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BEEKeeping

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Cover: This is Charlie Brandts, beekeeper at the White House for 10 years. Come and meet Charlie, and hundreds of beekeepers, vendors, scientists and the BEEKeeping staff at the EAS Conference August 13 - 17 in Hampton VA. Check it out at www.Easternapiculture.org.



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The Editor's Hive

Our Sister



Kim Flottum

I want to share a bit about our sister publication *Bee Culture*, The Magazine Of American Beekeeping. Both are published by the A. I. Root Company here in Medina, but *Bee Culture* started back in 1869, when the Root Company was the largest manufacturer of beekeeping supplies in the universe. They were also one of the largest queen producers, honey packers and beekeeping book publishers in the US at the time.

Beekeeping lends itself to beeswax, and over the years the Root Company eased over to producing candles instead of wooden ware and queen bees, but kept up with the book and magazine publishing, and so here we are today.

Bee Culture's content is aimed more toward experienced beekeepers, serious honey producers selling their products for a living, migratory beekeepers, queen and package producers, serious pest and disease discussions, scientists (but it isn't a science journal), gardeners interested in pollinators and the like. It makes the broad assumption that its readers have the basics mostly under control. That can be a stretch sometimes as all of us still struggle with the basics sometimes, but mostly that's our reader.

In the world of beekeeping *Bee Culture* has, and sometimes shares, some of the best known writers in the industry. You've seen Jim Tew here, Ann Harman, Clarence Collison and Ross Conrad. All are good at working with beginners as well as talking to scientists. And, many of the writers you see here are also

book authors that you can find where books are sold. Jim and Clarence are retired University Professors. Jim was Beekeeping Extension at The Ohio State University with a couple of basic beekeeping books under his belt, and Clarence was the same at Mississippi State with two books that we have published with him. Ann writes for several beekeeping publications, many of them in the UK, Ireland and other countries and she's a sideline beekeeper. Ross is a commercial beekeeper and author of *Natural Beekeeping*. Others include Jennifer Berry, Lead Researcher at the Univ of GA, and Phil Craft, retired State Apiary Inspector from Kentucky. Occasionally you'll see Larry Connor, once a queen breeder, Extension Specialist in Ohio (Jim replaced him), and now beekeeping book publisher.

And then there's the related stuff. History articles with Jim Thompson occasionally, arguably the most studied beekeeping historian in the universe, and those cooking with honey recipes you'll see (honey isn't only good in tea and on toast you know).

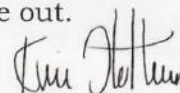
Of course while we keep some things and most of our writers separate, we do share information that is pertinent to all beekeepers. Our Honey Report, New Products, and many of our advertisers are in both magazines because that information can be used by just about every beekeeper.

But the information you find here is aimed right at the 0 - 3 year beekeeper. I tell writers to imagine a beekeeper who still isn't sure which end of a hive tool to use, all the

way to a beekeeper who feels comfortable with smokers, but maybe not yet good disease ID, but is trying. The original idea came up for the same reasons A. I. Root started *Bee Culture*. I found I was answering the same questions every Spring for folks just starting out, so it was always difficult to get new items and information in the magazine. So...*BEEKeeping* began.

Of course BC is monthly, so the stream of information is wider and deeper, and that does make a difference to some, but a quarterly is just fine for a lot of folks we've learned. So we try and pack as much in as we can, both how-to, why-to, when-to and where-to so you have a reference point on timing and doing.

If you're curious, there's probably a BC on the same newsstand you found this one on, or drop us a line and we'll send one out.



Have a thought about something you'd like to see in *BEEKeeping*? Or someone you know about who covers topics of interest to you? We are contemplating having a Mailbox section each issue along with a Calendar section so you can see what meetings are on the horizon. And so far we haven't ventured into hive management much for top bar or Warre hives, but that's on the agenda. But if there's something else you'd like to see? Let me know and we'll see what we can do. 🐝



Ann Harman

1ST YEAR HIVE TASKS

Goal: all comb drawn by end of June and colony numbers increasing.

If your colony was started from a package of bees, do not plan on a honey harvest this year. If started from a nuc (nucleus colony) you could harvest honey if you have a late honey flow.

- Inspect hives when weather permits: warm sun, low wind, temperature above 60°F
- Keep inspection time as short as possible
- Lightly mist foundation (Langstroth hive) with 1:1 sugar syrup with Honey-B-Healthy to stimulate drawing comb
- Move follower board (top bar hives) to keep up with comb construction
- Add next brood chamber (Langstroth hive) only when previous one has 90% drawn comb
- Feed package bees 1:1 sugar syrup
- Feed pollen patties until pollen is available
- In small hive beetle (shb) areas monitor patties for infestation



Inspect hives when weather permits.



Replace the queen if she is dead or not laying.

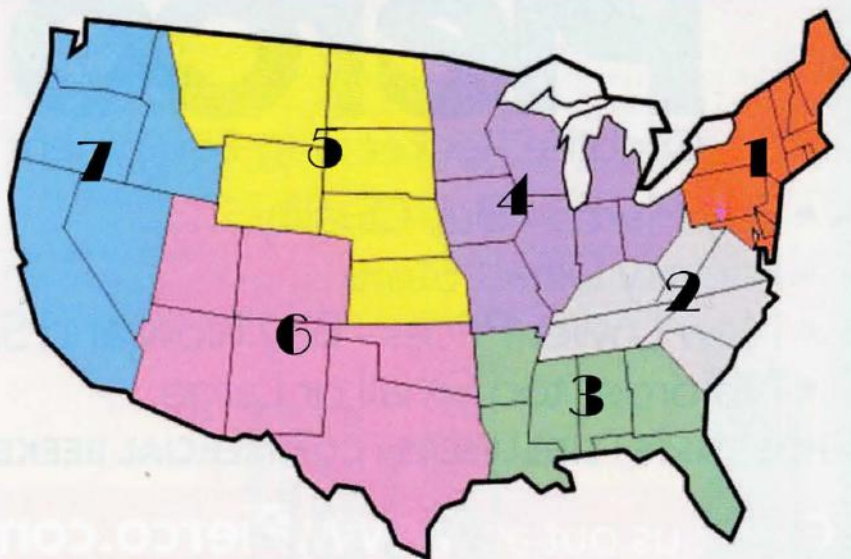
- Watch returning bees at entrance for evidence of pollen collection
- Keep entrances small until colony numbers increase
- Inspect for presence of queen by looking for eggs and young larvae
- Monitor queen performance from the brood pattern
- Replace queen if she is dead or not laying enough eggs to increase colony numbers

- Do not consider a honey harvest until all brood chambers have 100% drawn comb and colony is full of healthy bees
- Bottled sugar water is not honey! Do not put honey supers on when feeding sugar syrup
- Learn seasonal pollen and nectar plants in your area
- Learn about your bees' foraging area whether urban, suburban or rural 🐝



Feed pollen patties until natural pollen is available.

MAY - REGIONAL HONEY PRICE REPORT



Honey Market Prediction

Imports are still a challenge when it comes to honey prices (and honey quality), so we checked in with our reporters this month on their prices, the demand for their honey and what they intend to do this season because of all this.

It's about a 50:50 split on the demand side. About half expect it to increase, the rest to stay the same. That's over all. Regionally, it's way different in a couple of places. Region two has only 20% thinking demand will increase, and 80% staying

flat, while Region 3 is just the opposite, with 77% aiming for an increase. The rest are about the same as the overall picture.

Honey prices aren't volatile in most places either. Overall, only 35% plan to increase prices this season, and 65% are going to stay the same. And that picture is pretty much the same everywhere. But for those who are raising prices, cost of production was by far the most common reason. But the simple fact that demand was increasing, especially in Regions 3 and 6, led reporters

in those regions to take advantage of that and price increases will be seen more there. Interestingly, we offered another reason for raising prices, Because I Can, and 11% of the reporters will raise their prices because they can without hurting business.

So what about production plans next season? Overall, fully 60% plan some level of production increase to accommodate demand and need for increased income, even if prices stay flat, with Regions 3 and 5 leading the way for increases, and Regions 1, 2 and 9 avoiding that risk the greatest.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	\$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.36	2.18	2.53	2.46	2.25	2.28	3.00	1.74-3.00	2.36	2.36	2.29	2.21
55 Gal. Drum, Ambr	2.20	2.13	2.14	2.39	2.20	2.15	3.00	1.35-3.00	2.22	2.22	2.19	2.10
60# Light (retail)	200.89	184.75	188.75	199.35	159.00	200.57	250.00	150.00-250.00	201.79	3.36	202.88	200.91
60# Amber (retail)	202.30	184.84	187.50	204.94	202.30	193.93	250.00	150.00-250.00	204.60	3.41	202.10	197.16
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	88.51	76.50	88.20	65.67	57.84	84.00	88.51	57.84-134.40	80.90	6.74	85.19	77.67
1# 24/case	137.93	108.70	130.76	113.11	127.16	124.88	172.00	86.40-211.20	127.06	5.29	124.55	118.50
2# 12/case	118.97	95.95	113.58	102.64	97.44	98.40	118.97	78.00-182.40	107.75	4.49	110.42	105.48
12 oz. Plas. 24/cs	107.83	89.60	100.67	87.00	74.40	104.32	84.00	66.00-172.80	96.27	5.35	98.57	92.91
5# 6/case	127.28	109.80	186.00	112.70	102.30	115.80	127.28	71.50-186.00	125.82	4.19	126.05	116.61
Quarts 12/case	161.72	138.04	133.26	163.25	155.32	130.62	132.00	109.00-250.00	143.93	4.00	141.78	140.01
Pints 12/case	92.35	91.40	76.33	81.00	111.00	81.96	84.00	65.00-126.00	89.19	4.96	91.65	89.98
RETAIL SHELF PRICES												
1/2#	4.64	4.30	4.70	4.12	3.97	3.68	6.00	2.36-7.00	4.60	9.19	4.86	4.24
12 oz. Plastic	5.93	5.09	5.21	5.22	4.76	6.50	5.10	3.50-9.00	5.61	7.47	5.78	5.32
1# Glass/Plastic	6.00	6.98	7.43	6.27	6.55	6.58	8.67	4.00-11.00	7.10	7.10	7.40	6.88
2# Glass/Plastic	12.00	10.51	12.84	10.57	11.62	11.00	15.00	8.00-19.00	12.05	6.03	12.47	11.90
Pint	11.10	8.89	9.14	13.14	8.90	10.69	9.47	4.50-20.00	9.95	6.63	10.08	9.65
Quart	16.54	15.80	17.17	15.15	15.90	17.10	19.04	8.00-25.00	16.58	5.53	17.10	16.35
5# Glass/Plastic	27.87	27.10	40.63	23.50	22.41	25.98	27.87	15.00-43.25	26.61	5.32	26.74	25.92
1# Cream	9.73	8.67	11.25	7.25	9.99	5.50	9.73	5.50-16.00	8.71	8.71	9.07	7.97
1# Cut Comb	11.82	10.00	11.75	9.56	12.50	6.50	11.82	6.00-20.00	10.64	10.64	11.48	10.63
Ross Round	9.00	6.59	9.00	9.00	9.00	10.50	12.49	6.00-12.49	8.75	11.67	8.27	8.75
Wholesale Wax (Lt)	7.73	4.96	5.75	5.91	6.00	5.55	8.83	2.75-15.00	6.58	-	6.41	5.82
Wholesale Wax (Dk)	6.31	4.84	4.18	5.89	6.31	3.17	5.50	2.00-12.00	5.62	-	5.64	5.60
Pollination Fee/Col.	102.50	69.00	72.50	82.50	102.50	142.50	75.00	40.00-195.00	87.50	-	89.58	87.50

New For The Summer-

The Backyard Pollinator is an individual block of leafcutter bee nesting habitat containing bee larvae ready to hatch in warm weather. It can be placed anywhere that you wish to observe the activity of Leafcutter bees and the pollination of nearby flowers.

Along with the Backyard Pollinator blocks, we offer Hatch & Release Leafcutter Bees, Wildflower Pollinator Mix and Commercial Leafcutter Bee Blocks.

The Backyard Pollinator is an essential item for curious children, avid gardeners, nature lovers, budding entomologists, excited Grand-parents, super Moms, cool Dads, the ecologically aware and entry level beekeepers.

This product is a piece of our farm scaled down to fit any situation whether in your backyard, on an apartment window, in a classroom and everywhere in between.

From Vancouver to Nova Scotia, from Alaska to Florida, the Backyard Pollinator is our way of getting leafcutter bees to you in a convenient package, at an affordable price.

The true value of a Backyard Pollinator is not what comes inside the package. It is the magical experiences you will encounter during the growing season.



Are you ready to enhance your whole life adventure and rediscover the connection to important values that have been lost in the daily grind of life? Visit backyardpollinator.ca for more information.



Bee Hive Thermal Industries, Breaking News, Saving Honey Bees Organically

An organic and noninvasive solution in targeting and killing Varroa Mite infestations, that are killing honey bees, was developed by the joined forces of, Bee Hive Thermal Industries (www.beehivethermalindustries.com) and OVEN Industries (www.ovenind.com), experts in temperature control.

In the fight against today's Varroa Mites, beekeepers are often, if not always, resorting to pesticides as the solution. Bees have many other predators and hardships to endure, including weather related issues such as cold temperatures, moisture and diseases. The effect of the Mite on the overall colony is paralyzing to both general activity and honey production within the hive. This revolutionary product is showing positive results in killing and controlling mites and hive beetles, with only a few applications annually. Visit our website: www.beehivethermalindustries.com



Lynn Williams
803-504-9313; lynn@beehivethermalindustries.com
Entrepreneurs Needed For Sales & Support

The redesigned **Honey Squeeze** is more eloquent, efficient, and affordable.



The stainless steel construction comes with a lifetime warranty and is 100% made in the USA. The machine dispenses honey, maple syrup, chocolate syrup, agave, and simple syrup without mess or contamination. It weighs only three pounds 11 ounces and measures 14 inches high, 7 inches wide and 6 inches deep. It will display nicely on any kitchen counter top. For pricing and more information visit www.thehoneysqueeze.com.

More Of What's New-

Mule-Grip

Of the several styles of frame grips sold today or developed through the years they all offer the same scissor action to hold and extract the frame. The beekeeper must use strong hand strength to squeeze then lift the frame. This pressure force must be maintained through-out the handling of the frame.

The new Mule Grip™ offers a major increased gripping force through a double mechanical advantage along with its increased position from the frame. This is further complimented by using



uniquely shaped ends formed to hold all styles of wood and plastic bee frames preventing them from twisting even when held at 90°. Plus a unique scissor design requires less travel distance to close against the frame.

The result is less hand and wrist strain is achieved with less force and arm strain by the beekeeper.

Ever since the introduction of plastic frames the same awkward wide frame grips that are used for wood frames remains the industry standard. The Mule-Grip™ is the first product designed specifically to handle both wood and plastic frames.

Three Styles of Units are Available – Wood and Plastic, Wood Only, Plastic Only.

If desired a separate wood or plastic version is available to meet the needs of all markets. This may apply if you only have wood frames or only plastic bee frames.

All styles have been uniquely designed to offer the same level of performance.

Locking Arm (Available on all

styles) – allowing the beekeeper to tightly lock the frame grip onto the frame. Once locked the frame can be moved in any angle even horizontal without using any force to hold it closed. No longer be concerned about frame twisting or falling due to losing your grip.

This will also allow you to set the frame down without releasing the hold on the frame.

Visual Positioning Indicator ensures frames are returned in same direction as removed. Eliminates confusion and damage to comb or bees

All Frame Grips are made from heavy 12-gage stainless steel not aluminum.

Plastic grip handles are 3/4" 6-Flute plastic that not only improves one's grip while wearing bulky gloves, it reduces hand strain and pressure. Excellent to all users: from adults, women, children seniors and even those with disabilities.

Little Mule Bee Supply, LLC www.littlemulebee.com
sales@littlemulebee.com – Oklahoma, USA

Parsons' Gold Apiaries DVD Set

Bob Parsons is owner and operator of Parsons' Gold Apiaries located in Forest, OH.

The main *Spring* board to a life time of honey bees came in 5th grade when a beekeeper brought in an observation hive to his class. During a visit to family members in Indiana he watched his uncle tend his hives. He got his first four hives in 1965 and has been involved with bees ever since – 52 years.

He sells package bees and nucs and all sorts of bee equipment to beekeepers all over. He has been shipping bees for about 10 years. His website is geared mainly to new and returning beekeepers. It helps them in getting started by telling them the equipment they need, cost, etc. What customers really want is to 'see' how to do things. So Bob decided to show them how.

Below are the developed DVD's to date:

DVD #1. – Beekeeping Simplified! This DVD shows the beekeeper how to put a beehive together. How to assemble a frame. How to light a smoker and keep it lit.

DVD #2. – Hiving Packaged Honey bees Successfully! This DVD is very helpful to new beekeepers. It shows what equipment they need and how to go about getting the bees out of the box and into the hive.

DVD #3 – Honey Comb Production and Bee Pollen Collecting!



This DVD shows the equipment needed, how to put it on and how to make comb honey and collect pollen.

DVD #4 – Catch a Swarm/Work the Bees! This DVD demonstrates Bob and Deborah Parsons catching a swarm in their own backyard. All is not successful at first, so alternative measures are taken. Next, Bob shows how to work the bees. What does that mean and what do you do and what are you looking for once you get inside the hive?

DVD #5 – Extracting Honey for the Small Beekeeper! Once you have made honey, how do you get it away from the bees and how do you get it out of the frames? Using a hot knife to cut the wax and the use of a small extractor shows you how to do it.

DVD #6 – The Prescription! - Helping honey bees survive cold times of the year. This outlines a step by step over wintering process. Also use these steps during rainy Seasons. 🐝

Got Questions?

Phil Knows!

Phil Craft



A beekeeper in Pennsylvania writes:

Q: *I have a question on storing raw honey. What is the optimum temperature to help prevent crystallization? In the past we've kept some in the freezer with no crystallization after 6 months. Do you have any ideas on reheating crystallized honey that we would keep it classified as "raw honey".*

Phil replies:

A: Honey tends to crystallize in a temperature range around 57°F. Five or 10 degrees more or less can reduce the probability and rate of crystallization, but still be in the danger zone. Of course, honey from some nectar sources tends to crystallize more readily and in a wider range of temperatures than others. Canola honey is notorious in that respect, though it has a light, delicate flavor. I am always cautious when storing honey between 45° and 70°F.

I think you have already found the best solution; freezing honey before it crystallizes is the best, and likely the simplest way of dealing with the problem, as long as you have enough freezer space. Freezing prevents crystallization from occurring. A few days before the honey is needed, it can be removed and allowed to sit at room temperature until it returns to a liquid state, just as it was before you put it into the freezer.

Your other question is more problematic, not because the process of de-crystallization is complicated, but because there is no accepted definition of "raw honey." It is a marketing term, not a legal one. "Pennsylvania honey", for instance, is specific. Logically, it means honey harvested in Pennsylvania, made from nectar sources within the state. Raw honey, on the other hand, can be interpreted variously. A customer might assume it to mean that the product is unfiltered, whereas the beekeeper intends to convey that it

is lightly processed. The Phil Craft definition might be honey as it comes from the hive, without any processing at all – in other words, comb honey. After all, honey houses are considered food processing facilities and are regulated and inspected as such by the government in most states. By extension, if raw means unprocessed, it must also mean un-extracted.

Most definitions of raw honey include some restriction on the maximum temperature to which it can be heated during processing. Purists go so far as to argue that heat should never be applied. If you have honey to de-crystallize, that poses a problem. The **only** way to return it to a liquid state is to heat it enough to melt the sugar crystals – to 100°F at least. Though it's true that excessive temperature can alter the subtle flavor of honey (that's why most people prefer the taste of local honey to that of the commercially processed, flash heated, pressure filtered generic product available in stores), there's no agreement on what is excessive. This group says that honey is not raw if it is heated, that one that it loses quality over 115°F so anything less than that is OK. However, during Texas Summers, honey supers can get hot, really hot. Does that mean that honey from Texas doesn't qualify as raw even if it's not processed? It's a debate I don't want to get into. I won't even stand behind the Phil Craft definition which I offered tongue in cheek (though there is some logic to it.) I simply avoid using the adjective raw as applied to honey.

I can only tell you how I handle processing and labeling my own honey. I produce and sell about 800 pounds a year. After extraction, I store it in five gallon buckets, and when it's time to bottle I move it to a double-jacketed, water heated bottling tank. I always heat it to at least 100°F to expedite the bottling process. (Warm honey flows more readily, which saves me a lot of time

and eases the strain on my surgically repaired back.) If it has started to crystallize in the buckets, I turn the heat up to about 110° to 120°F for a couple of days. This de-crystallizes it, without (in my opinion) harming the flavor. I label it as "Kentucky honey" or "local honey." When asked, I describe it as lightly processed. If a customer is looking for raw or unprocessed honey, I encourage them to buy it from someone else.

If you really want to sell your honey as raw and unheated, and to avoid the crystallization problem, one solution might be to freeze as much as you can and consider making creamed honey with the rest. Creamed honey is a product of controlled crystallization and is the form in which most honey is consumed in some parts of the world. If you don't already know how to make it, contact me again for suggestions.

A beekeeper in Indiana writes:

All of you experts tell us to treat for

Q: *Varroa mites, but they also say to monitor for mites. Though all the beekeepers that I know who don't lose most of their bees every year, treat EVERY year. So if we are going to treat anyway, why monitor?*

Phil Replies:

Monitoring alerts beekeepers to

A: high *Varroa* levels, but it accomplishes much more than that when done correctly.

Let's go back in time, to when *Varroa* mites first swept the U.S. with devastating results, to understand how monitoring practices developed and how they have changed. When the first treatment was approved in the early 1990s beekeepers seized upon it eagerly. Monitoring was not common practice because there were really no decisions to be made. Mites were pervasive and there was only one registered product to control them: Apistan, containing the active ingredient fluvalinate. Not treating meant total colony loss. *Varroa* treatments were typically "by the calendar", meaning an application in early Spring and another in late Summer, without prior monitoring. This method was successful with the majority of mites – those susceptible to fluvalinate – but a few possessed a degree of natural resistance. They reproduced and passed on enhanced

resistance to their numerous offspring in a process similar to that in which over-use of antibiotics in humans has created MERSA and various other drug resistant strains of bacteria.

Researchers feared that years of regular exposure to a single chemical agent would create a super strain of *Varroa* impervious to our only available weapon against them. They started urging beekeepers to monitor in order to assess the level of infestation in their hives and to treat only when necessary. Resistance developed despite their efforts with the result that, though still sold by suppliers and sometimes still effective, Apistan is now little used. Fortunately, by the time *Varroa* resistance to fluralinate was widespread, Checkmite+ with coumaphos had been given emergency approval for use in beehives in most states. Experts continued to advise treatment only when indicated by regular monitoring. Like Apistan, Checkmite+ is available but seldom used against mites these days, both because of resistance and because of its toxicity to bees.

Thanks to the diligence of researchers and the commercial importance of honey bees, we now have a variety of tools to use against *Varroa*: some synthetic and some organic, some having an immediate effect and some which act over time to kill emerging as well as adult mites, (and also a few which are popular but ineffective). With all these options comes the need for solid data to enable individual beekeepers to make the best choices for their situations. Resistance is still a concern and reason enough to monitor, though alternating different types of treatments can mitigate the problem. But monitoring can also ensure timely treatment. Knowing the mite count in early Spring gives a beekeeper information to direct a strategy. A moderate to high number would indicate immediate treatment to save the colony, even if

that meant missing part or all of the honey flow, because most miticides cannot be used with supers in place. A beekeeper with a low or moderate count has more options. Depending on the number, he or she might decide to act at once, or to postpone treatment until supers are removed. MiteAway Quick Strips are registered for use with supers, but like other fumigant products (such as Apiguard and some applications of formic and oxalic acids) are not effective until average temperatures reach a certain range – thus not of use in much of the country until later in the Spring. An accurate mite count is invaluable in deciding whether it's safe to wait that long. It should also be a part of hive assessment going into Winter. When it's too chilly for fumigants and too late in the year for Apivar strips (because cold weather could prevent their timely removal) there's still time for a flash treatment with oxalic acid if indicated by a high Fall count.

The fact that so many confusing choices exist highlights another reason for monitoring *Varroa* mites: to gauge the effectiveness of mite management strategies. Could *Varroa* be developing resistance to the chemical you've been using for years? Is the organic treatment you read about online really working? Many beekeepers feel safe because they conscientiously use some form of mite control. When their colonies die, they ascribe the losses to CCD, pesticides, or some other cause, and that may be the case. But. There is no way to know if a treatment is effective, or if it was employed in time, without monitoring both before and after.

Regular monitoring can also reveal sudden increases in *Varroa* loads, which may occur if your hives are located near those of other beekeepers. One small commercial beekeeper I know tells me that a hobby beekeeper placed some hives near one of his apiaries. The hobbyist doesn't treat for *Varroa*. My friend can tell just by looking at mite counts which samples come from that apiary. His treated colonies, which rob his neighbor's *Varroa* weakened ones, carry mites back with them and always show a higher mite count than those in his other, more isolated hives. He has to keep a closer watch on those. There's no one-size-fits-all answer for how often you should monitor any more than there is for

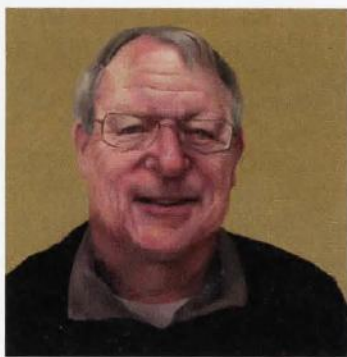


how often to treat. It's typical for commercial beekeepers to monitor once a month. For small beekeepers and hobbyists, I would suggest as a minimum checking in the early Spring, then after honey supers are pulled, after the completion of each treatment for *Varroa*, and again in the Fall. That sounds like a lot, but it isn't always necessary to monitor each hive every time. If you have fewer than 10, I recommend checking them all, but in an apiary with more than that I suggest randomly sampling eight or so, including any which seem to be building up slowly or which give you other reasons for concern.

How high is too high? Interpreting the results of monitoring could be the subject of another column – or a short book. It depends on the monitoring method, the time of year at which samples are taken, and the region of the country in which the hives are located. The best guidance might come from your state apiarist or local association. Good information is also available at the websites of the Honey Bee Health Coalition: <https://honeybeehealthcoalition.org/> and the Bee Informed Partnership: <https://beeinformed.org/>

Controlling *Varroa* is no longer as simple as treating by the calendar. It's about knowing whether to treat, when to treat, and whether your treatment was effective. Monitoring is a tool you need to be successful.





BROOD & BROOD PHEROMONE

Feeding Hungry Bees

~Clarence Collison

When larvae of the three honey bee castes are starved under natural or laboratory conditions, some produce dwarf adults. Jay (1964) tested the effects of larval starvation on subsequent development; larvae of various weights were removed from their food and put into gelatin capsules. The following development parameters were determined: (a) success in completing prepupal and pupal ecdyses (shedding of outer cuticle, molting), (b) weight after the pupal ecdysis, (c) time for development, and (d) type of adult reared. The longer the larval feeding period for the three castes, the more successful were the ecdyses. Developmental failure was high if worker, drone, and queen larvae were removed from their food when they were 60-65%, 85%, and 60-65% of the weights of control larvae, respectively. The developmental times of workers or drones did not vary significantly with the various larval weights but those of larvae from queen cells increased with decrease in larval weight. The various-sized adult drones reared did not appear to differ in gross external appearance but the smaller workers had proportionately longer wings than the larger ones. Adults reared from the smallest larvae from queen cells resembled workers (or intercastes) whereas those from the largest larvae resembled queens.

Honey bee larvae are frequently inspected and, sometimes, provided with food by adult workers, but the stimuli that elicit the important task of food provisioning have not been fully investigated. Larvae with their food experimentally deprived received more frequent inspection and feeding visits from nurse bees than normally fed larvae, suggesting that there could be a "hunger signal." Food-deprived larvae with artificially supplied larval food received the

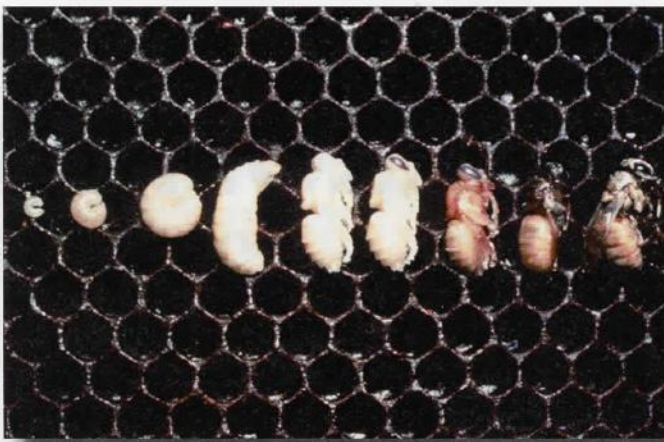
same rate of feeding visits from nurse bees as did normally fed larvae but still received more inspection visits. These results suggest that stimuli eliciting feeding are different from those for inspection. They also support the hypothesis that worker bees deposit food in a larval cell only when the quantity of food is below a certain minimum threshold that is perceived during larval inspections (Huang and Otis 1991).

A brood pheromone signaling the presence of larvae in a bee colony has been characterized and well studied. He et al. (2016) investigated whether honey bee larvae actively signal their food needs pheromonally to workers. They showed that starving honey bee larvae signal to workers via increased production of the volatile pheromone E- β -ocimene. Analysis of volatile pheromones produced by food-deprived and fed larvae with gas chromatography-mass spectrometry showed that starving larvae produced more E- β -ocimene. Behavioral analyses showed that adding E- β -ocimene to empty cells increased the number of worker visits to those cells, and similarly adding E- β -ocimene to larvae increased worker visitation rate to the larvae. RNA-seq and qRT-PCR analysis identified three genes in the E- β -ocimene biosynthetic pathway that were upregulated in larvae following 30 minutes of starvation, and these genes also upregulated in two-day old larvae compared to four-day old larvae (two-day old larvae produce the most E- β -ocimene). This identifies a pheromonal mechanism by which brood can beg for food from workers to influence the allocation of resources within the colony.

Most animals can modulate nutrient storage pathways according to changing environmental conditions, but in honey bees nutrient storage

is also modulated according to changing behavioral tasks within a colony. Specifically, bees involved in brood care (nurses) have higher lipid stores in their abdominal fat bodies than forager bees. Pheromone communication plays an important role in regulating honey bee behavior and physiology. In particular, queen mandibular pheromone (QMP) slows the transition from nursing to foraging. Fischer and Grozinger (2008) tested the effects of Queen Mandibular Pheromone (QMP) exposure on starvation resistance, lipid storage, and gene expression in the fat bodies of worker bees. They found that GMP-treated bees survived much longer compared to control bees when starved and also had higher lipid levels. Expression of vitellogenin RNA, which encodes a yolk protein that is found at higher levels in nurses than foragers, was also higher in the fat bodies of QMP-treated bees. No differences were observed in expression of genes involved in insulin signaling pathways, which are associated with nutrient storage and metabolism in a variety of species; thus, other mechanisms may be involved in increasing the lipid stores. These studies demonstrate that pheromone exposure can modify nutrient storage pathways and fat body gene expression in honey bees and suggest that chemical communication and social interactions play an important role in altering metabolic pathways.

Schulz et al. (1998) conducted three experiments to explore the effects of severe food shortage on the control of two important and interrelated aspects of temporal division of labor in honey bee colonies: the size and distribution of a colony's foraging force. The experiments were conducted with single-cohort colonies, composed



Stages of development.

of entirely young bees, allowing them to quickly distinguish the development of new (precocious) foragers from increases in activity of bees already competent to forage. In experiment 1, colony food shortage caused an acceleration of behavioral development; a significantly greater proportion of bees from starved colonies than from fed colonies became precocious foragers, and at significantly younger ages. Temporal aspects of this starvation effect were further explored in experiment two by feeding colonies that they initially starved, and starving colonies that were initially fed. There was a significant decrease in the number of new foragers in starved colonies that were fed, detected one day after feeding. There also was a significant increase in the number of new foragers in fed colonies that were starved, but only after a two-day lag. These results suggest that colony nutritional status does affect long-term behavioral development, rather than only modulate the activity of bees already competent to forage. In experiment 3, they uncoupled the nutritional status of a colony from that of the individual colony members. The behavior of fed individuals in starved colonies was indistinguishable from that of bees in fed colonies, but significantly different from that of bees in starved colonies, in terms of both the number and age distribution of foragers. These results demonstrate that effects of starvation on temporal polyethism are not mediated by the most obvious possible worker-nest interaction: a direct interaction with colony food stores. This is consistent with previous findings suggesting

the importance of worker-worker interactions in the regulation of temporal polyethism.

The age of onset of foraging in honey bee colonies is affected both by inhibitory social interactions among nestmates and starvation. Schulz et al. (2002) determined whether starvation affects worker-worker interactions by quantifying the frequencies of five social interactions (trophallaxis, begging, offering, antennating, and grooming) in colonies that either were starved or well-fed. They hypothesized that bees in starved colonies engage in fewer social interactions than bees in colonies with ample food stores. In all three trials, starved colonies had significantly greater numbers of foragers than well-fed colonies, as in a previous study. In three of three trials, starved bees showed a significantly higher frequency of begging behavior than well-fed bees. Begging in starved colonies increased exponentially with time as the starvation presumably grew more severe. Immediately following the onset of foraging in starved colonies, the frequency of begging declined dramatically. No consistent differences for other observed social behaviors were found. Their results under starvation conditions do not provide support for the hypothesis that precocious forager development must be associated with a decrease in social interactions. Perhaps factors that influence precocious foraging under starvation conditions differ from those under conditions of ample food stores. They speculate that the duration and specific nature of the social contact may be important. Furthermore, they speculate that

begging itself may be a cue associated with precocious forager development.

Honey bee worker energy reserve levels are correlated with task performance in the colony. Workers in the brood nest (house bees) have abundant stored lipid and protein while foragers are depleted of these reserves; this depletion precedes the shift from nest work to foraging. Toth et al. (2005) tested the hypothesis that lipid depletion has a causal effect on the age at onset of foraging. They found that bees treated with a fatty acid synthesis inhibitor (TOFA) were more likely to forage precociously. Secondly, they set out to determine whether there is a relationship between social interactions, nutritional state and behavioral maturation. Since older bees are known to inhibit the development of young bees into foragers, they asked whether this effect is mediated nutritionally via the passage of food from old to young bees. They found that bees reared in social isolation have low lipid stores, but social inhibition occurs in colonies in the field, whether young bees are starved or fed. These results indicate that although social interactions affect the nutritional status of young bees, social and nutritional factors act independently to influence age at onset of foraging.

Honey bee colonies, foraging predominantly on a single pollen source, may encounter nutritional deficits. Hendriksma and Shafir (2016) examined the nutritional resilience of honey bee colonies, testing whether foragers shift their foraging effort towards resources that complement a nutritional deficit. Eight honey bee colonies were kept in screened enclosures and fed for one week a pollen substitute diet deficient in a particular essential amino acid. Foragers were subsequently tested for a preference between the same diet previously fed, a different diet that was similarly deficient, or a diet that complemented the deficiency. Foragers preferred the complementary diet over the same and similar diets. Appetitive conditioning tests showed that bees were able to discriminate also between the same and similar diets. Overall, their results support the hypothesis that honey bees prefer dietary diversity, and that they do not just include novel sources but specifically target



Feeding larvae.

nutritionally complementary ones. While they specifically focused on deficiencies in essential amino acids, it cannot be ruled out that bees were also complementing correlated imbalances in other nutrients, most notably essential fatty acids. The ability of honey bees to counter deficient nutrition contributes to the mechanisms which social insects use to sustain homeostasis at the colony level.

Poor nutrition has major consequences for the expression of genes underlying the physiology and age-related development of nurse bees. Corby-Harris et al. (2014) aimed to further understand the transcriptional changes associated with starvation during early adult development. They assayed three day-old and eight day-old bees kept in normally functioning hives and caged over only honey (poor diet) or honey and bee bread (rich diet) and allowed trophallaxis with the rest of their colony. Substantial changes in gene expression occurred due to starvation. Diet-induced changes in gene transcription occurring in younger bees were largely a subset of those occurring in older bees, but certain signatures of starvation were only evident in eight day-old workers. Of the 18,542 annotated transcripts in the honey bee genome, 150 transcripts exhibited differential expression due to poor diet at three days of age compared with 17,226 transcripts that differed due to poor diet at 8 days of age, and poor diet caused more frequent down-regulation of gene expression in younger bees compared to older bees. In addition, the age-related physiological changes that accompanied early adult development differed due to the diet these young adult bees were fed. More frequent

down-regulation of gene expression was observed in developing bees fed a poor diet compared to those fed an adequate diet. Functional analyses also suggest that the physiological and developmental processes occurring in well-fed bees are vastly different than those occurring in pollen deprived bees. Their data support the hypothesis that poor diet causes normal age-related development to go awry. More research is needed to fully understand the consequences of starvation and the complex biology of nutrition and development in this system, but the genes identified in this study provide a starting point for understanding the consequences of poor diet and for mitigating the economic costs of colony starvation.

Corby-Harris et al. (2014) began by assessing whether bees that were fed only honey (no pollen) had reduced hypopharyngeal glands, a classic signature of starvation. Significant differences were found between three day old bees fed the rich versus poor diet, eight-day-old bees fed the rich versus poor diet, and three day old bees versus eight day old bees fed the rich diet. No differences were found between three day old and eight day old bees fed only honey.

Wang et al. (2016a) tested whether food deprivation during development can shift adult phenotypes to better cope with nutritional stress. After subjecting fifth instar worker larvae to short-term starvation, they measured nutrition-related morphology, starvation resistance, physiology, endocrinology and behavior in adults. They found that the larval starvation caused adult honey bees to become more resilient toward starvation. Moreover, the adult bees were characterized by reduced ovary size, elevated glycogen stores and juvenile hormone titers, and decreased sugar sensitivity. These changes, in general, can help adults survive and reproduce in food-poor environments. Their results suggest that this mechanism may play a role in honey bee queen-worker differentiation and worker division of labor, both of which are related to the responses to nutritional stress.

Wang et al. (2016b) further hypothesized that developmental starvation specifically improves the metabolic response of adult bees

to starvation instead of globally affecting metabolism under well-fed conditions. They produced adult honey bees that had experienced short-term fifth-instar larval starvation, then starved them for 12 hours and monitored metabolic rate, hemolymph sugar concentrations and metabolic reserves. They found that the bees that experienced larval starvation were able to shift to other fuels faster and better maintain stable hemolymph sugar levels during starvation. However, developmental nutritional stress did not change metabolic rates or hemolymph sugar levels in adult bees under normal conditions. Their study provides further evidence that early larval starvation specifically improves the metabolic responses to adult starvation.

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HONEYBEE FACT # 35

By John Martin

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OVER WINTERING NUCS

Michael Palmer

A Better Way

The beginnings of a new plan

I used to buy bees, lots and lots of bees; singles from South Carolina, nuclei from Florida and frames of brood from New York. I used to buy queens, lots and lots of queens; queens from Georgia, queens from Texas and queens from California. Every year it was the same. Pick up the pieces of my apiary in the Spring, send a big check to southern queen breeders, split up my best colonies, and hope I made enough of a honey crop to pay the bills. Some years I did, some years I did not.

In 1982, an apiary management job became available with a New York state orchard located on the west side of Lake Champlain. Chazy Orchards, advertised as the largest contiguous McIntosh orchard in the world, managed something like 800 acres of trees. Whether or not it was the largest then or is today I do not know, but I can say it was huge to me. The new job added 500 additional colonies to my workload. Colonies more or less dumped in my lap with the instructions, 'fix it'. The orchard's apiary had crashed over the years from mismanagement and American foul brood (AFB). What had been a successful apiary of more than 800 colonies had dwindled to 150 by 1980. The orchard was able to hire a former Vermont bee inspector for a couple years and he did a great job of cleaning up the disease and starting the buildup of colony numbers to

near pollination requirements.

When I took over, the bees were in decent shape but unproductive. There had not been a honey crop in years and the previous beekeeper, while dealing appropriately with the AFB, nearly bankrupted the apiary, costing \$55 a colony for his management when the orchard could rent colonies of bees for \$22. How many times the owner of the orchard threatened to burn the whole lot I cannot remember, but it seemed like all the time. While working for an angry man is never much fun, I have a thick skin and persisted with my management. The second year I worked for Chazy Orchards, the bees made almost five tons of honey. The angry man almost smiled. The following year we made 10 tons of nice light honey, and management costs fell to less than rental prices.

After working for the orchard for several years, I was ready to expand my own apiary. I felt I could do better with my own bees, and in 1986 I gave my notice; sell me your bees or I am off to work for myself. The grumpy old man resisted but his son saw the wisdom in my offer and the orchard agreed to sell me the bees and all the related equipment. At the time, I thought I had it made. I now owned a business of more than 800 colonies, pollinated with 600 colonies, and if everything worked out as I hoped, the possibility of making many tons of honey seemed entirely possible. Looking back, I now realize the folly of my new path. The best-laid plans often go astray and I found that to be true.

Beekeeping is just like all other agricultural endeavors. It is a tough way to make a living and it seems that every year something goes wrong. How many times have you said it will all be better next year? Next year your bees will Winter successfully, or they will make a big honey

crop because you will do this or that or something else. That is the great hope of every farmer everywhere, no matter what they grow or where they farm. Next year will be the year. So I approached my beekeeping with an eye to the future and the belief that next year will be the year.

Over the years that followed, I did the best job I could. I followed the best management practices recommended by beekeeping experts and educators. My honey crops averaged 18 to 20 tons a year and my Winter losses averaged 10 or 15 percent. For a few years there, in the late 80s, my apiary did me well. Then came *Acarapis woodii* (Tracheal mites). Winter mortality skyrocketed; losses of 30 to 50 percent became normal. Two years after the arrival of acarine, I discovered *Varroa destructor* in my bees. On seeing that first mite, I closed the hive, sat down under an ancient sugar maple, to think about what I had just seen. I knew this was the end of an era and of beekeeping as I had known it. I felt a bit like that maple tree that held my back. She had stood on that spot for hundreds of years, watching the passing of the old ways, one by one. She and I were witnessing the passing of another.

The 1990s was a tough time to be a beekeeper. Winter losses were high and Spring clusters were small. As an apple pollinator with a contract to fulfill, I found it difficult to maintain the required number of suitable colonies to pollinate the orchard. Some years, with numbers way down and very few colonies strong enough for Spring splits, I resorted to buying bees. That is where the singles from South Carolina, the nuclei from Florida, and the frames of brood from New York came in. It was mandatory that I fulfill my pollination contract. I had no choice but to buy in replacement bees and pay for them with my pollination check and it went like that for several years. Buy replacement bees in the Spring spending what money I had and hope



a decent honey crop would come my way. You all know how fickle the honey crop can be, so this was not a good plan. I felt as if I was slowly losing my business. There really had to be a better way.

In 1999, I visited Kirk Webster, another Vermont beekeeper, just before apple bloom. We drove out to one of his apiaries where he showed me some of his over-wintering nucleus colonies. These nucleus were wintering on top of production hives and there were bee beards hanging from the entrances of the nucleus boxes. Understand I was a struggling beekeeper trying to keep my bees alive and fulfill my pollination contract. This particular Spring was late and it was all I could do to put together 600 good colonies for the orchard and Webster had over-wintered nucs that were so populous they were bearding, two weeks before apple bloom.

That really got me thinking. My management meant splitting up all the strong colonies I had to keep my numbers up, and spending the money I made on apple pollination to buy bees and queens to help restock my apiaries and Webster had nuclei wintering in his apiaries with bee beards, two weeks before bloom. After seeing those nucleus with bearding bees hanging out their little entrances, in the middle of April, I was convinced. It was time for a management change.

It was not until years later that I realized the full potential of having nuclei wintering in my apiaries. All the bee work I do now, as the owner/manager of a large business, is centered on the production, wintering, and use of nucleus colonies with locally reared queens.

Maintaining honey producing apiaries

For the first few years I wintered nucleus colonies, I thought of them as stocks for replacing Winter losses and as stocks for making increase. Dead colonies were cleaned up and new equipment was readied. Nucleus colonies that had successfully wintered were transferred to the empty equipment and apiaries were filled after the long Winter. Nucleus colonies were perfect for both uses and often built up faster than many of

the over-wintered production colonies. In fact, they absolutely exploded on the dandelion flow when hived on drawn comb.

In a commercial honey producing operation, the beekeeper must keep colony numbers up and every colony as strong as possible.

While increased numbers may seem beneficial to the honey producer, quantity should never trump quality. Weak colonies do not produce. With that thought in mind, I began managing weak Spring colonies differently. Formerly I had boosted slow colonies with frames of emerging brood from the best colonies. It was a good plan. The weak colony got a shot of young bees and the strong colonies got some needed swarm control. But, did that swarm control come at the cost of a reduced honey crop? With my short beekeeping season, I would have to say yes. And did boosting weak colonies with brood do anything to correct the problem? I had to ask myself why were they weak? Was it the fault of the queen? I believed most likely so and re-queened them later in the season. But why wait? Why not just do it right off when the problem was first discovered. Rather than give a weak colony valuable brood resources only to discover a failing queen later in the Summer, why not just kill that old queen and give the colony an over-wintered nucleus? Doing so immediately boosts that weakling early in the season and re-queens it at the same time. It takes a struggling colony with an inferior queen and only three or four frames of brood and turns it into strong colony with a tested queen and eight or nine frames of brood. The results can be startling.

As I said, in the beginning nucleus colonies were future production colonies to be used in my apiary. I made them up before the middle of July, using brood and bees from hives that were not strong enough to make a honey crop. The little colonies would build up, filling their



four frame cavities. When August arrived, with hot and humid 90°F weather, it was all I could do to keep them in their boxes. The only solution seemed to be to remove frames of brood and bees, replace them with comb or foundation, and start more nuclei. That worked to some extent, but nucleus colonies made up after the beginning of August do not Winter well here in Vermont. So what to do? I chose to add that excess brood to struggling production colonies. This turned out to be a good use of those resources. Imagine placing a deep body of brood on the floor of a colony having difficulty growing enough of a population to survive the coming Winter. The results were quick and lasting. The larger cluster created by adding combs of emerging brood not only boosted the colony population in the short term, that increased cluster size lasted through the Winter and come Spring, those colonies were among the strongest in the apiary. It was as if I had dropped a bomb on ↪





each colony and I jokingly referred to them as 'Bee Bombs' in an article I wrote for this magazine. Drop the bomb and the population explodes.

While harvesting brood from strong nucleus colonies slowed swarming, it did not help much with absconding. Try as I might, too many of these Summer nucleus would abscond with the arrival of our August weather. Days with 90°F temperatures and 90% humidity levels were just too much for these miniature colonies. They could not maintain a suitable temperature within their cavity and objected by, what I thought at the time, was swarming. This proved to be wrong. The clusters were leaving the hive with no queen cells left behind. Oddly, the 'swarm' would fly fast away from the area, never clustering temporarily as traditional swarms do. Upon inspecting the swarmed out colony, there would be a good brood pattern, a handful of very young bees, and a few older field bees that must have been out foraging when the bees left. It took me a couple Summers to understand what was happening, and when I realized that the bees were actually absconding



and not swarming, the solution became obvious. Add another story above. This gave the bees needed expansion room, but more importantly a cavity size where they could better control the temperature of their brood nest.

Brood factories

In the Spring, after the nucleus colonies had been transferred to the production yards, I always had some too weak to be of much use. Because my season is so short, these colonies never really built up in time to be productive. Trying to use what resources they held to benefit my operation, I combined the weakest, allowing them to grow until strong enough, and sacrificed them for making nucs. While this worked okay, it was far from perfect. Some years, for whatever reasons, they did not build up properly. This left me without enough brood and bees to make the planned increase, and forced me to sacrifice production colonies to make my nucs. Breaking up honey producers worked to provide me with the necessary resources for the work, but resulted in a decrease in the number of colonies. As a commercial honey producer, this was unacceptable.

One night while falling asleep, the thought came to me. Why not allow good overwintered nuclei to build up, use them as my brood/bee resource for making up the new nucleus colonies and leave the production colonies alone. In the Spring, I could expand them onto additional combs, and then harvest combs of brood and bees. What a game changer. The plan worked so well I decided to see how far I could take it.

In the Spring of 2011, I set up 50 nice over wintered, four over four, two-story nucleus colonies in double nucleus boxes. Each nucleus was given a nucleus super with four additional combs, for a total of 12 combs each. Beginning in early May, I began removing

sealed brood with adhering bees to strengthen my cell building colonies. Every four days, starting with the first nucleus, I removed two or three frames of brood from each nucleus until the day's brood requirement was filled. Four days later, I repeated the process, harvesting brood from the nuclei next in line. My intention was to remove enough brood from each to fill my needs, but not enough to significantly weaken the colonies. I needed them to be strong enough to fill combs of brood quickly, but not so strong they would swarm before I returned for another harvest. From May 9 until June 19 I harvested 245 combs of brood to set up my 35 cell builders, each receiving seven combs of sealed brood and two of honey. Then, after the last cell builders had been set up, I switched the focus of my brood harvest to making the Summer's nucleus colonies. Those 50 nuclei gave me enough additional combs of brood and bees to establish 330 more nucleus colonies. Think of it! More than 900 combs of brood and bees harvested from only 50 overwintered nucs.

Wintering nucleus colonies changed my beekeeping career forever. Back when I used to pollinate and keep bees using my old management, an average honey crop from 800 hives was something like 20 tons. I know that may sound like a lot of honey, but it is only a 50 pound average. When I started wintering my own nucs and raising my own queens, I had all these nucleus colonies in the Springtime and I did not have to split my bees to replace my losses. I did not have to buy any more bees and queens. I did not have to pollinate apples anymore! After only a few years of the new management plan, my average honey crop rose to 40 tons instead of 20, with a big crop being 50 plus tons instead of 30. And that is the difference. My bees are healthier and more productive. I have the resource in my nucleus colonies to build up my honey producers so they have a chance to make a good crop. My bees are stronger going into Winter and stronger coming out of Winter, and for those that do not make it? Well, I guess Wedmore had it right. That is what nucleus are for.

I never thought I would look at individual colonies in my apiary as

being disposable. They were all 'sacred cows' to be preserved, come what may. I no longer feel the need to preserve every colony, or to give every queen just one more chance to prove herself. With a supply of nucleus colonies on the other side of the apiary, or down the road in an out apiary, I can afford to be ruthless. Unproductive colonies and poorly performing queens become completely disposable. My bees benefit, my apiaries benefit, and I benefit as well. And the same process benefits the bees when working on a much smaller scale.

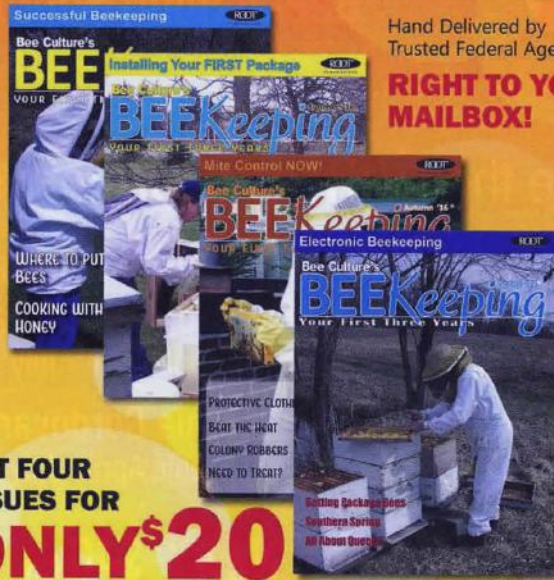
While beekeeping is still agriculture and every year does not reward me with a big profit, I am having so much fun playing with my bees I doubt I will ever retire.

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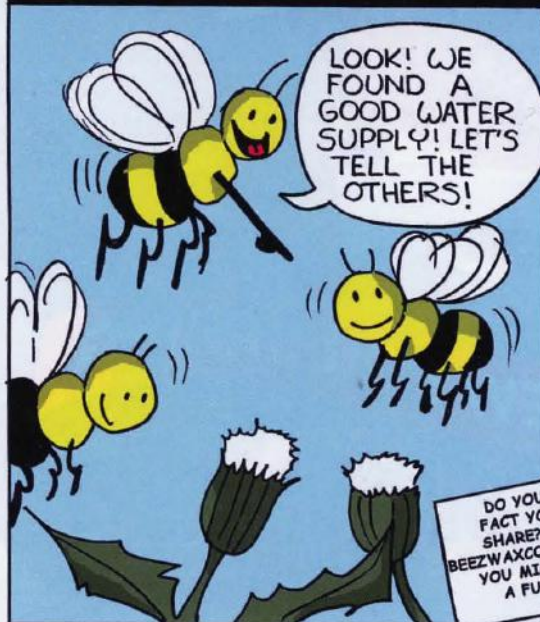
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HONEYBEE FACT #46

by John Martin

HONEYBEES NEED A GOOD
SOURCE OF WATER TO SURVIVE...



SO IF YOU OWN A POOL NEAR A
HIVE, IT MAY BE A LITTLE
CROWDED ON HOT DAYS!



© 2018 John Martin

Students Learn... Urban Waggle Dance

Janice Sina

My rural honey bee colonies have access to hayfields, a sizable pond, a mixed hardwood forest, even a nursery brimming with potted plants, all within foraging distance. I watch plants bloom in turn throughout the season, from skunk cabbage to goldenrod, and never give much thought to water supply even on the hottest Summer days as the pond glimmers through the trees beyond the hives. Lucky bees. Living the life.

What about their urban cousins, I wondered? I picture car horns blaring, cement walkways and blacktop roadways. I'm dismayed at the polarity between the manicured, pest-free lawns with fountains spraying chlorinated water in front of office complexes, and empty lots strewn with weeds and muddy puddles on neglected streets. I can recall the acrid smell of fumes rising from exhaust pipes and sidewalk grates. Are there enough dandelions between the cracks in the sidewalks in March to coax honey bees out of their hives? Is there enough variety in the flower beds and window boxes, and in the trees lining the avenues? How, then, are beekeeping practices in the city different from those in the

country?

To answer these questions I had to find some urban beekeepers and it turns out that schools are promising places to raise bees. To the adventurous of spirit, bees are intriguing and just daring enough. They appeal to ecologically minded and informed young adults who have a stake in what their world will be like 20 years from now. And their care ties neatly into ecology clubs that generally meet weekly.

I made my way to Fairchild-Wheeler Regional Magnet School on an unusually warm October day, clean bee suit folded neatly in the back seat of my car, anticipating a foray into the hives, despite the threat of thunderstorms. Fairchild-Wheeler is located in Bridgeport, a city of about 146,000 citizens on the Connecticut shoreline, a little over 60 miles from New York City. Driving along I-95, surrounded by cars, trucks and concrete, I admittedly had a dismal outlook. The adrenalin rush of highway driving slowly subsided as I wound my way up the long driveway to the school, flanked by trees and open fields. I was escorted up to a third floor classroom by Dr. Watson,

the vice principal, and placed in the care of Abby Kolakowski and Victoria LaGuardia just as the Ecology Club was getting underway. The room was its own hive of activity, each cluster of students focused on their own project. As the rains swept through and the bees stayed inside, Abby and Victoria took me out to the hallway where a floor-to-ceiling window revealed four hives nestled in an alcove on the third floor rooftop. A three-

foot wall served as a windbreak and rock sedum carpeted the area. Looking beyond, I saw only trees. It was hard to imagine that the busy urban heart of Bridgeport pulsed just two miles away. The question in my notebook about forage dissolved into the autumn colors.

Fairchild-Wheeler is a new green school with five rooftop gardens and two ground-level gardens at each end of the school. With the school's location at the northern end of Bridgeport, these bees appeared as well fed as any rural bees.

Still, I needed more evidence. On to a much older school, one solidly grounded in history and viewed as the anchor of the city of Cambridge, MA - Harvard University. Here, old buildings are revered and preserved; any modernizations are carefully added so as to preserve its traditional appearance. I met with senior Walter Martin on the rooftop of Pforzheimer House, a five minute walk from Harvard Yard. Walter has been an active member of the club for four of its six years; he comes from a family of beekeepers in Maine. There was no need for a clean bee suit here either because at 42°F, it was just too cold to peek inside, though there were a few brave workers out on cleansing flights.

The thing about a settled city like Cambridge is that it's, well, *settled*. Mature trees, the principle source of forage, are as much a part of Harvard as their massive buildings. Unfortunately, limited lawn space means few dandelions or clover, and the tightly packed maze of busy streets within foraging distance leaves little room for areas of goldenrod or asters, those weedy roadside sources of pollen and nectar so important for Fall feeding. Walter acknowledges that forage is sparse and unpredictable, and this isn't good for bees.

Greg Morrow is the advisor to the Harvard Undergraduate Beekeepers



Harvard Undergraduate Beekeepers Club members working the hives on a Spring day. - Photo by Greg Morrow

Club and a beekeeper for over 50 years. He modestly gives credit to the students, citing club co-founders John Aloian, Li Murphy and Sarah Callan who reached out to researchers, faculty, businesses, and fellow students to establish the club in 2011, making it the only club at Harvard that manages livestock. Interestingly, the club didn't start out with any live bees due to constraints from Environmental Health and Safety. The students learned about honey extraction and candle making in a Winter session with Maine's State Beekeeper, at the time, Christie Hemenway, and trained in the basics of beekeeping before the first bees arrived. In time, the University recognized the group as an official club, its protocols approved by Environmental Health and Safety, and got its first grant from the Harvard University Center for the Environment for \$1,000. With additional funding from the Office of Sustainability, they were ready for bees. They found Greg, who contributed not only bee-wisdom but veils, hive tools and hive boxes.

Both the students at Fairchild-Wheeler and at Harvard practice organic beekeeping to keep stress at a minimum. Neither club uses any chemical treatments. Walter says his Harvard bees have had very few problems with *Varroa* mites and mite-related viruses and this may be because there are fewer hives around for cross-contamination. That said, they also haven't had much better success at overwintering than the average New England beekeeper. This may be due to the increased temperature swings on the rooftop, wind currents, and the inability to put up enough stores for winter despite supplemental feeding. This year, the club wants to try using an insulated black plastic product known as a "bee cozy," and earlier Spring feeding. The students at Fairchild-Wheeler use drone frames and confectioners' sugar to control mites. They supplement their feed with Honey-B-Healthy®. I was surprised to learn they rarely if ever smoked the bees when working with them. They're experimenting with sumac or burlap as natural alternatives to purchased smoker products. They

too have had their share of troubles with Winter survival, employing tar paper, windbreaks and even straw in an empty box with a mesh bottom for moisture control.

Both schools also cite safety concerns as a limiting factor to the size and location of their apiary. There must be secured access to the hives to prevent injury to other students or to the bees themselves. Foraging flight paths must be considered also, but as Walter and many other beekeepers have observed, bees generally fly out and up as they leave the hive, minimizing contact with anyone directly below the roof. Proper protective gear must be provided to keep the student beekeepers safe, and proper training by a knowledgeable beekeeper takes time and commitment. All this must come from the club's budget, either through dues, fundraisers or grants. It's a pretty big learning curve for an extracurricular activity.

But it's not all uphill battles and losses. Fairchild-Wheeler harvested honey their first year and sold candles at a school fundraisers, raising awareness along with money. Abby recalls some funny stories. There are pictures showing their advisor spraying a new hive installation with sugar water in a bottle labeled 10% ethanol. The joke of course was all about drunken bees. On another occasion, a drone frame showed brood in the shape of ILY, the acronym for I Love You. They kept that for a long time. Maybe the bees were trying to tell them something. And Harvard beekeepers may have invented a new form of hazing, as recounted by Walter. As a freshman in his third week of school, he was recruited to help combine two weak hives, each with a queen, and only a layer of newspaper between them. To add to the challenge, they had to be transported to another building. The ride through Cambridge was fraught with speed-bumps, curious police officers tagging along, and some agitated bees barely contained in a laundry hamper. Once on site, the students had to carry the bees through the building and up the stairs to their new home before both freshmen and bees were initiated into the club.

Beekeeping clubs are unique, and not just for science buffs. Though the bottom line is to build a competent core of beekeepers that can oversee the livelihood of their charges, there are so many other facets of beekeeping. From honey extraction to candle making to assembling equipment, there's something for everyone. In addition, school settings lend themselves to research. Using infrared sensors, students can collect data on hive temperatures, or they might research queen viability, *Varroa* mites and their viruses, or toxins brought in on pollen. The list is long and students are curious.

Though not directly used in their classroom studies in either school, some students at Fairchild-Wheeler, a STEM Magnet school, have done research on CCD as a Capstone Graduation project. At Harvard, the Biology department studied neonicotinoids and a photography class presented Portraits in Beekeeping. There are benefits that reach into every nook and cranny of learning. Abby says, "It teaches good problem solving skills and application-based learning. If a school can do it, they definitely should. It's good for the bees, good for the students."

There are a lot of unanswered



Senior Walter Martin on the rooftop of Pforzheimer House with a hive on a chilly November afternoon. Photo by Janice Sina



Students prepare for the installation of a new hive. No, it's not really ethanol! Photo by Aby Kolakowski



Janice Sina is a writer and beekeeper in East Haddam, CT. She welcomes the chance to mentor new beekeepers and trade beekeeping wisdom with seasoned beekeepers. You can contact her at janicesina.com.

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Pollinator Habitat

Feed The Critters That Sustain Us

David Donnelly

As livestock managers, we beekeepers do one thing that is uniquely different from all others. We let our livestock forage over the fence line without repercussions. Could you imagine a cattle rancher willfully allowing his livestock to run roughshod over his neighbors' fields, pastures, gardens, and yards, as well as eating all his feed? He could be shot!

Yet not only are we and our bees not shot, they are welcomed onto our neighbors' properties with open arms. And what's more, free roaming cattle could destroy a neighbor's crops or garden faster than they could chew their cud. Not so with our bees. After they finish foraging, everyone is better off, especially the neighbors whose crops or flowers have been pollinated.

Honey bees and other pollinators have been free-ranging foragers since the dawn of time. As a consequence, we have gotten used to the idea that we don't have to provide their foraging feed. We don't always know what they will find within a three-mile radius, but they obviously find something since they keep coming back with pollen and nectar.

The Time for Change

Don't expect things to continue this way forever. The old guys will tell you that feral hives were commonplace in their youth. But not so any more. Today, we are experiencing an unprecedented loss of pollinator habitat, which will only get worse unless we act. This forces us to rethink our passive mindset that bloom will always be out there, somewhere. There are many reasons for this, which are supported by a new study from the University of California San Diego. They find, "The health of managed honey bee colonies is threatened by a host of factors including habitat loss, pesticides, pathogens, parasites and

climate change."

Rural and commercial beeks each face their own set of issues, and I am speaking here mostly from the position of a suburban/urban bee groupie. We think that the only good weed is a dead weed, and that anyone whose grass lawn is not freshly mown must have a few screws loose.

Now is the time for change. As *beekeepers* and *managers*, we need to start taking an *active* approach to pollinator habitat, no longer satisfied with our old passive ways. It is not good enough that we just let our bees forage willy nilly, without regard to where the bloom is. Like the other livestock managers, we need to provide feed.



Perfect!

Institutional Change

This viewpoint is beginning to gain traction as federal, state, and local governments recognize the important role that pollinators play in our lives. In fact, President Obama signed a Presidential Memorandum in 2014, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators." The memorandum directs federal agencies to take additional steps to improve habitat for pollinators including honey bees, native bees, birds, bats, and butterflies. They work with state departments of transportation to accomplish these goals.

The Idaho Department of Transportation, for example, promotes

awareness of their partnership with birds, bees, and bugs, and of the plight of pollinators and pollinator habitat. They are involved in "several activities that promote pollinators/pollinator habitats, most notably the Operation Wildflower Program, where districts distribute native forbs to volunteer groups to seed along selected roadsides, rights of way, or slopes." You can check on-line to see what your state is doing.

The USDA's Natural Resource Conservation Service is also involved. They provide guidance and implementation to enhance habitat for pollinators: "Despite their importance, pollinators are threatened world-wide by habitat loss, habitat fragmentation, improper pesticide use, disease and parasites. This has serious economic implications for humans and for maintaining ecosystem diversity and stability."

Private Non-Profit Support

It is also encouraging to see the private, non-profit organizations that are working to protect our pollinators, largely by promoting the importance of providing more habitat. These include:

- *The Xerces Society* -- <https://xerces.org/>

They are committed to helping all pollinators, including monarchs and bumble bees, and their habitat. They say, "Take the pollinator pledge to bring back the pollinators." They also publish books and support research on the subject.

- *National Pollinator Garden Network* -- <http://millionpollinatorgardens.org/>

They remind us that, "Pollinators are responsible for one out of three bites of food we take each day, and



Ground cover.
Photo by Diane Jones



A wild flower mix should
last all season. Photo by
Diane Jones

yet pollinators are at a critical point in their own survival. Increasing the number of pollinator-friendly gardens and landscapes will help revive the health of bees, butterflies, birds, bats, and other pollinators across the country.” They promote pollinator gardens through their Million Pollinator Garden Challenge.

- *Pollinator Stewardship Council* -- <http://pollinatorstewardship.org/>

They raise awareness about the plight of pollinators and how toxic pesticides contribute to their decline. They encourage us to plant local pollinator gardens, since their research shows that pollen collected contained an average of nine different pesticides.

We all have different reasons for supporting pollinators. For some of us, it may be for the honey or pollinating services. For others, it may be to enhance and protect our food source. Still others just appreciate these living creatures.

Feed the Bees, a book published by the Xerces Society, states that pollinators are responsible for, “. . . 90 percent of the plant species found on earth . . . a process more than 250 million years in the making.”

Types of Pollinator Habitat – Tall or Short

Short habitat includes flowers, wildflowers, weeds, clover, and many row crops.

Feed the Bees also states, “Providing wildflower rich habit is the most significant action you can take to support pollinators. Native plants, which are adapted to local soils and climates, are usually the best sources of nectar and pollen for native pollinators.”

Tall habitat includes trees and

bushes. To many of us, the value of flowering trees may not seem to click. But did you realize that just one flowering tulip poplar tree can provide as much bloom as an entire acre of clover? Who’d a thunk? This kind of information may be valuable to farmers, who can’t afford to “waste” land for pollinators, but who can plant trees at the edges of fields and along fence lines. Another important one is the Korean Bee Bee Tree, which blooms in mid to late Summer, when most other plants are taking the Summer off. Bees love this tree.

Rock Bridge Trees – <http://rockbridgetrees.com> – is a Tennessee nursery whose mission includes *Trees for Bees*. They write, “The role of trees in honey bee health cannot be underestimated. Trees provide a bridge of flowers between Spring and Fall. This bridge is the pathway available to everyone who wishes to strengthen and improve the health of our cherished honey bees.” Without elaborating on the hundreds of beautiful blooming trees, a few important ones for bees include vitex, sourwood, Japanese pagoda, catalpa, and American linden. None of these are household names. Maybe we can change that.

Bloom from Frost to Frost

Imagine just how cool it would be to have a six-eight month honey flow! No Summer dearth! No fall off in the Fall! In theory at least, this is possible when we take an active role in providing pollinator habitat.

The sources cited above show how we can do this. They also provide links to nurseries and seed companies that will help us fill in our gaps. Here are some tips for pollinator gardens:

- Select different plants to cover the entire growing season;
- Consider native seeds appropriate to your growing area;
- Include milkweed in your garden. This plant is critical for the survival of monarch butterflies.

Wildflower Garden Tips

Here are some wildflower planting tips, offered by Sierra Laverty, Assistant Horticulture Director, at the Idaho Botanical Garden:

- Try to select plants that are native to your area. Seeds that grew from plants adjusted to the local climate and soil are “programmed” to grow in your area;
- Check your soil and texture it according to your plant’s needs. For example, you may have a clay soil, whereas the plants prefer a sandy soil.
- Most wildflowers require full sunlight, perhaps six hours per day;
- Be careful in selecting your seed company. Many large national companies will not have native plants for your area, or they could contain weedy plants.

To protect our bees, their other pollinator friends, and to maximize our harvest for now and the future, we need to take advantage of every resource available. We need to get beyond the passive foraging mindset, and take an active role in our girls’ foraging opportunities.

We need to feed the bees and save the pollinators. 🍯

David Donnelly holds a Doctor of Education (Ed.D.) degree, and is a backyard beekeeper.



Be Safe

For You, Your Guests And Your Bees



Ann Harman

Beekeeping is fun but it is much more fun if all goes well. However we, as humans, do manage to get ourselves into difficulties even when trying to do something right. Let's go through some things that you can do to make sure when you are leaving your apiary you can say "That was a great time in the beeyard."

First, before you enter the apiary, check over your clothing, including your protective clothing. Let's start at the bottom. No flip-flops! Bees do not always stay up in the air, flying about. Sometimes they fall off a frame you are handling and land, unseen, in some grass. If they crawl onto a bare foot in flip-flops and you get stung you can be certain you will be surprised. One result could be your dropping the frame you had in your hands. Now you have quite a number of unhappy bees – everywhere. In the air, on you, on the ground.

So wear some shoes, ones that are comfortable and easy for walking around. Light colored sneakers are a good idea. Now look at your socks. Black socks, especially fuzzy ones, are, to a bee, a predator that needs to be chased with a sting. White athletic socks are cheap and need to be a part of your beekeeping wardrobe.

Never think that you can go into your apiary without at least a veil. At any time of day, whether cloudy and dull or chilly but sunny all you need is one bee, who decided to fly, to collide with you. She knew where she wanted to go, but you didn't. Bee

collisions frequently result in a sting.

A sting in the eye can result in damaged vision or blindness. A sting inside the ear canal can lead to swelling and ruptured eardrum. Such permanent damage can be prevented by wearing your veil.

You can substitute regular clothing for some of the special bee clothing. However the jackets and coveralls sold by the equipment suppliers have been designed to prevent wandering bees from entering. Bees are quite clever at finding a way into your clothes. If you should find a bee inside your veil stay calm. Put down your hive tool and smoker and immediately leave the beeyard. When outside and not in a flight path, it is safe to remove your veil – and the offending bee.

You can now safely replace your veil and continue work. However as soon as you have finished beeyard work for the day it is important to investigate just how that bee was able to get in. Check all fastenings, including the Velcro® ones so the bee invasion will not happen again.

You can look through the clothing offered by beekeeping equipment suppliers. They have a huge selection: coveralls, suits with veils, jackets, leggings, trousers, sleeves, helmets, hats, separate veils, gloves of all kinds and more. So there is no excuse for not being comfortably and safely dressed for bee work. Choose the various pieces of clothing carefully – they should be loose-fitting but not

baggy. You need to bend comfortably but not be awkward. Beeyard work is actually a bit messy. You encounter sticky honey, beeswax and very sticky propolis. Fortunately bee clothing is washable and it should be washed frequently. Those beekeepers in African bee territory should wash their clothing and even veils very frequently to prevent buildup of dried venom that could lead to allergic reactions.

Make certain that your laundry detergent does not leave your beeyard clothes smelling like a flower garden. Bees are very sensitive to odors. After all, floral odors tell the bees where to find their food. Bees will not only be attracted to your clothing but also to you. Shampoo, aftershave, bath soap, hand and body lotions and perfume can carry a message to the bees that you need to be carefully searched. "That delicious flower nectar and pollen is there somewhere," is what the bees are sensing and trying to find. There is no point in batting them away. Such actions indicate you are a threat, an aggressor. Their defense is to sting. You can have happy working bees if you choose odors wisely.

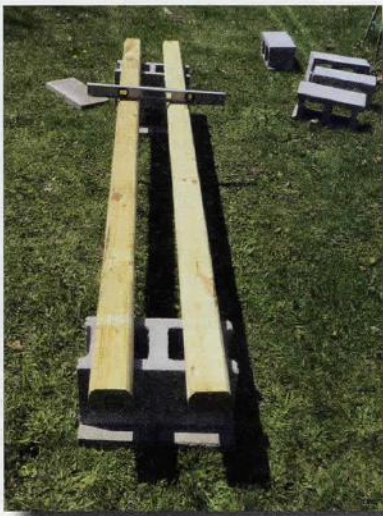
Your most important tools are your smoker and your hive tool(s). More about the hive tool later. The smoker, although extremely important when working with your bees, is the one item that can get you into trouble. It's HOT! Although there is a protective cage around the sides, the bottom of it gets hot. If you need to set your smoker down on something where will you put



Always use caution when setting down a hot smoker.



Find the one(s) that are right for you.



An effective DIY hive stand made with cinder blocks and treated wood.

it? The flat metal top of a telescoping cover can be safe. But a garden hive has a peaked roof. You can have a flat piece of cement block in your beeyard as a rest for a hot smoker.

Your smoker will develop a coat of creosote on the inside of the top and at the rim where the top fits onto the body. These areas can be cleaned with a wire brush so that the top always fits down tightly. The fuel inside is smoldering and can burst into flames if spilled out and exposed to more air. So the top must fit firmly.

Your choice of smoker fuel needs to be considered. Some beekeepers gather pine needles or other dry foliage while others purchase fuel from equipment suppliers. Recently beekeepers have discovered wood stove pellets for smoker fuel. They are easily lit and do produce nice smoke. However, they are loose inside the smoker and can fall out of the

smoke spout if the smoker is tipped. If any are smoldering they could be a fire hazard. In drought conditions and in fire hazard areas liquid smoke is highly recommended. Some of the equipment suppliers have it. It is mixed with water and used in a plastic spray bottle.

If your beeyard is not at your home are you going to drive home with a lit smoker? Remember, even after putting the smoker out, the bottom can still be hot. Fortunately one of the equipment suppliers has a metal carrier for a hot smoker so it can be carried safely from one beeyard to another. Do you have a safe place to store your still-hot smoker when you have finished work? It can be put on a flat piece of cement block.

The beeyard is an active place. You will be opening a hive, removing frames, carrying various pieces of equipment – lifting, stretching, bending, twisting. “Beekeepers back” is a common complaint. However, many tools, and even hives, are available to help prevent injury and make hive work easier, more enjoyable for you – and the bees, too!

Your most important gadget is your hive tool. Today the equipment suppliers have many sizes and designs. Hive tools are not expensive so you can try several styles to find the ones you prefer. Learn to make use of a hive tool to raise a frame end, to move a frame gently. Bees that get bumped get angry; bees that are squashed release alarm pheromones that trigger other bees to respond. Look at all the gadgets that can help you prevent stinging attacks. Use your hive tool to loosen a frame. Then a frame grip can be used to

lift a frame up. A frame holder hung on the side of your hive will help keep the frames in order for replacing and also prevent damage.

A hive stand is essential, both for you and for your bees. Hives set on the ground can lead to damp con-

ditions and rotten wood. It is much easier for unwanted pests and predators to enter the hive, upsetting the bees and possibly you when you open a hive and encounter an unwanted snake or a mouse with a nest. These critters can cause a bee colony to become nasty from disturbance.

A hive stand, at a comfortable height for you, will make hive manipulations much easier. Equipment suppliers have a few designs but their height may not be suitable for your height. Cement blocks come in many shapes and sizes so you can construct a stand at a height friendly to your back.

When you first purchased your present hives did you consider the weight you would be lifting? Lifting a weight and then twisting your back can lead to some very painful back problems. If you have a fairly sedentary life style such as working in an office then a planned program of exercises could be helpful.

Hives and hive parts come in a variety of sizes. What do the bees want? A dry cavity of about 40 liters is nice but the bees are adaptable to size of parts and shapes. Today eight-frame size instead of 10-frame Langstroth is very popular. The deep depth is handy for large commercial operations because handling is mechanized. The medium depth for brood chambers and honey supers means all equipment is interchangeable. That’s economical too! Would bees be happy in a hive made up of only the shallow size? Certainly! Shallows, full of bees or honey are also lighter weight. Some beekeepers have chosen the top bar hive as being back-friendly. However in cold climates it may be an impractical style.

Did you plan your beeyard too small when you set it up? Consider how easily you move around in it, especially when carrying something such as a full honey super. In bear country an electric fence is necessary. You need enough room between you and the fence to do your necessary bee tasks. Although you turn the electricity off when you enter the apiary, you still want to have plenty of room to move around. Fortunately many bear fences are easily enlarged.

The ground surface of your beeyard needs thought. You can certainly have grass throughout but that will need to be mowed and trimmed.



The bees need free flight from their entrance, not blocked by tall weeds and grass. You need the freedom to walk around without stumbling over hidden rocks, lumpy soil and lost pieces of equipment. Bees do not like emissions from gas engines nor do they like their hives or hive stand being whapped with trimmer strings or blades. If you chose grass and it needs attention always wear your veil and, if you can, mow and trim in the evening when bees are returning to their hives for the night.

A few beekeepers try to work at

night by using lights covered with transparent red film. Although the bees do not see well enough to fly, instead they crawl around when outside the hive. A dropped frame of bees results in many crawling bees on the ground – and up into your trouser legs and over the surface of your clothes. It is possible to have many more stings from unseen bees than in daylight when bees are actively flying.

Your beeyard is not a trash dump. Scraping wax and propolis is part of beekeeping but the scrapings should be put into containers and

removed from the beeyard. The wax can be collected and cleaned. Broken pieces of equipment left lying about can be stumbling blocks. Spilled honey will attract small hive beetle as well as other pests. Spilled sugar syrup can start robbing, particularly during a nectar dearth.

A good toolbox is very useful. Let's see what items should be in it. Your cell phone should be carried always, especially if you are in an outyard away from home. You are outside in sun and hot weather so drinking water is essential! Put sunscreen on before getting dressed for bee work but carry some with you. Your method of record keeping is important. You will never remember details (which hive had a poor queen?). If a colony is particularly nasty with bees attacking you, and you live near African bee areas, noting that behavior means it is essential to keep monitoring that colony. That is where keeping records is important.

When your friends find out that you are now keeping bees they may wish to visit your beeyard "to see honey being made and the queen bee!" Now what? Bees will be flying and not necessarily only in one direction. The visitor needs to be safely dressed, perhaps more so than you. Maybe you have some bee clothing belonging to a family member; maybe not. In that case you might be able to borrow veil, bee suit and gloves from a friend. In addition you will have to ask your visitor not to wear dark socks and do wear sensible shoes. In addition you will have to explain about cosmetics and lotions that contain perfume. Ask your visitor if there is a possibility of being allergic to bee stings. If so, tell your friend to watch from inside a tightly closed up vehicle. Or "sorry it's not a good idea to have a beeyard visit." Promise the disappointed visitor a jar of your honey when you have harvested.

Keeping safe while working with your bees is essential. Fortunately the bees can remind you to work safely – they have a stinger! 🐝



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BARRIERS

Morris Ostrofsky

They say death and taxes are unavoidable. There is a third item that can be added to this list; physical changes whether due to aging or disability.

This article is written for any beekeeper who is encountering physical barriers that affect their ability to continue keeping bees. These barriers can come in the form of mobility issues, arthritis, diminishing strength, back problems, eyesight or other unexpected challenges.

Beekeepers are resourceful and find creative solutions to continue keeping bees. Aging or other obstacles can be addressed on multiple fronts: lifestyle, equipment and management changes. Some of the solutions can be put into practice now and some will take planning and time to implement. The objective of this article is to provide practical information to help beekeepers adapt to changing physical conditions thus allowing them to continue doing what they love.

If you use Google to search for "common aging changes" you will find an abundance of information about how the body changes overtime. Sight, memory, bones, joints and muscle strength, are obvious changes as we age. Put another way, age or disability can get in the way of keeping bees. We will describe some of the more common barriers beekeepers encounter followed by possible solutions.

Are the eggs getting smaller? No; it's just your eyes. Presbyopia is a slow loss of ability to see close or small objects. It is a normal process that happens as we get older. Having to hold a frame at arm's length is a sign of vision loss. Reading glasses usually fix the problem. However, in some situations beekeepers need greater visual acuity. Queen rearing is an example.

HM-2LED



Finding 24-36 hour larvae when grafting can be next to impossible without extra help.

One immediate solution to reduced vision can be found as close as the Internet. Randy Oliver of Scientific Beekeeping has advice for those over 40, "I recommend grafting in a very dark room, wearing a jeweler's type head-mounted magnifier of 3x-4x power, plus a focusable headlamp (battery powered). Put the headlamp as close as you can between your eyes, and aim the spot directly where you are looking." This is a piece of equipment worth splurging on; get visors with good optics and a built in LED light source. I used to struggle finding 24 hour larvae when grafting. It is fun again now that I can see. The LED light is very bright and does not give off larvae-drying heat. An added bonus is that I can use this visor for reading the finest of fine print.

"When was I supposed to release that new queen?" Mayo Clinic points out that our "Memory tends to become less efficient with age. It might take longer to learn new things or remember familiar words or names." Our memory affects all aspects of our lives including beekeeping. Think about that always

missing hive tool.

Jotting down details of your hive visits in your journal is one tool to combat the effects of our aging brain. There are many types of journals, both paper and electronic, that can be used. What is important is to keep track of what you have done and plan to do on your next visit to the bees. This is especially true when raising queens. Missing a key date can mean the difference between success and failure.

It is a shock when you realize your hands are starting to look like your grandparents'. Degenerative arthritis is a general term for inflammation of one or more joints in the body. The areas most often affected are the hands and the weight-bearing joints of the lower extremities. The onset of osteoarthritis is usually related to aging and will affect most of us at some point in our beekeeping careers if we stay at it long enough. Activities such as manipulating hive tools or lifting heavy boxes can become difficult if not impossible.

As the Mayo clinic web site says, "There's no known cure for osteoarthritis, but treatments can help reduce pain and maintain joint movement." Treatments vary from medication, therapy to surgery. For Judy Scher, Oregon Master Beekeeper instructor and mentor, arthritis in her hands and back has made it necessary to ask fellow



beekeepers and mentees for help in lifting boxes. It is a win win situation. Judy gets help with lifting and her mentees learn something in the process. As an extra bonus, Judy adds a "thank you" lunch.

Muscle loss and back problems are the "evil" twins of aging. From the time we are born to about the time we turn 30, our muscles grow larger and stronger. According to a January 2012 Berkley Wellness article, most of us lose muscle as we age - a loss of one to two percent a year after age 50, on average, or about 30 percent between age 50 and 70. Even beekeepers and "Arnies", whose decades-long workout routine has included lifting heavy supers or weights, will still experience some



muscle loss as they age. Any loss of muscle mass is of consequence, because loss of muscle means loss of strength and mobility.

It becomes harder to lift packages or in the case of beekeepers supers. While we can't completely halt this aging process, researchers believe we can do a lot to slow it down following the "Use it lose it principle". The primary goal is to avoid being sedentary.

"Eighty percent of the population of the United States, at some point in their life, is going to have back pain," says Ronald J. Wisneski, MD, an orthopedic surgeon, specialist in spinal disorders and spine surgery, and associate in the Department of Orthopedic Surgery at Geisinger Medical Center in Danville, PA.

"You can wreck your back in any number of ways, but a few major offenders stand out: not stretching, not paying attention to your movements, and years of wear and tear" says Nick Shamie, MD, associate professor of orthopedic neurosurgery at

UCLA and a spokesman for the American Academy of Orthopedic Surgeons.

While there are many roads to loss of strength and back problems, all can lead to reduced beekeeping activities. Richard Taylor in *The Joys of Beekeeping* sums it up, "...no man's back is unbreakable and even beekeepers grow older. When full, a mere shallow super is heavy, weighing forty pounds or more. Deep supers, when filled, are ponderous beyond practical limit."

In your mind's eye you see yourself as a much younger person. You realize you are not that same person when you get half way through a large apiary and realize you are ready for a break. Even though your strength isn't what it was at 40 or even 60, and your back doesn't want to cooperate, there are strategies you can use to minimize the impact and keep doing what you love.

Life style change is a place to start whether it is keeping your weight under control to lessen stress on joints to being aware of ergonomics. There is an abundance of information available on how to lift boxes as well as how to improve back and leg muscle strength. The bottom line is when lifting brood boxes and heavy supers, lift with your knees, not with your back.

While most of us know what we are supposed to do when picking up a super, it does not hurt to remind ourselves how to do this ergonomically.

1) Stand close to the super and center yourself over it with your feet



shoulder width apart.

2) Tighten your abdominal muscles.

3) Keeping your back straight, bend your knees and squat down to the floor.

4) Get a good grasp on the super with both hands.

5) Keeping the super close to your body use your leg muscles to stand up lifting the box off the floor.

6) Your back should remain straight throughout lifting, using only the muscles in the legs to lift the box.

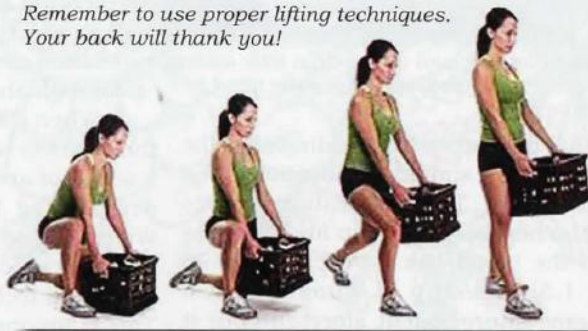
7) Do not twist your body when moving the box. Instead take small steps with your feet turning until you are in the correct position.

8) Again bend at the knees using only your leg muscles and place the box in the appropriate spot.

Your equipment choices can also help you deal with an aging back. Bill Greenrose, a New Hampshire beekeeper with 19 years experience, commented on dealing with beekeeping after surgery, "...and I also use a lower back brace for support. Along those lines, I would suggest wrapping your knees very well beforehand to help stabilize them. A lot of the injuries with knee replacement therapy come from twisting or torquing the knee and it's easy to take a misstep with a box in both hands on uneven ground."

The great thing about tools is that they provide leverage. Make gravity work for you not against you especially when moving heavy

Remember to use proper lifting techniques. Your back will thank you!





honey supers. If at all possible, place your hives at an elevation higher than where your truck or extracting equipment is located. This way you can load the honey supers on a garden cart found at most home improvement stores and roll them down to where needed. Remember new beekeepers too are happy to help move honey supers in exchange for learning the process of extracting.



Tools at hand can be used to save your back. For instance Kelley Beekeeping's longer J hook hive tool at 15-3/8" increases the leverage that you would normally get from the traditional, shorter 10-1/8" J hive tool. The hooked end also makes it easier for lifting frames. The combination of easily lifting frames along with a longer reach means less stress for your back.

Two hive tools can be used together to give you more leverage than a single hive tool. I recommend using hive tools with the large J hook, either length, because when you open the hive there are two things you need to do to prepare to inspect frames. The first thing you need to do is break the propolis seal between the stacked boxes. Twisting the J tool with the curved end in the space created now widens the space between the boxes and completes breaking the propolis seal. Now the box can easily be lifted off. Or you can insert a piece of wood between the boxes if you only need a small space; i.e., applying a grease patty or Thymol wafer. I do not have to hold the box open or completely remove the upper box. It leaves my hands free and makes the job go faster. Not to mention it is much

easier on my back.

There will be times when the space created by the small block of wood is not sufficient; i.e., during Spring when looking for queen cells. You can create a wider space by simply tilting the upper brood box back. This exposes the bottom bars of the upper most brood box. Tilting the box back eliminates heavy lifting and makes the frames more visible.

The question that comes to mind is "When the upper box is tilted back,



Block the super up to check for queen cells instead of lifting it.



Installing a metal strip with a little added spacing makes a lip to keep the tilted box from falling.

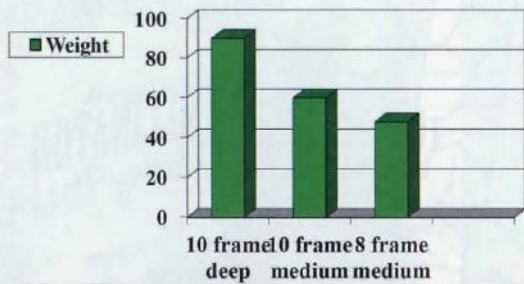
what prevents it from sliding off? The answer is a simple modification to the brood box. The modification involves attaching a metal strip and washers to the brood box. I purchased a 96 x 1.5 inch strip of aluminum at a home improvement store and cut it

into 16 x 1.5" pieces. I drilled four non-centered holes using a 7/32" drill bit to avoid the thin wood in the frame rest part of the box. I used four 3/4" screws (#6X 3/4") and two 3/16" washers per screw to attach the strip to the brood box. The top of the strip must be flush with the brood box to avoid interference with the cover. The washers create a small space between the metal strip and the wood of the box. It is this space that prevents the top box from sliding off the lower brood box. Now I can place a block of wood between the upper and lower brood boxes. My hands are now free.

There are times when you can not avoid lifting boxes i.e., reversing boxes, moving hives or supers full of honey. Here too there are options that help keep you going and your back healthy. The first option is to change the way you move boxes. As Bill Greenrose says, "I have another suggestion, which is a change in methodology. I have used this method successfully, whenever I have tweaked my back and need to go light with the lifting for a while. I use a second box – deep, medium, shallow – whatever will hold frames from the box I want to lift/move. I move half of the frames from the full box to the empty box before any manipulations. If half a box is still too heavy, just move more frames until the first is light enough to work. It will take more time, but it beats having to give up something you love."

Another option to avoid heavy lifting is to imitate how the bees work collectively. There are a couple ways to do this; the buddy system and mentoring. Although beekeeping tends to be solitary, it doesn't have to be. In fact working with a fellow beekeeper is not only easier, it can be more enjoyable not to mention safer. This is a good time to mention another social tool; the cell phone. Having a cell phone with you could save your life or the life of a companion.

When I think of getting older and the limits to what I can do, I think of a series of articles that Roy Thurber wrote in the 1970s titled "Older but Wiser". As we age, hopefully we get wiser but we definitely have picked up skills and techniques along the way. This is an opportunity to share that



knowledge with new, enthusiastic beekeepers. These new beekeepers are usually more than willing to do the heavy lifting in exchange for gaining knowledge. Mentoring is a win win situation: you get help plus enjoy sharing and the mentee gains knowledge.

Another back saver involves changing your box size to either eight or 10-frame westerns. When I discussed my plans for this article with Kim Flottum, editor of *Bee Culture*, at the recent Oregon State Beekeepers' conference in Seaside, he said two words to me, "Eight frames". Put another way, James Fisher stated, "I've often intoned 'Friends don't let friends lift deeps.'"

Michael Bush is the author of *"The Practical Beekeeper"* and manages the Bush Farms website. This chart from his *"Lazy Beekeeping"* presentation illustrates the relative weight of different size boxes with honey. Of course, if these boxes contain brood, they weigh much less. So basically you can see that going from a 10-frame deep to an eight-frame medium reduces the weight by half. As Michael Bush says, "I find I can lift about 50 pounds pretty well, but more is usually a strain that leaves me hurting the next few days. The most versatile size frame is a medium and a box of them that weighs about 50 pounds is an eight frame."

Robin Dartington, creator of the Dartington Long Deep Hive in the UK, says, "Changing to a new type of hive is a big step but can prolong the years of beekeeping if specially designed to reduce lifting and also increase convenience."

Transitioning to all eight-frame westerns is a long term strategy. Why not start now? One way to get started is to transition from a 10-frame box to an eight-frame box. This can be done by purchasing one (easier) or cutting down a 10-frame box (more work). For details on cutting down 10-frame boxes see Michael Bush's *"Lazy Beekeeping"* in the reference section.

Another way to reduce weight is to cut down 10 or eight-frame deeps into westerns. See the references for

directions. Again I find the easiest way is to purchase the correct size box. By using a single box and frame size, everything is standardized and interchangeable. They can be used for both brood production and honey storage. The bees don't care if you give them two westerns for brood or a full depth brood box. While the bees do not care, your back sure will. Why not suggest to new beekeepers just starting to acquire equipment that they start with eight-frame westerns? They can save their back now and do not have to transition later. 🐝

Next month – Reconsider your goals to make keeping bees still part of your life.

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- Instructions to cut down 10 to 8 frame western www.bushfarms.com/beeseightframemedium.htm
- For plans or already constructed Valhalla hive (no delivery) The Hive Man Richard Nichols 541-447-7907 richardtarsia@gmail.com
- Fabricator and supplier of Valhalla hive arm latch and metal for outer cover McAlister Industries Tim McAlister 541-610-5554 mcalister@cbbmail.com





Toni Burnham

It Can Happen!

My friend was at home the night that vandals climbed the high fence that completely blocked his beehive from passersby, then sprayed enough pesticide into the entrance to soak the concrete and make us cough the next day. Looking over his thousands of dead bees, I was glad that he had not come face to face with these people, folks way more dangerous than any honey bee.

My friend had never received a complaint, did not talk up his bees to the neighborhood, and they'd never thrown a swarm. When the police came, they refused to take a criminal complaint even though he had been a victim of criminal trespass and loss of a few hundred dollars of property. The only help he got was some cleanup assistance from fellow beekeepers and an idea of what pesticide was from an entomologist at the University of Maryland.

Here in DC, we've haven't had a bee sting fatality since I set up my first hive in 2005. But at about a quarter of our ground level apiaries in public areas, we see something like this every year.

Beekeeping may belong in the city, but not everybody thinks so, and that's why we have to think of this as the single least attractive feature of our chosen habitat. Just like a sure-fire mite treatment or the definitive response to CCD, this article cannot

promise a guaranteed solution, but we can talk about why and how vandalism is most likely, and some strategies for minimizing your risk.

Two-Legged Bears

Beehives are still curious things to most modern Americans. Folks have often never seen one, fewer have ever opened one, and many place beekeeping on a spectrum somewhere between the heroic and the bizarre. Among mammals, when the curiosity button gets pushed, the animal in question will seek some kind of interaction to satisfy that urge. If a beekeeper is available, we can show them a new world; if we are not, they poke it with a stick.

It's a bit of an exaggeration, but we tell students here that the most dangerous threat to an urban bee is three urban teenagers – mix 'em up any way you want: any gender, any level of education, any economic status, any place on the planet – because it goes like this:

Teenager #1: "Isn't that a beehive?"

Teenager #2: "I hear they sting!"

Teenager #3: "I dare you!"

The key concept here is that they didn't plan this. It's an impulse crime, often taking place at night and in cold weather. Teenagers do similar damage to urban beehives to that which our rural counterparts describe by bears: lots of toppling, breaking and throwing of frames, damage to enclosures. If the little idiots push the hives in one direction, there's a chance there may be bees to save the next day. If they push

it in the other, it's probably a loss.

Preventative strategies

It pays to think about the risk from two-legged bears from the very beginning of your apiary site selection.

Are there barriers to entry? One reason to love urban rooftop apiaries is their restricted access. Most agree that fences are the absolute minimum protection for an urban apiary at ground level (if only to keep dogs and toddlers from inadvertently stumbling into boxes full of stinging insects) but minimal is also the level of protection they provide. At least they broadcast "Authorized Persons Only" in a way that everyone understands.

Is the hive site low profile? 99 days out of 100, out of sight is out of mind. Can you manage lines of sight or mute the paint color on the boxes? Can the hive be placed at maximum distance from a footpath? If you are in a garden, is there a chance that taller plantings can be placed between the hive and the most popular routes? If you are not in a garden, is there any chance for a strategic container shrub or two?

Can you add camouflage to your fence? If you have a fence, you may have the option of installing fence slats or fence screen. This is a product that construction companies attach to chain link around active building sites to block wind-carried debris and hide the temporary ugly before the beautiful new takes shape. It's also a tool for managing bee flight upward, and for causing nearby pedestrians to remain clueless. If you have to buy it yourself, prices start at \$10 per linear foot. But if you are not particular, you can reach out to the companies that are



prominently featured on the fences of projects nearing completion, and ask them if they are interested in recycling the stuff and getting a positive shout out from neighborhood beekeepers. Of course, then your beehives will be advertised as attractive modern living locations...

Make it really hard. Junior the Jerk did not prepare for his hive attack, so making it harder to pull off will reduce his/her success and increase the likely cost to the perpetrator. We are moving to ultra-stable hive stands in many of our locations: not just 2"x 4" legs that rest on the ground surface, but wider footings that will require more leverage to overturn (we are experimenting with wedges that extend front and back as well as 1' diameter disks attached to the bottom of hive stand legs). This Winter, we will be strapping hive boxes together (to prevent them breaking apart on impact) and to holes drilled in the stand. In some locations we will be securing the stands to the ground with spikes. None of these measures is a guarantee, but they will require time on the part of the vandals, be hard to figure out in the dark, and give the bees a chance to provide useful feedback. For the hard core, there is a YouTube video of a guy who built metal cages that secure his hives to pallets on the ground. (Google "Vandal proofing a bee hive")

Do you have lots of friendly eyes on the prize? Reducing isolation and improving response times can reduce the incidence and the impact of vandalism. Locally, most news of vandalism comes very quickly after the event, because most ground level hives are located in micro-communities (garden allotments, schoolyards, neighborhood parks) where there are lots of people looking out for the bees and rooting for them.

It's hard to be low profile in that bright white veil, puffing away with that smoker. At this point, turn lemons into lemonade. When you are working a hive in a public place and attract an audience, please take a moment to answer questions and to share the wonder of bees with them – and to recruit Average Jane and Normal Joe to their admiration and defense. You have then also helped with that "what can I do with my curiosity?" problem.

Bribery can help, too. If possible, it is a grand idea to distribute small amounts of honey to as many people as you can in the surrounding community: we have had both vandalism and swarm reports phoned in right away even by dog walkers!

Victims of Fear, Uncertainty, and Dread

Students in our short courses here have heard this many times: "If only 1 person out of 100 in this city is an irreconcilable bee-phobic-hater, there are 10,500 of them running the streets every day (about half as many at night, when the commuters go home)." Just to belabor this, that's over 150 per square mile. Personally, 1% sounds a little low. So yeah, you'll run into them. What's your plan?

Someone who is certain that "those bees don't belong there" is very much like the jerk(s) who invaded my friend's home and poisoned his hive: they don't care about the law, the assault is planned in advance, and it is likely to be effective. They also think, fundamentally, that there is nothing wrong with what they are doing, and the failure of public safety officials to act only proves to them that this is so.

It's harder to profile where this kind of hatefulness comes from with the certainty one can apply to teenagers. In this city, there is a perception that beekeeping (and lots of other "green" activities) are trendy preferences given to individuals with economic and political privilege. It's also associated with demographic change, putting the poor bees in the middle of the age-old social struggle of "us versus them" with fearful "us" being the group that feels pushed out of changing neighborhoods.

On the flip side, I have learned never to challenge an upscale parent on a mission. In one of the poshest neighborhoods here, the schoolyard beehive was nixed by a single maternal meltdown of nuclear proportions. Some news reports have linked poisonings in community gardens to hives installed over a small number of parental objections, but this was not proved. Or apparently even

investigated.

In addition, the phantom "fatal bee sting allergy" looms large in the minds of some parents and others who are not fearful enough to actually ascertain (from an actual allergist) that they have one. That fear is apparently strong enough in some cases to provoke a criminal act before it reaches the level necessary to schedule a doctor's appointment. It's hard to track down firm morbidity figures, but it appears that somewhere between 40 and 100 people in the U.S. are known to die from stings from all members of the order *Hymenoptera* combined each year (honey bees, bumble bees, wasps, hornets), about half the number killed on the roads *every day*. But folks don't slash the tires on the cars or block the roads next to the community garden where they toppled our hives last Winter.

Why? Because cars are "everyday" and bees are "strange." And some folks feel they are involuntarily having to deal with strange. My friends: "dealing with strange" is life in the city.

Strategies for Managing Fear Vandals

There are long games as well as short term moves that must be applied to securing hives against haters. All of the strategies listed above for reducing impulse vandalism will help – short term – against inveterate phobias, but they will not change the field.

• *Know your neighborhood and your neighbors.* Do you live in an area that is changing rapidly? Are you a new arrival? Have you made friends with anyone nearby yet? People you talk to are more likely to see you as



Two legged or four legged vandals?

a person and not a heedless threat to their wellbeing. Keep your antennae out for folks who signal unfriendliness or unhappiness with your bees, and watch for whether such stress seems on the rise. It's worth starting a conversation with them, as well, to signal that you see their concern and would like to alleviate it through information or even a visit to your apiary. Plus, vandalism is a coward's game, and they might worry about being identified. And this is sad: if you live in a hot hate zone, consider finding an out apiary. Not every site is habitat.

- *Explore easy geek options.* Motion detector lights (as low as \$20) freak guilty parties out, and wildlife cams (mine cost \$100) will get their picture. Even cheap fake cameras may do the trick.

- *Be boring.* The fact that beekeeping is seen as funky and unfamiliar is not beneficial to your bees. Despite widely known facts like the link between fast food and poor health, and speeding and car crashes, what is familiar is unconsciously perceived as safe. Therefore, anything you can do to normalize beekeeping in your community, to become as boring

as possible, will help your bees escape unwanted notice.

- *Be all over the place.* Do outreach to schools, churches, garden clubs, fairs: all the usual. And do it over and over. And get lots of voices to do it: this should have nothing whatsoever to do with personal notoriety.

- *Insist on your rights.* If there is an instance of beehive vandalism of *any kind* in your community, demand to file a police report. Provide evidence of the cash value of what was lost: bees, equipment, and harvest. If the police won't cooperate, get your local beekeepers to complain, *and loudly*. Letters are better than emails. No farmer around here would let some jerk come in and kill his livestock, and no police officer would pretend that it was OK. It's doubtful that prosecutions will follow, but being a big enough pain might cause the officer on the beat to keep an eye out for folks in back alleys with cans of bug spray.

- *Complain like the devil* on local social media and to the press, and link such crimes to others that inflict random harm. Mention CCD. Create a social environment where the perpetrator does not feel in the right,

but like an outcast.

Take a breath

An article like this can do bad things to your head, but please remember the 90% or more of your fellow citizens who hope for the best and avoid doing harm. Sometimes the statements of outrage we have received after an apiary is vandalized give us a whole new picture of how much we mean, and the hope we give, to the communities in which we live.

To take a city site and turn it into successful bee habitat does require some forethought about vandalism, but this is just another part of facing an urban, human-dense future which is safe for bees (and everything else). And if your experience is like ours, almost all apiaries end up carrying on with support from fellow beekeepers and the community at large. It's worth noting that once again the bees pay the price for human mis-perceptions and shortcomings, but we are more than able to work on these. 🐝

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

Beekeeping Supplies

Keep it simple. Buy painted, ready to go.

Hive Kit (lid, boxes, frames, bottom)	\$145.23
Starter Kit (hive plus tools and clothing)	264.34
Medium Super with frames and foundation	42.57
Deep Hive Body with frames and foundation	49.58
Economy Nuc with frames (for splits)	41.47

Do it yourself. Buy unassembled.

Telescoping Lids	\$ 15.83
Inner Covers (raised panel)	7.12
Medium Supers (finger joint)	10.11
Deep Hive Bodies (finger joint)	13.97
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Ross Conrad

And We All Know What May Flowers bring . . . pilgrims? No – a honey flow.

First let me start off by clearing up the terminology. It is often called a “honey flow” though technically we are talking about a nectar flow. This is a period of time where one or more major nectar sources are in bloom and the weather is favorable enough with warm temperatures and a lack of rainfall, to allow honey bees to forage and collect nectar in abundance. In locations where there is a succession of nectar sources that bloom, the honey flow may last for many weeks. In areas with more limited nectar sources, the honey flow may only last two to three weeks. The rest of the year may be spent on simple maintenance, where the amount of incoming nectar and pollen closely match the needed food supply of the hive and the honey stored away during the short honey flow is required to survive times of dearth, such as Winter.

Generally speaking, nectar flows are more predictable in temperate regions where there is usually a single main flow from a sequence of plant sources for several weeks, normally in late Spring or early Summer. In Southern regions during the long hot Summers, or in areas that are suffering from drought, nectar sources will tend to dry up due to the lack of moisture in the ground.

In order to take the fullest advantage of the first nectar flow of the year, a colony of bees needs to maximize the adult population in the hive. Traditionally beekeepers have fed syrup and protein supplements to colonies at least four to six weeks prior to the first major flow in order to artificially stimulate brood production in an effort to boost the population of foragers. However recent studies indicate that the use of artificial feeding can also reduce the bees’ immune response, and so more and more beekeepers are focusing on the honey bees’ natural diet (honey and pollen) in order to boost colony strength. By leaving enough honey on the hive to last the entire Winter, the need for artificial feeding between Autumn and Spring can be eliminated resulting in stronger hives in the Spring. Combine this superior nutrition with a good fertile queen and mite and disease control, and hives should be in great shape when the first honey flow starts in Spring.

Strong hives are not only needed to take full advantage of early flows but for beekeepers providing hives for pollination services. Migratory beekeepers typically evaluate the strength of their hives by the number of brood frames per hive, with six to eight frames of brood considered the minimum for a strong hive. Given that often colonies are dropped off in orchards just prior to bloom, and

depending on the crop, the bloom may only last two to three weeks, judging a hives’ strength solely on the number of frames of brood may be misleading. This is because it is the older bees (that are about three weeks old and who are of foraging age) that are needed in order to maximize the hives’ pollination potential.

Since it is the younger bees (less than three weeks old) that primarily care for the brood, frames of brood covered with bees do not necessarily indicate that the colony is of prime strength for pollination. In my view, a better test of a colony’s pollination strength is the number of foragers returning to the hive early in the afternoon on a warm, sunny day during a honey flow. Observe the hive and count the number of bees returning to the hive over the course of a minute. The minimum acceptable strength of one bee per second should be seen returning to the hive, with really strong hives having more returning bees than you can keep up with and count over the course of a minute. Such hives will very quickly cover all the top bars of the upper super and have bees overflowing down the outside of the box after the inner cover is removed, a condition often referred to as “boiling over” with bees.

Unfortunately, such colonies are also typically in prime condition for swarming. A colony that swarms





just prior to a major flow typically is unable to produce much, if any, surplus honey *on that flow*. Instead, since the hive's population has been greatly reduced by swarming, the colony uses the nectar flow to rebuild its population. This is the challenge of the beekeeper that is focused on honey production: how to maintain colonies in potential swarming condition, yet discourage swarming through management practices. While it is next to impossible to prevent all swarms, swarming can be reduced and minimized through techniques such as reducing congestion in the brood nest, and ensuring plenty of room for honey storage above the brood area. Traditionally these techniques have been accomplished by reversing hives in late Winter/early Spring to break up the brood nest, and by adding honey supers before colonies have filled all the available storage space in a hive with honey.

It is during a strong honey flow that a strong hive boiling over with bees is also primed to draw out new comb, however to maximize honey production it is best to provide colonies with supers of empty comb that is already drawn out. Normally I like to add my honey supers one at a time since I also am typically checking the hives every week to 10 days during the active season. If one is unable to return to check on colonies within that time frame, two honey supers can be added in order to help ensure that there will be plenty of storage space for the colony until you are able to conduct another inspection. This should only be done on very strong colonies though since weaker hives may not be able to patrol and monitor all the additional space adequately enough to prevent wax moths or small hive beetles from taking up residence. If the honey flow is going to be used to have the bees draw out comb from foundation or starter strips, supers are best only added one at a time.

Because strong colonies that are in ideal shape to take advantage of a honey flow also have a strong potential to swarm, it is important to have all honey supers and frames of foundation fully prepared ahead of time in order to avoid delays and ensure timely supering.

While some beekeepers like to add additional supers when the top super is about half full, I prefer to wait until the super being filled is 75-80 percent full before adding another super. Signs that the super is getting full include frames of capped honey and old combs that have new, "white" wax added to them. Sometimes however, supers of drawn comb may contain significant amounts of nectar that is being converted by the bees into honey and none of the cells are capped nor is the "whitening" of the combs visible. In cases like this the only way to accurately gauge how full the super is without removing individual frames, is to lift up on one end of the super to see how heavy it is. With one end of the super lifted up, it is a good time to also take a quick peak at the bottom bars of the super to see if queen cells have been started by the colony.

Beekeepers who don't want to use a queen excluder in order to provide an unlimited brood nest area for the queen to lay in can help prevent brood from being raised in their honey supers by under-supering with foundation or starter strips. Instead of placing an empty super on top of the hive when under-supering, the super is placed underneath the full honey super and above the brood boxes. Although it is more work to under-super since the top super full of honey must be removed and then replaced, and must be lifted up upon subsequent inspections to see if the bees have filled the new super, colonies seem to fill the empty space that is created in the middle of their hive faster than they fill supers when they are placed on top of the hive. It is because of the extra work involved that the majority of today's beekeepers super from the top.

Inexperienced beekeepers often want to know how they can tell when a honey flow has started. Aside from the fact that there will be a lot of forage plants in bloom, favorable weather for foraging, and the "whitening" of the combs as the bees fill them with honey, a common sign that a strong honey flow is underway is a lack of robbing. When plenty of nectar sources are available foragers tend to focus on bringing in fresh nectar and pollen from the flowers rather than sneaking around other hives looking to steal honey from them.

Another way some beekeepers keep tabs on honey flows are through the use of hive scales. By monitoring and noting when significant increases in hive weight occur, honey flows can be identified. Over the course of years, such data can provide patterns that will give beekeepers a pretty good idea when to expect honey flows in their area. 🐝

Ross Conrad is the author of Natural Beekeeping, Revised and Expanded 2nd Edition and is out preparing for the honey flow in his bee yards in and around Middlebury, Vermont. Ross will be teaching an Organic Beekeeping for Beginners two-day intensive on June 4-5th at Sterling College in Craftsbury, Vermont. Call 1-800-648-3591 for more information or to register.

Letters from a Beekeeper's Wife
"The Honey House,"
April 1, 1917

Dear Sis,

With forsythia and violets blooming, frogs croaking and Rob's hammer sounding, I really believe that Spring has come. The hammering means that we (Rob doing the work and I encouraging) are putting up the honey-house we have talked about for so long. I am delighted to think that at last I'll be rid of the big tank from the back of the stove and all the sticky mess of bottling in the kitchen. Every bit of the preparation and care of honey is to be done in the honey-house. There are to be two big tanks to hold it all and a power extractor, and we are putting in all the little labor-saving devices that Rob had put in the kitchen and I believe that we are almost, if not quite, crazy now on the subject of economy of motion.

That's our slogan, and the children have taken it up and watch everything we do to see if they can't catch us "wasting muscle and nerve energy." The girls have a system of marks and keep count to see if the one whose turn it is has to make more than one trip to the kitchen to carry out plates and bring in the dessert.

When it came to planning the honey-house, Rob and I went thru every motion from the times the frames of honey are carried into the house until the cases of bottles are carried out, to see that every arrangement of tools, table, and appliances will make for economy of motion and nervous force. Do I talk like your much quoted efficiency expert? To begin with the door, it swings both ways so that one can go in and out with hands full, and the work begins just inside the door. From there on it goes right on around the room, the tables at the proper height, tools for each process kept at the place where that work will be done, etc., and it all ends up at the other side of the door, where there is space to stack the crates of bottled honey. To have all the work on one floor has necessitated a little extra outlay for a honey-pump, to pump the honey from the extractor into the tanks, but the one floor plan simplifies things for us and saves many steps.

For instance, a tray on wheels carries a super full of frames to the capping tanks. There we'll stand ready to take out a frame with both hands. Then one end bar rests on a nail for the purpose on a bar of the capping tank, this freeing the right hand which will reach for the steam uncapping-knife right under the hand on the edge of the tank. The cappings will fall into the tank where they will drain, the knife is replaced and the frame is placed on a rack where Rob can reach it easily. We have not put in a capping-melter yet. Rob will work at another part of the capping-tank. When enough combs are uncapped, he will put them into the extractor, which is beside him. Doesn't it sound fascinating? We are eager to see how much time we'll save, and see whether it all works out as well in practice as it does on paper. Of course we probably have made some mistakes, but we hope no serious ones.

One more thing that Rob thought of was a fan which goes with the power that runs the extractor. That will be a wonderful help. I don't mind being wet with perspiration alone, nor sticky all over with honey alone - but I abominate the combination!

I long to be outdoors hammering too, instead of housecleaning, but this is my job and I must get to it instead of writing at such length to my sister. There is so much of women's work that I don't enjoy and so much of man's work that I do, that I am glad it is no longer taken for granted that woman shall do housework and nothing else. "Women's sphere" is the whole world now if she wants it. I don't believe she does want it all though anti-suffragists to the contrary. I should hate to think that the time would ever come when she would be the dominant sex, as is the case in the beehive. If the time ever did come, thousands of years hence, that all the men were fat and useless and lazy (there are plenty of such drones now, goodness knows!) and all the women but one did the entire work of the country, made the laws and saw that they were carried out, do you supposed that these stern females would be as relentless as the worker bees? At The approach of Winter, would they starve their husbands and carry part of the children outdoors to freeze for fear there would not be enough bread to go round? I shudder to think of it! Would they keep the mother of all the children indoors working with never a respite until she grew old and feeble, and then would they kill her? I fly from such horrible thoughts to my attic which must be cleaned today. I wonder if you are housecleaning. Give the baby a squeeze from us.

Aunt Mary

Swarming

What Is Going On?

Steve Repasky

In temperate areas, beekeepers look forward to many things in the Spring, such as the first pollen coming in from skunk cabbage, crocus, willow and snow drops, the beginning of a nectar flow when the maples bloom or the start of a new hive from a nuc or increase hive. These events herald the beginning of the annual cycle of reproduction for honey bee colonies that may reach its climax only a month or two later. Just as the flowers bloom in the Spring, Honey bee colonies across the United States begin preparations for their annual colony reproductive event of swarming. It's a natural phenomenon; a process that nearly all colonies go through, both managed and unmanaged. For many beekeepers, the thought of their colonies swarming brings mixed feelings of tension, worry and excitement. It causes "new-bees" to switch their concern from making sure their colony survived the Winter to trying not to lose a colony and a potential honey harvest with it.

Losing a swarm may evoke feelings of failure from some beekeepers if it issues from your own apiary, but capturing a swarm also may bring on the feeling of great success. Catching a swarm is often viewed as a transition from a new beekeeper to one with more experience under the veil. Swarming is exciting and isn't something to fear; instead, it is something to appreciate and respect. The behavior of a swarm of honey bees, and the colony's preparations that lead up to a swarm issuing from the hive, give us a wonderful opportunity to study this marvel of Nature.

What is Swarming

Swarming is the colony's way of reproducing at a larger level than the reproduction that takes place within the cells of wax comb. It is a process that healthy colonies go through to

divide one colony into two or more independent units, as the season allows. It is asexual, meaning that the "reproduction" occurs by fission, where the colony divides roughly in half and the "new" colony is the swarm that leaves with the mother queen while the rest of the colony remains behind to raise a new queen and continue their existence. This process also provides a reduction or a break in the brood cycle, which also may aid in the reduction of the *Varroa* mite, a major pest to the Honey bee. It is important that beekeepers understand how to manage or deal with the swarming instinct of Honey bee colonies and in order to do that, they must understand the biological processes that take place within the hive.

What is that you see?

Throughout the process of swarming, beekeepers are most familiar with seeing the familiar peanut shaped queen cells along the lower one-third of the frames or locating the actual swarm in their bivouac on a tree limb or other temporary resting place. What we often miss out on are the signs within the colony that appear between the appearance of queen cells and the issuing of the primary swarm from the hive. These signs are often subtle but with some basic observations and understanding of Honey bee biology, they can tell the beekeeper a lot about what is happening or already has happened in their hive. Many beekeepers often react to seeing the queen cells by taking their hive tool and cutting them off or crushing them with the thinking that they will stop the swarming process and save their bees only to come back two weeks later to find more queen cells and likely a few thousand bees short! The swarming impulse in Honey bees is strong and once the process begins, it is very difficult to stop.

As a producer of queens with genetic traits I'd like to maintain I don't mind the occasional swarm as they are putting some great genetics into areas outside of my outyards – thereby strengthening local genetics. What I am not a fan of is losing queens that I use for grafting, so my management is a little more intensive than the average small-scale beekeeper. I am in my hives at five to seven day intervals to make sure that I do not lose a swarm with a favorite queen along for the ride! I often say that I am a poor salesman when it comes to selling queens because I often get many calls during swarming season (May through June here in western Pennsylvania) from beekeepers saying that they believe their colony has swarmed and they do not have a queen and need to purchase one from me. This is where some basic observation and simple math will help you determine if you do indeed need a queen or if you might be jumping the gun just a little.

First things first we must look at the age of the queen cells. As the swarm impulse strengthens, structures called queen cups begin to appear along the lower one-third of the frames. These structures are often called queen cups or play cups. They do not have an egg in them and can be removed by the beekeeper or the bees and rebuilt again days later seemingly at random, but they is no randomness when it comes



Check to see if there is an egg or larvae in the queen cell.

to Honey bees. At this early stage a beekeeper should be aware but not overly concerned about immediate swarm departure. However, this can change rather quickly. As soon as an egg is deposited into the queen cup that structure now becomes a viable queen cell. Determining the age of that cell will assist you in determining at what stage the swarming impulse is in. An egg deposited into the queen cup (now officially a queen cell!) will be in an upright position. At day two the egg will begin to lean towards the bottom of the cell. By day three the egg is completely laying down and will soon hatch into a young larvae at which point nurse bees will feverishly begin to feed royal jelly to the larvae for the next four days as the larvae grows larger in size and acquires the classic “c-shaped” look that larvae have.

At this point in the development of a swarm, the beekeeper should be more observant. Swarms will issue from a hive the day before or the day of capping of a queen cell – not all cells, just one and that, on average will occur on day seven or eight. Removing all of the queen cells at this point will only delay swarming for another week as the bees will quickly begin rearing more queen cells. Beekeepers choosing to use this technique as a method of swarm control should inspect their hives every five or six days to avoid the loss of a swarm. Even then we can miss a cell that is tucked into the edge of a frame or blended in too well and the swarm still issues despite our best try.

You may find a colony that has swarmed and has queen cells of multiple ages. Once a queen cell is capped this assures the bees that they have an opportunity to replace the queen that issues with the swarm, ensuring that the parent hive will continue to thrive if the swarm is unable to make it through its first Winter to swarm itself in its second year.

If we remove all queen cells AFTER a colony has swarmed, and there are no eggs or young larvae for the bees to begin raising another queen, we have effectively caused that colony to become hopelessly queenless.

This is where beekeepers often fail at reading what the hive is telling us. Reading the condition of brood

frames can give us an idea of when that colony has swarmed. The first step is to determine whether or not eggs are present. Though queens are run around by her workers to slim down and will lay less as they approach the day they issue from the hive, she does not always stop laying. Seeing eggs can mean that the colony has not swarmed (what age are the queen cells in?) or it can mean that they swarmed three days ago and the beekeeper is seeing what the queen had laid before she swarmed.

The presence of no eggs but open brood indicates that the colony swarmed approximately one to four days ago. You will see all stages of brood at this point. As the colony progresses and more time passes from when the swarm issued, more changes occur within the brood nest. The presence of only capped brood tells us that a colony swarmed at least eight days ago. Moving farther along in time, brood will begin to emerge and a common pattern can be seen. The oldest brood, located in the middle of a frame, has emerged and the bees are storing nectar in the cells where one would normally find eggs. As bees continue to emerge from their cells, the bees will fill the brood nest with additional nectar. We can be reasonably sure that the colony has swarmed at least 21 days ago (the time it takes for a worker to develop from egg to adult).

Using the development times of brood and queens and the basic observation of what the bees are doing in the hive can give us a lot of answers. However, we must also take into consideration colony equilibrium.

Colony Equilibrium

A colony in equilibrium is one that has a mated queen, many workers and drones. The process of swarming upsets this equilibrium by creating a situation where multiple queens (this includes cells, virgins and mated) are involved in a single colony. A study completed by David Gilley and David Tarpy [*Apidologie* 36 (2005) 461-474] describes three methods of queen elimination that can occur during the swarming process. Queen-queen duels occur when two newly emerged queens engage each other and “fight it out” to which an end result MAY end in one queen wounding or killing



the other queen. A second method is called pre-emergence destruction. In this scenario, where there are multiple queen cells of similar ages are destroyed by a recently emerged virgin queen. Shortly after emerging, the virgin queen will go to the cells of her sister queens and eliminate them by stinging. Once they are eliminated, the workers will chew a large hole in the side of the cells and remove the now deceased virgin queen. The third method of queen elimination is called secondary swarm departure. Here, a week after the primary swarm has already issued from the hive, the now fully developed queen cells emerge. Secondary swarms will issue from a hive often leaving with multiple virgin queens. I have found as many as 12 virgin queens in one swarm and have heard of more than that, but often finding two to four virgin queens is common. Keep in mind that the size of the colony as well as colony equilibrium has an influence on how many times a colony will swarm. Leaving too many queen cells in a hive after a colony has swarmed once can result in a colony swarming two or three times or more. This often surprises newer beekeepers when they catch one swarm from their backyard hive and then a week to two weeks later catch another swarm from the same hive – this is because a thorough inspection was likely not completed and additional queen cells were left behind with the thought that a colony swarms once and then






becomes queen right from the cells left behind. If you decide to remove queen cells – leave two cells behind so that you can be assured that there is an opportunity for the hive to become queen-right. The other cells can be used to create splits from hives that are on the verge of swarming or on hives that just aren't producing. Dr. Larry Connor's Increase Essentials is a great source of information on using queen cells to make up nucs

and splits in your own beeyard.

Once everything settles down, it can take up to three weeks after a colony issues its last swarm to become queen-right, which may be four weeks after the primary swarm has left the hive. This time-line often makes beekeepers antsy and is where I become a bad salesman! I usually



begin fielding calls at the two-week mark after a colony has swarmed from beekeepers looking for replacement queens. Explaining colony equilibrium and swarm behavior results in a call back a week or two later with an excited beekeeper on the other end of the phone stating that they inspected their hive and that eggs and queen were found. 

Stephen Repasky, author of Swarm Essentials, is a queen producer and EAS Master Beekeeper in Pittsburgh, PA. He can be reached at www.meadowsweetbees.com.



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ASK A MASTER



Bill Mondjack
EAS Master Beekeeper

As answered by Bill Mondjack, EAS Certified Master Beekeeper.

Not all beekeepers work their colonies the same way. Anyone who has worked with me in the past knows that I do not do things by the book; I do what works for me. So when I answer a question I like to pass along my thoughts on what I would do if the situation in question happened to me.

Question 1: I am a newer beekeeper and fed my bees sugar syrup with a honey super on? Now I have a super that is full of what I assume is a mixture of capped honey and sugar syrup. What are my options and what would you do?

Bill says: I've heard this story quite a few times over the years. I think I am partially to blame (at least in my area) because I tell new beeks to feed until ALL the foundation is drawn into comb but what I really mean is: feed sugar syrup until all of your foundation IN THE BROOD CHAMBERS is drawn into comb, without any honey supers on the hive. What are your options? Well, you can leave that honey super on the hive and let the bees eat the sugar syrup honey or extract it and feed the syrup honey back to the bees if you want to keep this super just for honey and free of brood in the future. If you leave it on the hive the bees may eat some of this syrup honey as they need it during an upcoming drought period and refill it with honey from a Fall nectar flow but then the super will have a mix of pure natural honey and syrup honey, OK for the bees but I wouldn't chance selling it as pure honey. If you choose to leave it on over winter there is a very good chance by early Spring the bees will have eaten their way into this super and the queen will have laid some brood in it, which darkens the combs and may be undesirable to some beekeepers. What would I do? If it were mine I would leave it on the hive.

Question 2: Three of my hives that overwintered last year have 2 year old queens from when the hives were installed. I hear/read recommendations to re-queen hives periodically. How do you know when it is time to re-queen?

Bill says: Tough question, here's my answer. The bees know more than we do! You can let the bees decide when to replace an old or failing queen within their colony. The belief is, and proven, by keeping a young healthy queen in each colony the colony has less of a tendency to swarm and you will have a stronger colony which produces more honey. Years ago (believe it or not) I've had productive queens last 3-4 years, now I hear of many recommendations to re-queen yearly. I do believe queens produced in early Spring from some of



How old is too old?

the commercial apiaries may not be mated as well and may run out of sperm prematurely. I believe a queen produced from your own or fellow beekeepers' apiary may be superior so letting your hive re-queen itself is not necessarily a bad idea. I've been re-queening about every 2 years and I choose to do it during a strong nectar flow, the best queens are produced at this time. I'll pull the queen and place her in a nuc as a back-up in case the parent colony should fail to produce new queens but I have never had a colony in the middle of a nectar flow fail to raise new queen cells. This does not affect the honey production because all of the mature worker bees in the hive at this time were born weeks before the main flow.

Question 3: I am a backyard beekeeper and the location I have for my hives gets a lot of shade and stays damp for several days after a rain. There isn't a sunnier/drier spot on my property to locate the hives. What can be done to minimize the moisture in the hives?

Bill says: We always read or hear to keep our bees in the sun with the entrance facing southeast so they wake up early in the morning and also to keep the western winds from hitting the entrance, then I think to myself: "when bees live in the hollow of a tree they are in the shade", but they usually choose a higher location than we do. I know quite a few beekeepers who keep their apiaries in the shade with no ill effects BUT not in low lying wet areas. If you cannot find a better location for your bees I would suggest at the very minimum prop up your telescoping outer cover to help with ventilation and if you are using screened bottom boards you may want to keep the tray out for the Summer months. My best suggestion is to move your hives to a new drier location.

Do you have a question for Bill? As an EAS Certified Master Beekeeper, Bill is an invaluable resource and we thank him for sharing his experience and expertise. If you have a question or want to know what Bill would do in a situation that happened to you, please email: billzbeez@mondjackapiaries.com.

CATCH THE BUZZ

Bee Culture

The Magazine of American Beekeeping

UNITED STATES HONEY PRODUCTION DOWN 9 PERCENT FOR OPERATIONS WITH FIVE OR MORE COLONIES IN 2017.

United States honey production in 2017 from producers with five or more colonies totaled 148 million pounds, down 9% from 2016. There were 2.67 Million colonies producing honey in 2017, down 4% from 2016. Yield per colony averaged 55.3 Pounds, down 5% from the 58.3 Pounds in 2016. Colonies which produced honey in more than one state were counted in each state where the honey was produced. Therefore, at the United States level yield per colony may be understated, but total production would not be impacted. Colonies were not included if honey was not harvested. Producer honey stocks were 30.6 million pounds on December 15, 2017, down 26% from a year earlier. Stocks held by producers exclude those held under the commodity loan program.

Operations with less than five colonies produced 599 thousand pounds of honey in 2017

United States honey production in 2017 from producers with less than five colonies totaled 599 thousand pounds, down 22% from 2016. There were 20 thousand colonies from which honey was harvested in 2017, down 17% from 2016. The average yield was 30.0 pounds per colony in 2017, down 6% from the previous year.

Honey prices up 2% for operations with five or more colonies in 2017.

United States honey prices increased 2% during 2017 to 215.6 cents per pound, compared to 211.9 cents per pound in 2016. United States and state level prices reflect the portions of honey sold through cooperatives, private, and retail channels. Prices for each color class are derived by weighting the quantities sold for each marketing channel. Prices for the 2016 crop reflect honey sold in 2016 and 2017. Some 2016 crop honey was sold in 2017, which caused some revisions to the 2016 crop prices.

Price paid per queen was \$14 for operations with five or more colonies in 2017.

For operations with five or more colonies, the average prices paid in 2017 for honey bee queens, packages, and nucs were \$14, \$76, and \$107 respectively. The average prices paid in 2017 for operations with less than five colonies were \$34 per queen, \$117 per package, and \$138 per nuc. For operations with five or more colonies, pollination income for 2017 was \$435 million, up 29 percent from 2016. Other income from honey bees for operations with five or more colonies in 2017 was \$163 million, up 10 percent from 2016. Number of colonies, yield, production, stocks, price, and value – states and United States: 2016

[Operations with 5 or more colonies that also qualify as a farm. Colonies which produced honey in more than one state were counted in each state]

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Ann Harman

YEARS 2 & 3 HIVE TASKS



Check to make sure your bees are bringing in pollen.

- It's Spring Hive Cleaning Time!
- Select a day above 60°F, warm sun, low wind, to inspect hives from top to bottom
- While inspecting replace any old or damaged equipment
- Help the bees by cleaning off bottom board and area underneath hive
- Clean up any Winter debris from beeyard
- In bear country, inspect and repair bear and small critter fence
- Select old and damaged comb for replacement during a good nectar flow
- If using foundation (Langstroth) for replacement mist it with 1:1 sugar syrup with Honey-B-Healthy as an attractant
- Depending on weather, monitor food supply, pollen and nectar
- If necessary, feed with 1:1 sugar syrup and pollen patties
- Monitor pollen patties for small hive beetles



Inspecting hives, reversing if necessary.



Watch for swarms.



Watch for small hive beetles, especially if feeding protein patties.



The best way to control American Foulbrood

- Inspect brood pattern and colony numbers – does queen need replacement?
- If colony is weak but disease-free, combine with strong colony
- Kill the queen in the weak colony when combining
- If any disease suspected contact local bee inspector or experienced beekeeper
- If in small hive beetle area, keep inspection to a minimum
- Look for swarm signs – drones at entrance, queen cells at bottom bar of frames



Check brood frames. Is the queen doing her job?

- Learn swarm time in your area and use your preferred method of swarm prevention
- Brood chambers can be reversed if bottom one is empty
- Reverse every seven to 10 days until strong nectar flow begins
- If reversing, do not split brood pattern
- Do you know your Spring nectar and pollen plants? If not, learn them
- Have honey supers ready before nectar flow begins
- If feeding syrup do not put any honey supers on
- Monitor the weather during strong nectar flow – increase or decrease honey supers if necessary 🐝

Cooking With Honey



Ann Harman

ASPARAGUS WITH HONEY-GARLIC SAUCE

Spring is asparagus time. Some like it and some don't. Here is a wonderful recipe for it.

- 1 pound asparagus
- 1/4 cup Dijon mustard
- 1/3 cup dark ale or beer
- 3 tablespoons honey
- 1/2 teaspoon minced or pressed garlic
- 1/4 teaspoon crushed dried thyme leaves
- 1/4 teaspoon salt

Cook asparagus your favorite way until barely tender. Drain. Combine the sauce ingredients and mix well. Pour over cooked asparagus. Makes four servings.

Strawberries appear around the end of May and continue into June. Be sure to visit any pick-your-own strawberry patches. Fresh strawberries dipped in honey make a delicious treat.

BERRY HONEY MILKSHAKE

You can use non-fat milk, ice cream or yogurt if you wish

- 1 pint vanilla ice cream or frozen yogurt
- 2-1/2 cups strawberries
- 1/2 cup milk
- 1/4 cup honey
- 4 small mint sprigs (optional)

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



Serve immediately in tall chilled glasses. Garnish with mint sprigs if desired. Makes four servings.

TROPICAL TEA COOLER

- 1 pint strawberries, hulled
- 1/4 cup honey
- 1 5-ounce can frozen orange juice concentrate
- 2 cups brewed green tea, cooled

In blender or food processor combine strawberries and honey; process until smooth. Add orange juice concentrate; process until well blended. Stir into cooled tea. Serve over ice. Makes four servings.



HONEY BBQ - MARINATED CHICKEN DRUMSTICKS

When using honey in BBQ sauces, the sauce can scorch more easily and quickly than when using sugar.

- 1 pound chicken drumsticks
- 1/2 cup ketchup
- 1/2 cup honey
- 1/4 cup vegetable oil
- 2 tablespoons soy sauce
- 2 teaspoons lemon juice
- 1/4 teaspoon crushed peppercorns
- 1/4 teaspoon hot chili sauce
- Salt, to taste

Place chicken in shallow dish or in plastic bag. Combine the sauce ingredients in a small bowl. Pour over chicken. Cover dish. Refrigerate about one hour. Prepare grill. Then grill to desired doneness. Turn drumsticks frequently.

All recipes from National Honey Board.

Will you be making ice tea or lemonade this Summer season? Use honey to sweeten it. Honey stirs into ice cold drinks quickly and easily. 🍯

