enough in the season that the colony has adequate time to collect, store and process the syrup before it becomes too cold to do so. Why don't we?

The later reason it turns out can be an even more challenging problem. While it is easy to blame beekeepers that overharvest and starve their bees as being greedy or beekeepers who don't feed enough in Autumn as lazy, it turns out that our human brains seem to be wired in a way that changes our thinking when we perceive that we lack something. These changes in our thinking that are triggered by thoughts of scarcity are explored in the book, *Scarcity: Why Having Too Little Means So Much*, by Sendhil Mullainathan and Eldar Shafir. In the book, Mullainathan an economist at Harvard and Shafir a psychologist at Princeton University drawn on cutting edge research in economics and behavioral science.

As the authors explain, the mindset of scarcity brings with it two benefits. It forces the mind to focus on immediate and pressing needs and it can give people a keener sense of the value of things.

Unfortunately, the scarcity mindset can also be debilitating, shorten a person's horizons, narrow their perspective and create tunnel-vision so narrow that it can be dangerous. The book argues that the anxiety created by a perception of scarcity reduces our mental "bandwidth" by filling our mind with processes that distract our thoughts from the situation at hand, thus decreasing both brainpower and willpower. A feeling of scarcity creates a mindset that can make people slow witted and weak willed which results in poor decisions that often serve to perpetuate the feeling of scarcity.

The book cites numerous studies that support their conclusions. One study revealed that when we have monetary concerns and feel poor, our cognitive performance is eroded even more than when we are seriously sleep deprived. In another study, sugarcane farmers scored worse on intelligence tests before their harvest (when they were short of cash) than after. This same phenomenon has the potential to similarly impact beekeepers when they find themselves out of honey (or money) before their harvest. This suggests beekeepers can fall prey to harvesting too much in the effort to meet immediate short-term challenges while important long-term needs, like the health of the hive in Spring gets waylaid. The end result is that not enough honey gets left on the hive for the bees to survive on through the Winter.

To summarize the book's insights, the scarcity mindset creates a "focus dividend", which is offset by a tunnel-vision "tax" and a "bandwidth tax"; "slack" can create relief from these taxes and relieve scarcity, but "abundance" can be dangerous in itself as it can lead to complacency. So according to the authors, while a lack of honey (or a need for more money), can lead to overharvesting, an abundance of either (or both) can lead to not enough feeding when needed in Autumn, resulting in our having to provide emergency winter feed or be faced with weak and/or dead hives in Spring.

Complacency resulting from a sense of abundance can be exasperated by the fact that colonies typically require little-to-no attention throughout the Winter, especially if they are well taken care of in Autumn. This can lead to an "out of sight, out of mind" situation where hives are over-looked during the warm breaks in the weather that occur during the critical transition from Winter to Spring.

So if you haven't done so already – go out and check your hives for adequate food stores on the next relatively warm day when temperatures are in the 40s or above (Given the polar vortex weather pattern that keeps repeating itself this Winter, at least in the Northeast, with several days to a week of sub-zero temperatures followed by temperatures in the 30s or 40s or higher) this should not be difficult. Be sure that all colonies have several frames of capped honey still in their hives to carry them

The remains of a small cluster of bees that died over the Winter from starvation.

through until the dandelions start to bloom. If hives are still good and heavy, you should not even need to open and check them. When hives feel light, a quick peek under the inner cover is necessary to confirm if the hive has enough to eat or not. In most cases, two-to-three deep frames or three-to-four medium or shallow frames full of capped honey should be enough. Just be sure the honey is located where the bees can reach it: either directly above or next to the clustered bees is best. Move frames around if necessary so that the honey is within reach of the cluster (but take care not to break up the cluster by moving frames in or out of its center).

The last two Winters in the Northeast were relatively mild. Warm Winter temperatures allow honey bees to be more active than they would normally be and the result is that they tend to use up their honey faster than they would otherwise.

Italian bees, having evolved in the warmth of the Mediterranean seem to want to build up at the first hint of Spring. This means that they normally start consuming all the food in the hive and building up their population early, often before the cold weather has lifted for good. Practically speaking, this means that if you keep Italian bees you are likely going to need to be sure they have more honey on their hives (or you may need to feed them more) compared to other strains of bees like Russians.

If during your late Winter/early Spring apiary inspection you find that a hive is weak with a small population of workers, be sure to reduce the entrance of the hive so they don't get robbed out by other hives in the area. It is also a good idea to remove the empty hive body(s) below if all the bees are clustered above in the top super or two. By removing space that the bees are not using and matching the size of the hive's cavity to better match the population of bees, the colony will have an easier time patrolling the hive's interior, keeping it clean and free from pests.

If the hive survives to the end of March, or the first half of April when the first dandelions start to bloom, they have survived the Winter. Congratulations! Now its time to turn your attention to Queen issues, swarming, diseases, *Varroa* mites, pesticide problems, and getting the hive ready for next Winter. There is no reason our hives can't be roaring like a lion by the end of March as long as we work to avoid the scarcity and abundance mindsets and their related consequences. BC

Ross Conrad is the author of Natural Beekeeping.

Ann Harman

In between the Blue Ridge Mountains of the Shenandoah National Park and the Appalachians to their west lies the beautiful Shenandoah Valley. Cattle farms are scattered over the fertile farmland there. The valley is a good area for honey bees. The mountains to the east and west are heavily forested, providing not only early pollen but also honey. Bee friendly wildflowers, are found in abundance in the hedgerows throughout the farmland. Small-scale beekeepers, and some sideliners make excellent wildflower honey in this valley. Several local beekeeping associations can be found along its length. Their beginning beekeeper classes each Spring bring more and more small-scale beekeepers to the region. Yes, all the bees have plenty to eat.

In the late autumn of 2009 Shane Clatterbaugh, owner of an equipment repair business, decided that keeping honey bees would make a nice stress-reducing hobby. But late Autumn is not the time to start beekeeping as Shane fortunately found out. During the following Winter he read books, watched numerous videos, and prepared for Spring by buying his woodenware, assembling and painting it. March came with early Spring weather and Shane's four new hives were now in place and ready for bees.

With the warmer weather of April 2010, Shane's bees arrived. He gathered some friends to watch the installation. He also made a video showing him dressed in shorts and with no gloves doing the installation. Nobody got stung. The friends, as well as Shane, now realized that honey bees are basically gentle creatures. First-year beekeepers tend to inspect their hives more than necessary. Shane did. But his four hives gave him a total of about 120 pounds of honey. Quite a respectable crop from newly-established packages in care of a new beekeeper.

During the past three years Mossy Creek Apiaries has grown to a little more than 30 hives in four different yards. He achieved these hives by catching swarms, doing splits and removing bees from buildings. Although he tried raising his own queens he found that he really did not have the time needed to fit into a successful queen-raising schedule.

His business, called Valley Bee Supply, located in Fishersville, Virginia, started with his desire to expand his number of hives. He tried ordering online but at times it was frustrating. Since he already had a location for his equipment repair business he decided to sell a few items for beekeepers. In August 2010 he set aside a room 'the size of a small bedroom' in his repair facility. The response was overwhelming. This little room was totally inadequate.

During the Winter Shane tore out walls and tripled the size of the bee supply room. To store his inventory he also added 2000 square feet to the repair shop. Now he could order larger quantities to obtain better pricing. However, his bee supply business seemed to be growing uncontrollably!

The inventory space quickly became inadequate with the unfortunate result that the business kept running out of supplies. Demand just kept on outstripping supply. The success was frustrating when he did not have enough of the equipment that the beekeepers needed. That is when he decided to produce his own woodenware.

Months were then spent determining ways to make the products needed and to find the machinery necessary. Added to those tasks was finding the materials needed for quality production.

During all that time Shane was also working in the store, helping customers as well as teaching his family about bees and beekeeping. He found that being 'cooped up all day in one place' did not suit him. Besides he needed the time to expand the business. Although it took

some convincing at first, Fred Hollen was employed to be in the stores selling equipment and, most importantly, giving advice to beekeepers.

Fred was a perfect choice. Although he had always been fascinated with insects, particularly honey bees, he did not become a beekeeper until he was in his early 40s. His career was as a high school teacher of French and Spanish. In 1988 a neighbor gave him some empty beehives that were going to be discarded. Although Fred's first package of bees failed, he found a local beekeeper to help him get started again. Since then Fred has been a highly successful beekeeper, active in both his local Shenandoah Valley Beekeepers Association and Virginia State Beekeepers Association. He has served as President of both groups. Currently he teaches the Spring series of classes for beginning beekeepers given by his local association.

Since Valley Bee Supply was only three miles from Fred's home, he had been a customer since Shane started selling some equipment. Fred had already retired from teaching high school in 2010, so when Shane asked him to help out in the store on three afternoons a week, Fred accepted. Of course those three afternoons quickly became full-time employment.

If you ask Fred how he likes his work you get a quick, definite answer: **'It's not work! It's fun!'**

He explains that being with the large assortment of beekeeping equipment and books is much more like play than work. He also said 'I find my interactions with this diverse group of people, all with a common interest in beekeeping, to be the most interesting part of my position with Valley Bee Supply.'

With Fred's help in the store, Shane was now able to put his time into manufacturing woodenware as well as planning other aspects of his growing business. The website, first designed and built by Shane appeared in December 2012. Like the rest of his business, the website has evolved into the one you see today, www.ValleyBeeSupply.com. Equipment now can be ordered online. The first catalog was printed in 2013. Shane described it as 'a work in progress.'

In December 2012 Shane bought a 10,000 square foot facility to manufacture his woodenware. The building had to be entirely remodeled and power installed. In May 2013, after five months of working seven days a week, the first

pieces of woodenware were made. Although bottom boards and inner covers were made first, soon those pieces that were being sold out in the store could be replaced.

Starting such a business is never easy. Equipment broke down and had to be repaired. Shane had to learn how wood responded to the environment. Efficient cutting and assembly of wooden parts required a lot of trial and error. Today production of woodenware is keeping up with demand. With five employees currently in the manufacturing shop it is possible to keep a large inventory on hand.

One addition to the equipment manufacturing is offering custom woodenware made to the customer's specifications. This addition is certain to be popular with those few beekeepers who like to experiment and design a new approach to beekeeping.

Valley Bee Supply was represented as a vendor at the November 2013 meeting of the Virginia State Beekeepers Association. The display was large and featured some new equipment. One was a newly-designed solar wax melter.

At Valley Bee Supply Shane is dedicated to making and selling beekeeping equipment that he would want to buy for himself. Although Valley Bee Supply is a new company, it has attracted customers from all over the state of Virginia as well as from neighboring states. Now, with online sales, equipment can be shipped easily.

Shane continues to learn by visiting other beekeepers, both new and experienced. He finds that those visits give him new knowledge. At present he is preparing to take the second level of exams in the Virginia State Beekeepers Association Master Beekeeper Program. Currently he is serving as Vice President of the Shenandoah Valley Beekeepers Association.

Valley Bee Supply now carries a complete range of beekeeping supplies. While Shane develops new equipment and tends to the making of woodenware, Fred, at the store, makes certain that beekeepers are finding what they need. Education and support encourages beekeeping and makes it easier, less expensive, more convenient and therefore more rewarding.

Starting a company, especially a manufacturing company, from scratch is a monumental task. Shane certainly tackled that with enthusiasm and dedication. Beekeepers are looking forward to new items in the store where both Fred and Shane welcome them. BC

GLEANINGS

MARCH, 2014 • ALL THE NEWS THAT FITS

NEW WEBSITE FOR EVA CRANE TRUST

The Trust was formed by Dr Eva Crane herself. It was enhanced by the residue of her estate bequeathed to the Trust on her death in 2007.

Dr Crane's research was meticulous and she felt that the recording of information - so that original material could be traced and used by succeeding generations - was a vital part of her work. In her lifetime she had over 300 papers and articles published, and she contributed many learned tomes to the shelves of bee lovers worldwide.

The aim of the Trust is to continue Dr Crane's work in the way she would have liked it to evolve. This includes advancing the understanding of bees and beekeeping by the collection, collation and dissemination of science and research worldwide, as well as recording and propagating a further understanding of beekeeping practices through historical and contemporary discoveries.

The Trust, as well as being Dr Crane's way of ensuring her work continues, is a memorial whereby it may be possible to help fund others who can build on the foundations of sound academic research laid down in her many publications. Grants may be made to individuals and organizations that might otherwise find funding difficult in this specialized field. Applications will be considered from anywhere in the world but must be made in writing in the English language, preferably using the form on the website.

The website, which will be developed and expanded in the coming months, can be found at www.EvaCraneTrust.org.

Similar information can be obtained by writing to: The Eva Crane Trust, c/o Withy King Solicitors, 5-6 Northumberland Buildings, Bath, BA1 2JE, UK.

Richard Jones
Trust Chairman

RUSSIAN HONEY BEE BREEDERS MEET

The Russian Honey Bee Breeders Association met for their annual meeting on December 5th, 2013 at the USDA-ARS Honey Bee Genetics and Physiology Lab in Baton Rouge Louisiana. Members and invited guests enjoyed presentations from Dr. Steve Shepherd from Washington State University on the cryogenic preservation of semen, from Dr. Beth Holloway from the Baton Rouge Lab on her ongoing study to sequence the Russian Honey Bee genome and develop molecular markers for mapping interesting traits and from Dr. Lanie Bourgeois from the Baton Rouge Lab on the genetic test for certifications and the presence, and further development of, genetic resistance to Nosema. Association members will collaborate in Doctors Holloways and Bourgeois efforts through the annual contribution of genetic material (bees and queens) to the lab.

The association also moved to donate $1000 to the "Pollination Stewardship Council".

The next meeting of the Russian Bee Breeders' Association will be Friday, October 24, 2014 in Medina, Ohio. Following that they will offer an informative 1½ day session to anyone interested in becoming a Russian Breeder, or who would like to learn more about these bees.

OBITUARY

Ray Hicks passed away December 9. Ray was a beekeeper for over 30 years and a mentor to many new beekeepers.

He was a faithful member and attendee of both WAS and EAS conferences. He was an avid photographer and provided wonderful photos from both conferences.

Despite fighting cancer, he and Gerry attended the 2013 WAS conference and EAS and gave both one more year of history with his photos.

Ray is survived by his wife Gerry, two daughters, five grandchildren and one great-grandson. He was a graduate of the University of California at Berkeley with a degree in Electrical Engineering.

MONSANTO SPONSORS WOMEN SPEAKERS AT EAS

Eastern Apiculture Society is a the proud recipient of a generous gift by Monsanto to sponsor women speakers to travel to Eastern KY University (Richmond, KY) for its 2014 Summer Conference, July 28-Aug.1, 2014.

Parallel to the scientific tracks offered, the following women speakers will emphasize vocational and/or technical skills applied in the field, the grafting room, or the hidden recesses of a house that swarms have chosen to locate.

- Jennifer Berry, GA queen breeder and EAS 2014 queen production director
- Cindy Bee, co-author of Honey Bee Removal, SARs recipient, Master Beekeeper
- Christy Hemenway, author of The Thinking Beekeeper: A Guide to Natural Beekeeping in Top Bar Hives, top bar hive beekeeper
- Stephanie Tarwater, migratory beekeeper and nuc supplier
- Diana Sammataro, USDA researcher on nutrition, hive products, co-author of The Beekeeper's Handbook (4th edition)

Monsanto's sponsorships spotlights the leadership that women have in the practical skills of beekeeping, some of whom are profiled in EAS President Tammy Horn's book, Beeconomy: What Women and Bees Teach Us about Local Trade and Global Markets (UP of KY 2012).

Monsanto is not the only corporate sponsor to EAS. Many bee supply companies and vendors have a long track record of being the "heartbeat" of bee conferences. For example, Hummerbee Forklift CEO Brian Kulling will make his forklifts available for Stephanie Tarwater to do demonstrations on EKU's campus. But such a gift signals an important paradigm shift among agriculture corporations to make the world a healthier place for bees and beekeepers.

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I generally do pretty well selling honey at the early-November Aspen ski patrol medical refresher. This two-day affair draws a couple of hundred attendees. I pitch product on day one, so folks can bring money the day following. At the last refresher, I ran into the ski area vice-president, an amiable guy who seems amused to have a beekeeper on the payroll. He said, "My beekeeper friends on the Eastern Slope had a fabulous honey harvest. They have acres of alfalfa outside their door and no completion from commercial beekeepers."

He's mentioned these people before. They sometimes send him my columns when they touch on the operations of the Aspen Skiing Company. So I have to watch what I say!

I said, "I know a few beekeepers. What are your friends' names?" The woman's name meant nothing to me, but the man's hit me like a gut punch. It was a name I'd never forget. It was the name of a man I'd never met. Long ago, he married Beth.

In 1967, when I was just a kid, I loaded up my Rambler station wagon, drove over Loveland Pass in a snowstorm, and landed a job washing dishes at a ski lodge in a new resort called "Vail." That's where I met Beth. She might have been a bus girl. I don't remember. I think she was bowlegged, but maybe that was somebody else. I'm sure she was a tomboy. We skied together. I was hopelessly smitten. This was unlucky for me, because she was engaged to a Marine pilot. The Vietnam War raged. I'd have wound up over there myself, if I hadn't already flunked my physical.

So there wasn't any smooching with Beth. But we hung out. I adored her. I didn't want that winter to ever end. When it did, I hitchhiked to California to visit her at her parents' seaside home. We went to Disneyland.

Sixteen years later I ran into her working in a grocery store in my neighborhood. She'd married that pilot. They had a family, and she had cancer. She seemed inexplicably upbeat. We thought maybe we'd get together for lunch, but we never did. After awhile, I stopped seeing her at the store. I figured she was a goner. I thought about calling, but it felt awkward. "Hello? Are you Beth's husband? I'm oh, just a friend, and I was wondering if she's still alive . . ."

All these years I wondered, until last November after the medical refresher, when I called the Marine pilot beekeeper whose name I still remembered after all these years. He was a little surprised to hear from a *Bee Culture* columnist. "I recognized your name on my caller ID but couldn't place you," he said. I got right to the point: "Is Beth still on this Earth?"

"Oh, sure," he said matter-of-factly. She'd made a "miracle recovery," he explained -- after refusing chemo and radiation. Later, they divorced. They both re-married. Now they both live in the country. She has horses. He has bees. The kids are grown. He sounded at ease explaining all this to a stranger on the phone.

I took a deep breath. Life never turns out the way we expect it to. All I wanted now was for all of us to live happily ever after.

Back at the patrol refresher, I made a pitch for improved health through the regular consumption of honey. You have to believe in your product! I explained Dr. Ron Fessenden's argument that the perfect ratio of fructose to glucose in honey acts to promote the production of glycogen in the liver, which keeps your brain fed through your nighttime fast, eliminating one cause of insomnia.

I got some skeptical looks from the audience, but I ran this past a freethinking doctor friend before I gave my little speech. "Sounds reasonable to me," he said. Plus I freely admitted a clear conflict of interest, which got a laugh from the crowd.

I sold plenty of honey, but only one person expressed an interest in getting more sleep by eating a teaspoon of honey before bed. One person out of 200? This is such a no-brainer! This is the best-tasting medicine you'll ever take. Why wouldn't you at least give it a try? I asked my insomniac honey buyer to let me know if the treatment worked, and so far the answer is no. Of course I never said it would. I only said give it a try. It works for me, but I have an advantage: I believe. Maybe it's all in the mind!

In my mind, I brought Beth back from the dead with a phone call. I'm pleased she beat the odds. It gives me great peace knowing she's alive. I hope she's happy. I suspect she is. I've got her number. One day I'll call.

Ed **Colby**

Beth

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