Ma 2013

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Bee Culture

The Magazine Of American Beekeeping

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USDA 2012 Honey Report

10 Rules For Modern Beekeeping

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Features . . . Bee Culture . . . The Rest

Honey bee on citrus. Photo taken by Jessica Lawrence.

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Developing Allergies

In response to the allergy article by Dr Wade, I have heard about a little-known fact to the medical world but some beekeepers have noticed. It seems there may be a relation between Non-Steroid Anti-Inflammatory Drugs and the development of allergic reactions to honey bee stings. I have heard of beekeepers who were under these medications and when stung developed long-term allergic reactions.

Of course, for science, this is just a series of anecdotal events.

Jean-Claude B.

Varroa Treatments???

I have to take issue with Buddy Marterre's March *Bee Culture* article, Why Treat for *Varroa*. In summary, Dr. Marterre states that he understands the threat that *Varroa* poses, and he also acknowledges that treatments do have some positive effect. After that he starts to ramble, "All *Varroa* treatments are bad for honey bees", and, "Treatments don't work near as well as you might think". . . He continues on citing a number of anecdotal experiences that he believes support his hypotheses. He concludes by offering his interpretation of the USDA Bee Informed survey, namely that "the vast majority of the beekeepers in this country are treating. But I'll bet they don't know why". Curiously, in his list of references, No.12 refers to Dr. Tom Seeley's work with the feral colonies in the Arnot forest. However, there is no specific mention of any of Dr. Seeley's findings in the article. Therefore, I'm left to conclude that Dr. Marterre is referencing Dr. Seeley's work, solely to lend credential to his own belief system. Overall, I found the article confusing, and somewhat difficult to follow. In the final analysis, I have to believe that it's Dr. Marterre who doesn't understand the hows and whys of mite treatment.

This type of gobbledy-gook reminds me of the confusion and controversy surrounding the use of screened bottom boards, powdered sugar dusting, 4.9 mm foundation, and any number of homemade treatment concoctions. All were, or still are, being touted by their promoters as the natural solution to *Varroa*. If any of these products or ideas actually worked, *Varroa* would be nothing but an unpleasant memory, at least among the small beekeeper fraternity. How much time and effort has been wasted by inexperienced or unsuspecting beekeepers trying to substitute these methods for legitimate mite control? For those unfortunate souls who have been mislead or overwhelmed by the situation, the value of lost bees and abandoned equipment, has to run into the millions of dollars.

In the meantime, beekeeping and beekeepers in general continue to suffer. The situation is only made worse by the constant negativity emanating from the anti-treatment crowd. This merry band of dedicated small thinkers will find fault with, and repeatedly assail any and all attempts directed at mite control, no matter how moderate or benign the treatment. I've often wondered how these folks treat their pets or farm animals when they get sick. Do they deny treatment in the hope that the affected creature will develop resistance, or recover on its own? Obviously that's how they treat their bees; they just close their eyes and hope for the best. Meanwhile, how many of their colonies die a slow, agonizing death at the hand of *Varroa*? They're not honest enough to ever discuss that subject! One final question, how do these folks go about replacing their non-*Varroa* losses? Ethics would certainly prevent them from purchasing replacement stocks that were reared or procured from treated colonies, or so you would think. Therein lies the real hypocrisy. It's yet another classic example of the do as I say, not as I do mentality. If I were a package bee, or nuc producer, I would just love the small thinking crowd. REPEAT BUSINESS!!

For anyone willing to think for themselves, the bottom line on *Varroa* control is this: If you want to achieve long term beekeeping success, some form of *Varroa* treatment will, on occasion, be necessary. Start by selecting or developing a mite sampling protocol suitable

for your operation, and use it to routinely monitor *Varroa* buildup. Once the pre-determined treatment threshold is at hand, treat with whatever control agent seems most appropriate for the situation. That choice could vary, depending on the mite load coupled with the overall apiary condition, the time of year, existing weather conditions, or personal preference. The *Varroa*-virus complex is constantly changing, so don't be afraid to experiment. (Albeit, on a limited number of colonies) That's the only way you'll be able to keep ahead of the curve. Remember this: The most valuable asset in any apiary, are the bees! Do any, and everything you can to keep them healthy and productive. Their long term future, and possibly yours, depends on that.

Roy Hendrickson
Chardon, OH

Smoker Fuel

In line with Ross Conrad's article "Using A Smoker?" (March 2013), I have been using dried peels of organic citrus fruit for smoker fuel with good result. The smoke is thick and pleasant smelling and the peels smolder well (they do not tend to go out easily). I mostly use orange, but also throw in grapefruit, lemon, and lime when I have it. I dry the peels by simply laying them out on the kitchen counter for a few days after eating the fruit. (With a family of six that goes through a lot of fruit, and as someone who composts but could not put these peels in the compost bin due to their acidity, this turns out to be a good way to "reuse" this left over product.) This season, I am going to try adding in the dried peels of the occasional pineapple and mangos that we eat (they are also a bit acidic for the compost bin).

John Atwell
Oakton, VA

Destructive Teasels

I am appalled by the article in the March 2013 issue of *Bee Culture* recommending planting teasel. This is a noxious, invasive species and it is irresponsible of your magazine to suggest planting this pest.

Teasels are extremely destructive to native vegetation. They seed prolifically, grow in rosettes, and crowd out other vegetation, particularly including native species which are already stressed by other human activities. Teasel is not a benign plant providing food for bees. It is a huge threat to the native ecosystems in many states.

Teasels are a threat through much of the United States. The author of the article in your March issue did not do her research. She indicated this was a regulated weed in Missouri, Oregon, and Colorado. Actually, many more states, and federal and state agencies, treat teasel as an invasive species and are trying to eradicate it on properties.

Teasel is listed as a noxious weed in Section 317.1A of the Code of Iowa (2013). In fact, Section 317.25 of the Iowa Code makes it an offense for which one can fined to "import, sell, offer for sale, or distribute teasel (Dipsacus) biennial."

My wife is a beekeeper and her bees are happy to forage among the 50 some species of native plants I have growing in my fairly small prairie planting on our property.

I bought my wife a subscription to *Bee Culture* as a Christmas present. I had no idea it would contain articles advocating the planting of plants which I and others are trying to extinguish in the landscape.

Obviously I have not seen many issues of your magazine, but I certainly think you should solicit articles from authors who can recommend native plants, and not invasive plants, as food sources for bees.

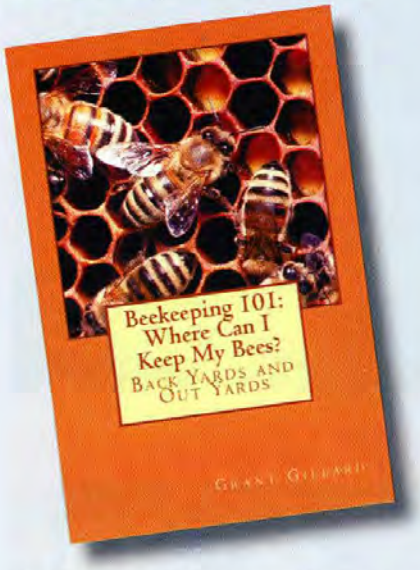
Joe Holland

***Editor's Note**: Teasel is indeed an invasive plant, and in some places, such as your home state of Iowa and perhaps others, outlawed. But it is a naturalized plant in much of the U.S., and indeed, available for sale from some sources.*

New For Beekeepers — Books and Products

Grant Gillard began keeping bees in 1981. He started out with 20 hives at home in southern MN, but now lives in Jackson, MO and runs about 200 hives. He sells honey at several Farm Markets, raises queens and is a Presbyterian Minister in his free time. He is past President of the MO State Beekeepers.

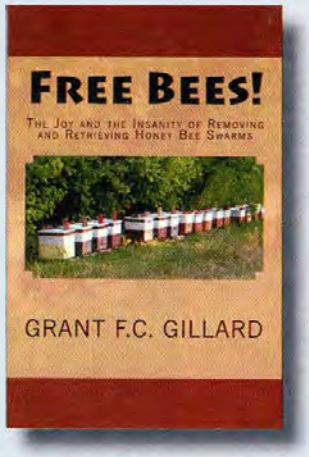
All of his books are available at **www.grantgillard.weebly.com**



Beekeeping 101: Where Can I Keep My Bees?, 9781480217089, 6"x9", 148 pgs, soft cover, B&W. $8.99

So you want to start keeping bees? Where does a newbee or hobbyist place their bee hives? The back yard is the most obvious choice, but there are many factors, including municpal ordinances and relations with the neighbors. Urban beekeeping is on the rise and roof top apiaries are becoming popular. Still, there are several factors that limit and define the most successful apiary site selection.

Grant details what makes for the ideal location for the bees, plus cites a number of other criteria helpful to the beekeeper. Just like in real estate, the admonition of "location, location, location," rings true for the honey bee and honey production.



The Joy and the Insanity of Removing and Retrieving Honey Bee Swarms, 9781481824040, 6"x9" 292 pages, soft cover, B&W, $13.99

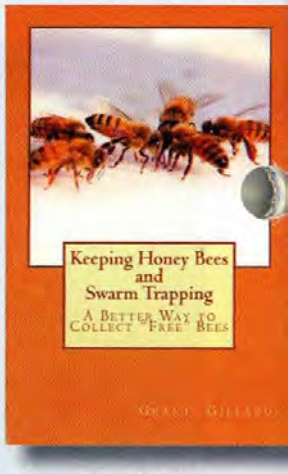
If you are struggling to get started in beekeeping, you know it costs a ton of money to buy all the equipment. Shipping charges are increasing every year. Costs continue to go up. Bees, in certain times during the season, are in short supply. I would think everyone would be interested in "free" bees!

In a nutshell, you don't have to buy bees and incur the out-of-pocket expenses that hold a lot of hopeful people back from enjoying a wonderful hobby that holds tremendous business potentials.

Like a lot of people, we have more time than money and the bees are out there for the expense of our time.

Never before has the opportunity for beekeepers been greater than now. The general public goes crazy when they find a swarm of honeybees and they'll make 15 phone calls looking for someone to take the bees off their hands. It would be easier to kill the bees, but there is a new thread woven into the public consciousness that recognizes it's just wrong to do so.

This manuscript is about finding those opportunities so people call you. You can acquire a bunch of free bees with a little effort and a little time.



A Better Way to Collect "Free" Bees, 9781481816403, 6"x9", 86 pgs., B&W, $12.99

Swarm trapping is another aspect to free bees that entails catching that runaway swarm even when you're not around and in places you can't always be. We've all had experiences where the swarm departed for some unknown destination, and then you wonder about the swarms that come out of bee trees in remote areas where no human being was able to discover them. And what about the swarms that people find but they don't know who to call? Eventually those swarms will leave for a hollow tree or somebody's garden shed. How can I get those swarms I don't even know about?

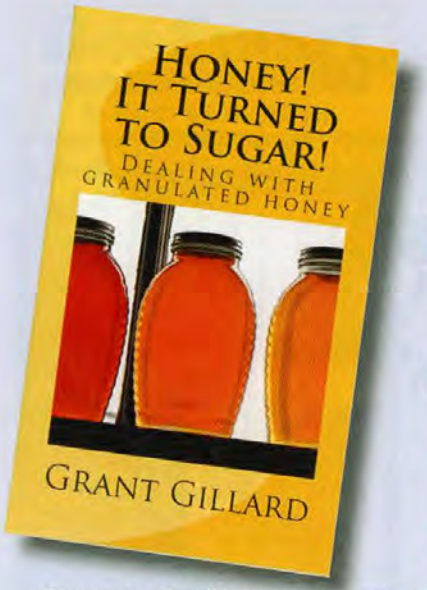
What about a temporary location that would attract the scout bees so you wouldn't necessarily have to be present to retrieve the swarm, or if you arrived a minute too late. Can you still catch that swarm by setting a trap over the hill or in various locations around the community?

So Grant got to thinking on how to create a box, an artificial cavity to mimic a hollow tree that would attract the bees so he didn't have to be everywhere at the same time. He could space out several of these boxes around the county to catch those bees that get away. He could have a dummy hive, a bait box to attract those swarms that no one sees. It would be a decoy box that would house the swarm until he found time to check it and move it.

Dealing With Issues Of Granulated Honey, 9781480220348, 6"x9", 68 pgs., B&W, soft cover, $4.99

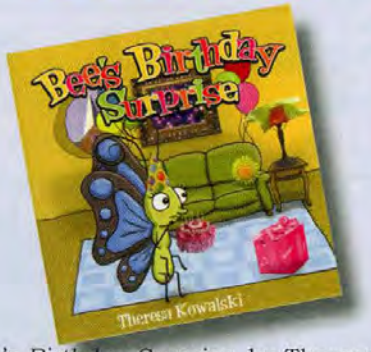
Honey is the only food that will never spoil. However, honey will crystalize or granulate, a process that some people like to say, "My honey turned to sugar!"

Well, rest assured, the honey didn't turn into anything. It's still honey. The natural, and eventual process of granulation is easily reversed with a source of heat, preferably at low temperatures.



The warmth will return the granulated honey back into liquid honey. Store-brand honey, pasteurized for a longer shelf-life, gives naturally produced, local raw honey a bad name as store-brand honey seldom granulates. Unpasteurized honey and local raw honey will granulate faster, thus confusing customers.

Still, it's the best honey there is, and now you can convince your customers that it really is.



Bee's Birthday Surprise, by Theresa Kowalski. 8.5" x 8.5". 30 pages, color throughout. Art by Jeff Duckworth. Published by Inspiring Voices. ISBN 978-1-4624-0381-3. $13.95.

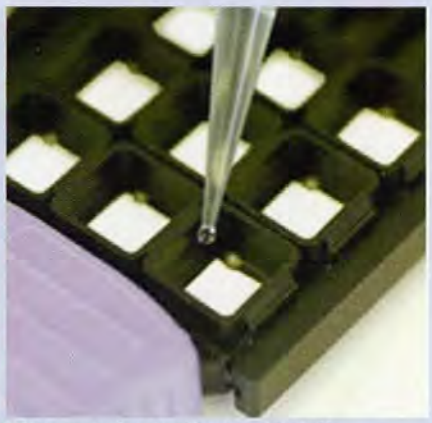
This children's book is a story about Bee and her friend Butterfly and their adventures in the Garden. When it's Bees birthday, Butterfly plans a surprise, but Bee becomes lost and Butterfly, their friend Charlie and Charlie's dad help to find Bee and celebrate her birthday. A delightful mix of art and photos make this an attractive book to see, and the story is perfect to read to a curious child. Developed with the help of Steve Buchmann, Tom Van Arsdall, Eric Mader, *Bee Culture* Magazine, Adam Burke and the Pollinator Partnership.

Pre-Glued seed tape is manufactured by Adcal Inc, 1270 W. 130th Street, Brunswick, OH 44212. The 100 foot roll is pre-glued for your convenience. Printed increments on the tape make for easy seed placement so every seed gets just the right amount of room. Peel back the protective covering, place the seeds on the sticky surface, place the tape in a furrow, cover and water. Both the paper and the adhesive are biodegradable and compostable. Available from **Adcalinc.com** with PayPal, or on Amazon for $5.95 per roll plus postage.

Randox Food Diagnostics presents the world's only multi-analyte quantitative Drug Residue analyser, the Evidence Investigator for honey testing. The use of the Evidence Investigator allows simultaneous detection of multiple antibiotics from a single sample. The system utilizes Randox patented Biochip Array Technology. This unique platform will consolidate testing, reduces labour costs and improves overall efficiency

With nearly 30 years experience in the market and a dedicated research and development team, Randox Food Diagnostics are committed to the development and manufacturing of high quality and reliable antibiotic screening solutions.

Randox Food Diagnostics honey testing offers excellent tools for screening of antimicrobials in honey. This unique multi-analyte testing platform will reduce labor costs, increase throughput and guarantee overall productivity improvement.



Why test for antimicrobials?

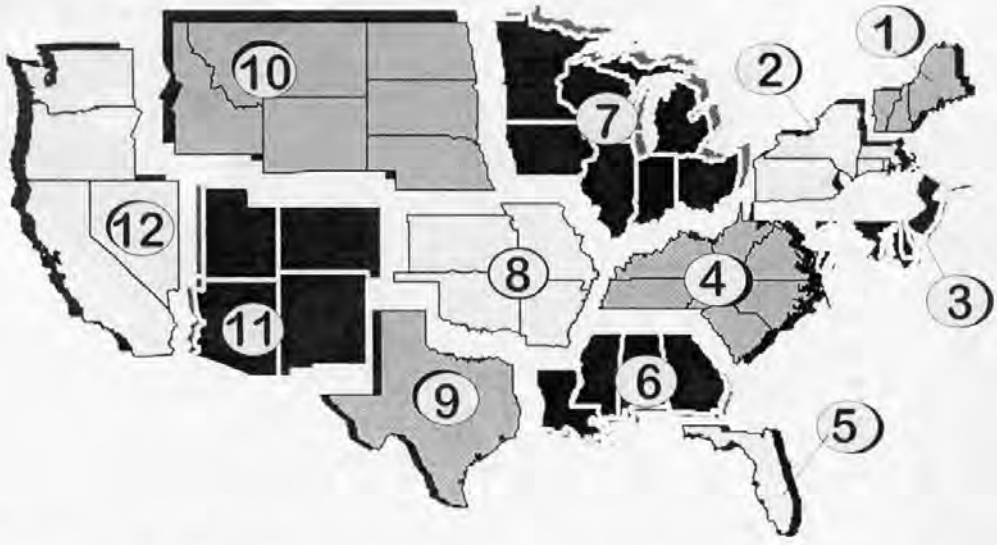
Antibiotics are used in apiculture to treat bacterial foulbrood diseases, for example American Foulbrood (AFB). Antimicrobial drugs are effective against foulbrood diseases, however, antibiotic drug residues in honey pose a potential risk to human health. As a result, the use of antimicrobials in apiculture is strictly regulated or banned. Recent import alerts in countries globally over antibiotic use in honey have led to an increase in drug residue surveillance and a demand for rapid, sensitive screening methods for antibiotic drug residues.

Randox ELISA Kit Benefits:

- Simple sample preparation
  - Generally honey sample will only require dilution and filtration
- Single sample preparation can be applied across various ELISA test kits
  - Consolidates testing, reduces labour time and cost
- Excellent generic antibodies
  - Quinolones – detects 17 analytes
  - β Lactams – detects 11 analytes
- Fast – 40 samples can be analysed in 90mins
- Lower set up costs as no expensive equipment required
- Intra and Inter assay precision typically <10%

Computer hardware and software are required and included, along with the array analysis hardware. As such, the cost for the entire operation is significant. Find out more at **http://www.randoxfooddiagnostics.com**

MAY – REGIONAL HONEY PRICE REPORT



We polled our reporters this month to see what they think the following season will bring relative to honey prices, demand and production plans, plus what plans they might have for pollination. The results were not surprising, considering that the price of honey continues to grow, as does the cost of maintaining a colony.

58% of our reporters expect demand for their product to increase this year, while 40% expect it to remain the same. 2% think demand will shrink this year. Generally, the regions in the west and east are more optimistic than those in the center, but not by much.

Demand, of course, affects price, along with availability and competition. Thus, there are as many that will raise prices – 51% - as those who will leave them the same – 49%. The east seems more inclined to maintain the status quo than the Midwest and west when it comes to prices, but the south is the most aggressive in price increase, by nearly 2:1.

With increased demand there's more honey needed and the ratio is not-surprisingly the same. 49% are going to increase production this season, while 50% will stay the same. The east tends to be more conservative in this respect than the rest of the country, again with almost a 2:1 ratio of staying the same compared to increasing production.

46% of our reporters do some pollination every spring. Of these, 34% are going to raise rental prices, while two thirds are staying the same. Nobody, fortunately is lowering prices this season.

What to expect for pollination crops? 38% of those who pollinate expect demand to increase this year, with more colonies needed, while 60% don't anticipate any change, and a tiny minority expect the demand to decrease, these in the east.

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	2.01	2.10	2.01	1.85	1.95	1.92	2.13	2.00	1.80	2.00	1.83	2.25	1.60-2.50	1.98	1.97	1.78
55 Gal. Drum, Ambr	1.93	2.03	1.93	1.76	1.78	1.76	2.03	2.00	1.60	1.90	1.98	1.93	1.55-2.40	1.88	1.84	1.67
60# Light (retail)	183.33	182.00	150.00	161.80	160.00	161.25	176.50	152.50	170.00	102.00	145.67	215.00	102.00-240.00	169.00	167.66	158.33
60# Amber (retail)	183.33	170.00	150.00	166.67	160.00	158.33	166.67	152.50	137.50	165.63	146.00	187.50	108.00-225.00	164.77	161.90	152.70
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	90.21	86.82	37.10	65.65	77.29	60.00	55.82	77.29	77.29	49.20	75.84	94.00	26.20-140.00	71.48	68.01	62.64
1# 24/case	117.69	112.34	64.80	86.90	90.00	110.76	91.83	94.80	72.00	95.40	105.92	129.30	45.60-158.40	103.07	103.64	95.56
2# 12/case	107.46	86.76	82.50	79.00	84.00	87.36	91.15	99.00	73.50	91.92	144.00	100.93	63.00-144.00	92.63	94.06	80.93
12.oz. Plas. 24/cs	110.92	97.02	50.75	70.60	72.00	85.00	72.25	81.60	66.00	70.08	88.08	82.60	38.40-145.00	82.75	79.11	79.51
5# 6/case	124.81	102.99	100.50	85.93	105.00	120.00	97.03	97.05	72.00	95.40	140.00	118.00	72.00-140.00	102.95	102.84	91.03
Quarts 12/case	146.00	112.44	116.21	109.00	102.00	107.55	126.75	107.20	116.21	111.18	114.20	107.00	56.00-180.00	114.42	122.20	118.21
Pints 12/case	90.33	130.48	91.80	72.00	72.00	63.14	80.56	61.20	54.00	97.90	73.20	80.00	48.00-190.00	76.79	76.40	72.66
RETAIL SHELF PRICES																
1/2#	4.86	4.69	3.09	3.84	4.13	3.50	3.26	2.19	4.13	2.84	3.87	5.00	2.19-6.55	3.88	3.70	3.71
12 oz. Plastic	6.06	5.39	3.90	4.23	4.50	4.38	3.92	4.39	4.50	4.24	5.21	5.10	2.99-7.75	4.68	4.65	4.52
1# Glass/Plastic	7.16	6.15	5.54	5.51	6.50	6.53	4.98	6.04	5.50	5.63	5.85	8.08	3.00-9.99	6.01	5.86	5.95
2# Glass/Plastic	13.36	9.89	9.50	9.35	10.00	9.87	9.14	10.67	8.00	9.84	8.48	10.00	4.99-20.00	10.00	9.93	9.36
Pint	10.08	8.98	9.75	7.01	7.00	6.88	8.73	6.96	5.00	7.75	7.65	10.15	4.00-13.50	7.88	7.89	8.00
Quart	15.33	14.29	14.23	12.20	12.00	11.59	12.32	14.67	14.23	14.07	11.62	17.30	7.70-23.00	13.10	12.93	13.31
5# Glass/Plastic	26.10	21.06	23.56	20.89	22.66	29.00	21.26	22.00	18.00	20.26	17.98	25.00	13.89-33.50	21.62	21.20	20.92
1# Cream	8.67	7.44	6.34	6.63	7.67	6.00	6.17	7.67	7.67	6.80	8.60	7.75	4.29-12.00	7.20	7.20	7.36
1# Cut Comb	9.33	6.48	8.19	6.61	9.07	9.00	7.23	16.00	9.07	7.75	9.25	13.66	3.00-16.00	8.63	8.67	7.61
Ross Round	9.13	5.98	8.19	6.50	8.62	6.50	7.50	9.50	8.62	8.62	10.33	7.20	3.50-15.00	7.99	7.69	7.45
Wholesale Wax (Lt)	5.92	4.86	3.75	4.09	3.20	5.94	5.13	5.00	5.00	8.00	3.61	4.00	2.25-8.50	4.97	5.01	4.40
Wholesale Wax (Dk)	6.25	5.73	4.88	3.85	3.15	5.51	4.48	4.83	4.83	4.83	2.53	4.00	2.00-8.00	4.65	4.29	3.74
Pollination Fee/Col.	91.00	112.50	72.50	55.40	60.00	65.00	56.33	85.00	91.29	60.00	90.00	118.75	35.00-175.00	77.58	80.78	81.47

INNER COVER

I was fortunate in being invited to the UK in April this year to share some of what we do here in the States relative to beekeeping techniques, philosophy, and even a bit of science. I'd like to share some of what I'll be offering when I'm there.

One of the topics they asked that I cover was "The 10 rules of Modern Beekeeping". That's a challenge and a half if you ask me, but after talking to a great group of folks – from thousands-commercial operations to a group of only-a-handful backyarders...all in the business for a decade or more, here's what they, and I, came up with.

1. Good Queens

What makes a good queen? The first criteria is that she should have been **raised in the lap of luxury**. All the food she could want, all the care she could get, none of the viruses, none of the diseases, none of the stresses that can happen in a hive. When she emerges she should continue to be extremely well cared for until she is ready for her mating flights. And those should be as well attended a possible ~ thousands and thousands of drones in several congregation areas, none related to her in the slightest, and all from colonies that were chosen for their excellent attributes such that when combined the result would be even better than the best of either . . . Greater than the sum of the parts if you will.

And she should be able to find as many of these as she could possibly desire...20, 30 maybe more, all happening during perfect flying weather so she isn't hindered, delayed, or in any way restricted from joining with all the drones she wants. I consider this **Extremely Mated**.

Once mated, she should be put in charge of a colony, maybe yours, that is as clean as can be. There should be new comb everywhere, lots and lots of food, thousands of nurses overflowing with Queen Food all the time in a hive that has more than enough room to store food, lay eggs, and provide protection. She should never be exposed to pests or diseases that could weaken her, or worse, cause her to pass along viruses or other beasts to her children.

And speaking of children, once she starts laying all the eggs she can produce, unhindered by lack of space, poor quality food, or nurses to care for her, she should soon be putting out 1000, then 1200, maybe as many as 1500 or 1800 eggs a day, every day. She should be an **Egg Laying Machine**, and she should be comfortably able to do this for three, four, maybe five years without interruption or distraction. Of course she will allow for seasonal differences and delays, but these aren't dangerous or debilitating in the least.

2. Good Genetics

Of course after all that good care, Extreme mating and perfect place to live, the offspring should be exactly what you want them to be. This is a combination of Nature and Nurture, and here's what they should be.

They should be perfectly adapted to the place they were born, whether cold, long winters or warm tropical all year. They should absolutely subscribe to your management style...honey producers, pollinators, urbanites, slow to start in the spring or raring to go on New Year's day. And they certainly should be at least nearly immune to the foibles of the pest, predator and disease world meaning they live full productive lives, unhindered by any of the legion of problems less able honey bees are prone to. In fact, they should be so adapted to all of this that never in her life should she be exposed to the poisons used in other hives to thwart the attacks of the evil ones. Never.

And they should be well behaved. So well behaved that you never fear their wrath or fury, and that they always display good manners toward strangers.

When it comes to Queens, remember that "An average queen in a strong, healthy colony will always do better than a great Queen in a subpar colony."

3. Pest Management

The rule is – control *Varroa* or die. Use resistant bees, non-chemical controls like drone trapping, broodless periods, or the organic acids, or even the softer essential oils. Maybe even go to the rougher stuff – but control *Varroa*, and the virus and plagues they carry, or die. The rest are a walk in the park compared to *Varroa*, but don't ignore them, ever.

4. Do No Harm

This is directly related to No. 3. The chemicals used to control *Varroa* and other diseases can and do harm bees, too. Always use non-toxic controls first, then soft chemicals, and as a last resort, pull out the big guns, but only as a last resort.

5. Provide a Safe environment

The environment in this case is

10 Rules

the whole world bees are in. Inside, keep poisons out, and remove any that enter – whether administered by the beekeeper, or those brought home by the bees. Keep equipment in good shape, weather preserved and sound. As far as possible, isolate your bees from other bees, reducing the likelihood of sharing problems. And stay far, far away from agriculture, the second greatest threat to a bee's continued existence after *Varroa*.

6. Enough room at the right time

A colony needs enough room for all the bees, brood nest expansion at the peak of the season, incoming nectar and stored honey and pollen. And the bees need that room before even they know they need it, but to be on top of any colony the keeper needs to know when they will need it, and have it ready and waiting.

7. Enough good food

This is simply good husbandry. Enough good food in terms of quantity, quality and timing. Good food comes in many forms however. Naturally, when the bees live off the bounty of nature, but also from the beekeeper so there is never a need, even for a day, for enough. And water. Lots of water close to home, always. In fact, the future holds, in my opinion, the promise of islands of forage, grown especially for bees, managed by the beekeeper, directly or hired done, such that the bees never have to forage further than the fence row that keeps them in.

8. Only healthy hives

Above all, keep stress, of any kind, out of sight. Do not nurse failing colonies, rather find the cause, cure it and join the weak to the strong so always one survives, even thrives. And as the old axiom says, take your losses in the Fall, rather than clean up the remains in the Spring. Requeen before the bees even know the queen is failing, before there is even a moment's hesitation in the command process. Always be proactive with food, queens, medications and available room.

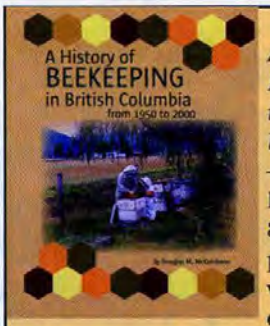
9. Winter well

Take care of the bees that take care of the bees that go into Winter for starters. Provide enough good food – both carbs and protein - to last until next summer, and have a strong population when the snow starts to fly so there's more than enough bees all Winter long. Provide protection – wrapping with dark colored covers, wind breaks and have excellent ventilation, all Winter long.

10. Food Safety

Prevent harvest contamination with fumes or smoke, and keep honey supers covered well at all times. Never, ever for any reason warm honey past 100F whether when uncapping with a hot knife, or flash heating to filter in-line, or when in a bottling tank to ease and speed the process, to make sure none of the fine things there are driven off or destroyed. Make certain the moisture content is below the magic number, and, simply, use common sense when handling any honey because it is a food, given to friends, family and sold as a luxury food.

Well, that's the 10 I came up with. I imagine there are maybe dozens more but these will do for now. If you have some, drop me a note and we'll share with the world. Maybe it should be the Top 100.



A History of Beekeeping in British Columbia, 1950 – 2000. Doug McCutcheon. 8"x10", 334 pgs, black and white, soft cover. $29.95 plus shipping. ISBN 978-0-9877928-0-8. Available from BC Beekeepers at **www.bcbeekeepers.com**.

I've been fortunate to have met some of the people Doug discusses in this just released book published by the British Beekeepers Association, and after reading it I wish I could have met more. This book does what it is supposed to do – showing off 50 years of the history of this Province, in 10 year chunks, building on the previous chapter, and heading toward the next. Each decade has its own story, its own characters, and its own right to fame.

The 50s talked about packages from California, and that there were so few beekeepers that they had to import honey to make ends meet. In the 60s things change, as they, and most of North America, embraced the back to earth movement and keeping bees became popular. Federal programs came into play, pesticides were a problem, and a commercial beekeepers group formed. Packages and queens were raised but still $1 million worth of bees were imported.

The 70s saw intense interest in queen production and indoor overwintering , more bear problems, and more colonies producing enough honey to export. The 80s saw the U.S. border closing and the issue surrounding that, and not unlike the U.S., quarantines set up and broken. Tracheal arrived, and in the 90s *Varroa* arrived, along with Apimondia, and queens from HI, NZ and Australia.

After this overview, Doug looks at the different areas of the Province, and the people who made each shine. Beekeeping is a family in BC, and like all families has its ups and downs, good and bad days and still keeps going. It parallels the US in many ways, yet is very different in others. It is a fascinating read, and I enjoyed every minute. If you've ever been involved with these people you will too.

It's Summers Time —

A Year With The Chickens

The chickens have been with us for a year now. And we have all adjusted nicely. They seem pretty comfortable with our somewhat random lifestyle. Spring always has us travelling a good bit and they have different folks coming in and out and not doing things exactly like Kim and I would do at exactly the same time of day. And even when it's Kim and I, sometimes it's 10:00 at night before we get home and gather the eggs and check on them. So like cats and kids, they've had to learn to be flexible.

We finally had a nice weekend a couple of weeks ago, a day nice enough to let those chickens outside, and a day when we were home – well at least Kim was home. So this is how that sunny Saturday afternoon went. I got home about 3:00 and the chickens were still outside, Kim was checking on the bees and everything was pretty quiet. I went into change clothes and as I was coming down the stairs Kim said "Come here, we've got a chicken loose." So there she was, running back and forth on the opposite side of the fence from all of her friends, who just sat there staring at her. They were no help at all. So she let me pick her up and set her back in the pen.

This happens on a somewhat frequent basis. They get excited, become airborn and land on the other side of the fence. And then they freak – "I don't want to be over here all by myself." They're usually very easy to catch and are happy that you have saved them from whatever it was that was going to happen if they stayed on the other side.

So all was quiet again. We headed into town for grocery shopping, knowing that we would be back well before dark to close the door to the chicken coop. Back home, unload the groceries, now it's getting dark. I went to the chicken coop to see if everyone was in and there's only 11 – someone is missing. So out to the pen, don't see her anywhere. I'm whistling, calling, Kim is shaking the bucket with scratch which usually brings them on the run. No sign of her. Now I've got the flashlight and I'm searching the yard.

This was a different chicken than had been outside the fence earlier in the day. Remember the chicken that hid in the garage, well this is the one that was missing.

Now it's dark, it's time to make supper so we close the other 11 in and go in the house. After eating, one more trip outside with the flashlight just in case. Later that night before bedtime Kim made one last trip outside – calling, whistling – no sign of her. So we went to sleep that night with only 11 chickens. I was troubled, but thought "She's gone!"

The next day was a beautiful sunny Sunday, so we let the chickens out again. After church and lunch I went outside to just wander around a bit. I have a chair that sits inside the fence and I really enjoy going out there and just sitting with the chickens. They seem to enjoy me being there as well. As I was sitting I saw movement underneath the walkway that goes along the fence. That's right, it was her. She had been stuck under there all night. Now this part of the walkway is only about six inches off the ground, so she was pretty cramped all night long – and no water, no food and no friends. At first I couldn't figure out how she got under there, then I spotted the place where she had pushed on the fencing and gotten through. Then she couldn't figure out how to get back.

It was a little tricky getting her out and she was not happy. She was hungry, dehydrated – chickens need a lot of water and she had gone close to 24 hours with none. It took a couple of days for her to completely bounce back. That first afternoon she walked like a penguin – tail dragging on the ground, head down. I spent a chunk of time getting her to eat and drink and just sitting holding her. She's back to her old self now. And Kim has now staked down the fencing so hopefully this won't happen again.

This chicken is skittish – she's the one in the photo – and when she gets scared, she hides and then doesn't make a sound. That's what she did in the garage and that's what she did this day. If she had just made some noise I would have found her much more quickly.

Compared to some chickens you might consider ours spoiled. But compared to some others they're not spoiled at all. I think we're somewhere in the middle – striving for balance. In spite of what Kim tells you they do not have names, and they don't come in the house, but we treat them pretty good and enjoy their company and their varied personalities. We make sure they're safe and warm and have plenty to eat and drink. We talk to them everyday, someone gets held everyday and we're all happy. It's pretty much the same with cats and kids in our lives. We don't baby them too much and we make sure they're safe and warm and fed and loved each day. I think this works for most of us.

I hope it is at least a little Spring-like when you read this. As I write it is still very much Winter in Ohio, even though the calendar says Spring. We had a fairly substantial snow fall just last night. The last few days of March aren't looking very good and it looks like the Easter egg hunts will have to be inside this year.

Kathy Summers

Honey Production – 2012

Worst In 23 Years!

Honey production in 2012 from producers with five or more colonies totaled 147 million pounds, down 1 percent from 2011. There were 2.62 million colonies producing honey in 2012, up 5 percent from 2011. Yield per colony averaged 56.1 pounds, down 6 percent from the 59.6 pounds in 2011. 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 32.9 million pounds on December 15, 2012, down 10 percent from a year earlier. Stocks held by producers exclude those held under the commodity loan program.

Honey prices increased to a record high during 2012 to 195.1 cents per pound, up 11 percent from 172.9 cents per pound in 2011. 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 2011 crop reflect honey sold in 2011 and 2012. Some 2011 crop honey was sold in 2012, which caused some revisions to the 2011 crop prices.

Prices for each color class are derived by weighting the quantities sold for each marketing channel. Prices for the 2012 crop reflect honey sold in 2010 and 2011. Some 2012 crop honey was sold in 2011, which caused some revisions to the 2011 crop prices. You can read the entire report, that is from 2011 and 2012 at **http://usda01.library.cornell.edu/usda/current/Hone/Hone-03-18-2013.txt**.

This report, while revealing in many ways, is only one set of data contributing to our annual analysis of the U.S. Honey Market. We sort out for you 18 years of honey prices so you can see any possible trends, and we look indepth at the top 10 producing states each year, compared to the top ten for the previous six years, again so you can spot trends and make plans.

Overall, USDA's calculated honey prices continue to be encouraging. From their "All honey prices", that is basically bulk prices, prices increased from 172.9¢/lb in 2011 up to 195.1¢/lb in 2012, nearly a 10% increase in an at best flat year for most price increases. Bulk prices in *Bee Culture's* monthly honey report increases were nearly identical rising from $1.63/lb to $1.74. USDA calculated retail prices were up also, going from $3.14/lb up to $3.40/lb, almost an 8% increase. Bee Culture calculates our retail figures differently, using unweighted averages. Our figures show a retail price last year of $5.18, rising to this year's $5.70, a 9% increase across the board for a pound of honey at the retail level.

Honey production was down 1.3 million pounds

Honey: Number of Colonies, Yield, Production, Stocks, Price, and Value by State and United States, 2012

State	Honey Producing Colonies[1]	Yield per Colony	Production	Stocks, Pounds Dec 15[2]	Average Price per Pound[3]	Value of Production[4]
	x1,000	Pounds	x1,000	x1,000	Cents	1,000 Dollars
AL	8	54	432	65	243	1,050
AZ	22	46	1,012	253	170	1,720
AR	26	63	1,638	197	184	3,014
CA	340	35	11,900	3,213	193	22,967
CO	26	48	1,248	487	212	2,646
FL	199	64	12,736	1,274	181	23,052
GA	62	51	3,162	190	189	5,976
HI	10	75	750	263	319	2,393
ID	96	32	3,072	553	161	4,946
IL	7	61	427	145	340	1,452
IN	9	59	531	228	244	1,296
IO	38	61	2,318	1,229	211	4,891
KS	7	55	385	146	235	905
KY	5	51	255	41	318	811
LA	41	86	3,526	141	177	6,241
ME	4	34	136	24	225	306
MI	76	57	4,332	1,386	203	8,794
MN	130	67	8,710	1,655	188	16,375
MS	19	118	2,242	67	163	3,654
MO	7	53	371	108	256	950
MT	149	52	7,748	2,479	191	14,799
NE	44	65	2,860	1,173	191	5,463
NJ	14	33	462	51	188	869
NM	5	52	260	99	313	814
NY	52	51	2,652	1,008	228	6,047
NC	13	39	507	106	369	1,871
ND	495	69	34,155	6,148	189	64,553
OH	19	60	1,140	433	242	2,759
OR	62	32	1,984	873	211	4,186
PA	17	60	1,020	286	262	2,672
SD	270	63	17,010	3,742	194	32,999
TN	7	61	427	68	285	1,217
TX	95	52	4,940	741	200	9,880
UT	26	38	988	217	185	1,828
VT	4	60	240	53	234	562
VA	4	41	164	23	385	631
WA	64	41	2,624	1,050	235	6,166
WV	7	48	336	111	280	941
WI	63	69	4,347	1,956	204	8,868
WY	51	51	2,601	468	182	4,734
Other States[5,6]	31	47	1,444	172	304	4,390
U.S[6,7]	2,624	56.1	147,092	32,922	195.1	286,976

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

Honey Prices 1995-2012

Cents/lb.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All Honey	68.5	87.8	75.7	65.5	60.1	59.7	70.4	132.7	138.7	108.5	90.4	104.2	103.2	141	144.5	160.3	172.9	195.1
Retail Shelf	100.0	117.3	125.7	114.7	126.6	130.4	142.2	152.5	188.5	188.7	183.3	191.0	196.1	197.6	278.4	305.4	328.4	340.5
%Difference	31%	25%	40%	34%	53%	54%	51%	13%	26%	42%	51%	46%	29%	28%	48%	48%	48%	43%

from the year before. North Dakota was up 1.6 million pounds, California down 5.8 million pounds, South Dakota was actually up a half million, Florida up 1.8, Minnesota up 2.4, Texas down .4 million . . . you can see where the loss occurred . . . the top 10 alone lost almost four million between them. Interestingly, but not surprisingly considering last year's drought, the top 10 producing states increased 59 million colonies, yet production dropped four million. It's good they didn't add more! My home state of Ohio gained 4,000 colonies, and produced only 1,500 pounds more honey – it must have been good somewhere here in Ohio last year – certainly not my backyard. Be sure and check out your state's production, colony count and honey value on the chart. Then, take a look at the web page on the previous page if you haven't already and start looking for trends.

Snap Shot Of Colony & Honey Production

YEAR	COLONIES (x000)	PRODUCTION (000 lbs)
1989	3528	180.6
1990	3220	198.7
1991	3211	220.9
1992	3045	221.7
1993	2875	230.6
1994	2783	218.2
1995	2655	211.1
1996	2581	199.5
1997	2631	196.5
1998	2637	220.5
1999	2652	203.1
2000	2622	220.3
2001	2550	186.1
2002	2574	171.7
2003	2599	181.7
2004	2554	183.5
2005	2409	174.6
2006	2394	154.9
2007	2443	148.3
2008	2342	163.7
2009	2498	146.4
2010	2692	176.4
2011	2491	148.4
2012	2624	147.1

Per Capita Honey Consumption

One of the more revealing analyses we do each year is to calculate the per capita honey consumption in the U.S. This is an arbitrary figure in a way, because you and I know lots of people who never, ever eat a drop of honey. Can't afford it, don't like it, too messy . . . take your pick. Some folks just won't and don't eat the stuff. I even know beekeepers who don't eat honey . . . or don't eat enough to amount to a teaspoonful a year. I'm always amused when I meet one . . . but so it goes.

The per capita consumption figure does, however, provide a tool we can use year to year to see how things are moving along. The final figure has to do with U.S. production, imports, exports, stocks held over from last year, and honey still in warehouses this year, and the amount of honey beekeepers have taken out of the commerce stream and put under loan. Here are the figures:

Honey Income

Imports – 312 million lbs. (up from 289 million lbs in 2011)

U.S. Production – 147 million lbs.(down from 148 million lbs last year)

Stocks held over from 2010 – 37 million lbs.

Honey placed on loan (from 2010) – 3.9 million lbs.

TOTAL – 500 MILLION POUNDS

Honey OutGo

Exports – 12 million lbs. (steady from 2010)

Stocks held this year not yet sold – 32.9 million lbs.

Honey placed on loan (from 2012) – 3.7 million lbs.

TOTAL – 48.9 MILLION POUNDS

To calculate honey consumption in the U.S. during 2012, subtract the amount of honey not consumed in the U.S., that is exports and honey still not sold (stocks), from all the honey that came into the country, that is imports, U.S. production, stocks held over, and honey under loan, and the total is 450.8 million pounds of honey were consumed last year. Now, divide that figure by the total U.S. population of 313.9 million people as of July 1, and you get per capita consumption of 1.44 pounds per person . . . which comes to 23 ounces. This figure has remained relatively constant for years, rising ever so slowly from 16 ounces/person about 20 years ago to over 20 plus ounces now. However, when you think about it, there are more and more people every year, and THREE ounces multiplied over 319 million people amounts to 58.8 million pounds . . . 27% of what we import, or 40% of what we produced in 2011.

Of course per capita honey consumption in the U. S. vanishes in comparison to per capita consumption of sugar and high fructose corn syrup (and the battle between the sugar and corn people only gets worse as time goes on...is corn sugar the same as cane and beet sugar? Some think yes, some think no, and only the lawyers will win). USDA figures indicate we consume 35.1 lbs/yr of HFCS, which equals 166

Top Ten Producing States Each Year

2006			2007			2008			2009			2010			2011			2012		
State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	X1000 Col	X1000 Prod lbs	State	X1000 Col	X1000 Prod lbs	State	X1000 Col	X1000 Prod lbs.
ND	350	25.9	ND	420	31.1	ND	390	35.1	ND	450	34.7	ND	510	46.4	ND	460	32.6	ND	495	34.2
CA	380	19.8	CA	340	13.6	SD	225	21.4	SD	270	17.8	CA	410	27.5	CA	370	17.7	SD	270	17.0
FL	170	13.8	SD	255	13.3	CA	360	18.4	CA	355	11.7	SD	265	15.6	SD	250	16.5	FL	199	12.7
SD	225	10.6	FL	160	11.4	FL	150	11.9	MT	146	10.2	FL	200	13.8	MT	145	13.3	CA	340	11.9
MT	132	10.4	MT	135	9.2	MN	122	9.5	FL	150	10.2	MT	157	11.6	FL	180	10.9	MN	130	8.7
MN	125	10.0	MN	130	8.8	MT	134	9.4	MN	122	7.9	MN	126	8.3	MN	120	6.3	MT	149	7.7
WI	64	6.0	TX	105	8.6	MI	71	5.2	ID	103	4.7	TX	100	7.2	MI	74	4.7	TX	95	4.9
TX	82	5.7	ID	92	3.8	TX	77	4.9	TX	74	4.7	WI	68	4.4	TX	78	4.5	MI	76	4.3
ID	95	4.2	MI	72	4.6	WI	58	4.6	MI	66	4.0	MI	70	4.0	WI	57	3.6	WI	63	
MI	72	4.0	WI	60	5.0	GA	55	3.9	LA	37	3.8	NY	47	3.0	GA	65	2.8	LA	41	
Total	1695	110.4		1769	109.7		1642	120.3		1773	109.7		1953	141.9		1799	112.9		1858	109.1
All Sts.	2392	154.8		2442	148.5		2301	160.9		2462	144.1		2684	175.9		2491	148.4		2624	144.4
% of Tot.	71%	71.3		72.4%	73.8		71%	75%		72%	76.1%		73%	80.6%		72.2	76.1		71%	76%

40 Years Of Change

YEAR	X1000 Colonies	Lbs. Yield/Day	$ Price/lb.
1972	4066	52.8	31.3
1981	4217	44.1	63.2
1992	3032	72.8	55.8
2002	2574	67.8	128.6
2012	2624	56.1	195.1

calories/person/day, and 37% of the added sweeteners we consume. Meanwhile, we also consume 47 lbs of sugar/year, for 222 calories/person/day, for 49% of the added sweeteners we consume. See **www.ers.usda.gov/Briefing/sugar/data.htm** for that report. As far as honey is concerned, a single ounce of honey weighs in at 86 calories, so our 23 ounce consumption per year, comes to 1737 calories/year, or 4.8 calories/person/day. Sugar = 222 calories/day, HFCS = 166 calories/day, and Honey = 4.8 calories/day.

But what about all those beekeepers with five or fewer colonies that don't get counted every year? So, OK, what about those 140,000 or so folks who don't get counted (our estimate here is that about 30,000 of these are new this year, so honey production will be minimal, if at all). But the remaining beekeepers out there? Well, let's see. If every one of them produced 75 pounds of honey . . . and you know beekeepers with five or fewer who do more, and a lot that do less, but for the sake of this computation, let's figure 75 pounds/beekeeper. That comes to an increase of 10.5 million pounds (or 157.6 million lbs produced this year). Divided by our population of 319 million, would increase per capita consumption by five ounces per person. That rounds it out 25.2 ounces, or 1.45 pounds per person. Certainly a more respectable figure, though perhaps a bit optimistic, and certainly insignificant compared to the other sweeteners.

Colony numbers of beekeepers with more than five colonies according to the report, increased this year by 13,000 or roughly 5%. That borders on barely significant. If I were to guess, if those five-or-fewer colonies were added in, that 13,000 number would increase (assuming an average of 2.5 colonies for each of those 140,000) by 350,000, for a total of right about three millioin, a 13% increase in total count.

Pollination figures need to be looked at here. Dr. Calderone's figures for the value of honey bee pollinated crops is (in 2009) $11.68 billion. This puts the income generated for each of the 2.624 million colonies at a respectable $45 each. This figure, applied to those 350,000 colonies not included in the USDA count amount to an additional $15,750,000.

Of course these figures are estimates, but fairly accurate and should be included in the discussion of the value generated by honey bees to the economy. BC

Dropping The Seed Bomb

Adam **Stearns**

Seed Bomb making is a practice that should be embraced by the beekeeping community. It is an efficient way to increase forage for our honey bees and other native pollinators. It allows the beekeeper to directly increase forage, with minimal capital and labor cost.

Why Seed Bombs?

Bee forage has been declining for years, due to several factors. Industrial agriculture practices like monocropping (corn, corn and more corn) and 100% field utilization are a significant cause. The proliferation of the manicured suburban lot – with nary a weed or flowering tree – contributes significantly to the reduction of habitat as well. Interestingly, in recent years, many urban beekeepers have found more forage available to their bees than their rural counterparts. As the trend of urban beekeeping continues to increase, there will be a greater demand for those urban forage resources. We all must find a way to get more forage for our bees.

What are seed bombs?

Seed bombs/balls are seeds that have been encased in a mixture of clay and compost and rolled into marble sized balls. It is an old technique for planting seeds that has been reintroduced by Japanese soil scientist and natural farmer, Masanobu Fukuoka, author of *One Straw Revolution.*

When prepared properly, seed balls keep seeds protected from predators like birds and rodents. Being encased in clay protects the seeds from being carried away by water runoff or wind. Because they are already "planted" in the seed bomb, the need for cultivation is eliminated. All the ingredients needed to grow (except moisture) are within the seed bomb, and therefore, the plants can germinate on top of the existing vegetation which would normally choke out broadcast seeds.

Many areas that are accessible to foraging bees may not be accessible to the beekeeper for cultivation and seeding. Seed bombs bring those areas within reach (depending on the strength of one's throwing arm, slingshot or other remote delivery system).

Any kind of seed can be used for seed bombs. Specialty seed mixes work particularly well (bee forage plants, tree and shrub seeds, cover crops, and even garden crops) and can be successfully grown using seed balls. A diverse variety always works best, and mixes of different types of seeds will provide for a natural balance and better growth.

How are seed bombs made?

The typical recipe for making seed bombs is very simple:

1 part seed mix
2 parts compost (a mix that includes vermicompost facilitates germination)
5 parts clay powder
1 part water

There are several methods to form the seed balls. The most simple is to manually mix the seed and compost, add the clay and mix together thoroughly. Add the water a bit at a time and knead together as if making dough. Pinch off small pieces and roll them into marble sized balls ½" to ¾" diameter. For those really remote areas, larger sized bombs can be formed to facilitate carry distance.

For larger scale production (acres), they can be formed using a cement type mixer or a home-made roller (see photo). All dry ingredients are placed into the mixer/roller. The machine is started and water spray is added gradually until they begin to "ball up" and form. A screened scoop can be used to reap the balls that have reached the desired size. The process continues until all are formed to your liking. When the balls are finished set them aside to dry. They will dry in a few hours if left in the sun in a single layer, or in 24 hours if kept indoors. When they are completely dry, they can be stored indefinitely for future use.

A variety of sizes, from ¼" to 2", can be sorted and stored according to size for use in different applications. Larger seeds may be presoaked in water and rinsed, then mixed with dry compost and clay. This will facilitate the encapsulation of the seed. Cayenne powder may be added to the mixture for a little extra critter repellent power.

Seed Bomb making is fun for the whole family. Make sure to enlist the help of your favorite six year old, and you are sure to have a productive and joyful day.

Dropping the S-Bomb

Bees that range one mile will forage over 2000 Acres. Not many beekeepers I know have that much property under their direct control. How can the average beekeeper increase that scale of forage? Guerrilla Gardening. According to Wikipedia, "Guerrilla gardening is gardening on land that the gardeners do not have the legal right to use." Sounds a whole lot like a beekeeper. In my opinion, beekeepers are some of the original guerrilla gardeners. We have been "farming" other people's property for years. Whether our apiaries are on property directly under our control or not, we are already guer-

rilla gardening, so why not take the next logical step?

Liberally drop those S-Bombs! Keep a container of them in your vehicle for just the right area. Edges of forested areas, fence lines, abandoned lots and newly disturbed soil from construction are perfect spots to deliver them. Spread the word and let your friends have a few to spread around as well.

By making and using seed bombs, each beekeeper can become a modern day John Chapman. Like the fruits of Johnny Appleseed's labor, the rewards of dropping the S-Bombs will be reaped for many generations to come.

Adam Stearns is a beekeeper, avid gardener, vermiculturist (earthworms) and makes seed bombs at his home in Medina, Ohio.

Managed Pollinator CAP
Coordinated Agricultural Project

Assessing Varroacide Toxicity To Worker And Queen Honey Bees

Lizette **Dahlgren**

Varroacide Tolerance and Longevity

Introduction:

Varroa destructor changed the way beekeepers see pesticides. After introduction to the United States in 1987, varroacides (pesticides) quickly became necessary to prevent catastrophic colony losses (Ellis, 2001). Beekeepers first fought *Varroa* with a pyrethroid, tau-fluvalinate (Mavrik® & Apistan®). Mavrik® registered under a Section 18 label (emergency use label issued on a state by state basis) in 1987 and Apistan® under Section 3 (nationwide approval, full registration) in 1990. When *Varroa* developed resistance to tau-fluvalinate, an organophosphate coumaphos (CheckMite+®), proved effective and was registered for use in beehives in 1999. Again, beekeepers widely adopted the new chemical and *Varroa* developed resistance by 2001. The octopaminergic agonist, amitraz, was briefly available to beekeepers (section 18) from 1992-1994 as Miticur®. It recently received section 3 registration in selected U.S. states and is available as Apivar®. Some populations of *Varroa* exhibited resistance to amitraz as early as 2000. Both fenpyroximate and thymol became available in 2007. To date, *Varroa* does not exhibit resistance to the mitochondrial inhibitor, fenpyroximate (no longer available) or the essential oil thymol.

Beekeepers began expressing concern about queen failure as early as 1996 (Tew, 1996). Delaney *et al.*, 2010 examined queens from commercial bee breeders in an effort to quantify differences in queen health and mating success possibly contributing to queen failure. They found 99% of queens examined tested positive for deformed wing virus (DWV). They also found a significant negative correlation between DWV titers and sperm counts. DWV is an RNA virus transmitted by the *Varroa* mite. Their findings suggest that without mite suppression measures, both *Varroa* and DWV will continue to affect queens and their respective colonies.

Comparison of Varroacide Tolerance:

The University of Nebraska's apiculture lab recently completed a study that fulfilled a portion of our commitment to the CAP grant. The specifics are available in the Journal of Economic Entomology, December 2012 (Dahlgren *et al.*, 2012). In this study, I compared queen and worker honey bee tolerance of varroacides.

Queens are expensive and time consuming to rear. For this reason, pesticide tolerance comparisons between adult worker and adult queens are not frequently conducted. Past studies include comparisons of DDT, carbaryl, and paraquat (respectively: Graves and Mackensen,1965; Tucker, 1980; Corona *et al.* 2007). Interestingly, all the aforementioned studies found queens could tolerate higher doses of pesticides than workers than can be explained by weight alone. As the pesticides tested vary in mode of action (method of causing death), the results add to our understanding of differences between queen and worker pesticide tolerance.

Queens were reared using Doolittle methods, caged with a drop of candy to ensure survival until they become attractive to workers (~4 days), and allowed to emerge in queen banks. Queen banks were queenless four to five frame nucleus colonies stocked with 1 kg of worker bees. A frame of brood was added weekly. All frames were checked for uncaged queen cells twice weekly. Workers were emerged in the incubator and brushed into cages every 24 hours. Experimental bees received a single dose of a varroacide topically applied. Doses chosen produced 0-100 % mortality with the exception of coumaphos and fenpyroximate for which the highest applied doses failed to produce reliable queen mortality. We treated worker bees aged three to four days and queens aged two to five days. Treated workers were kept in groups of 20 in wax paper cups, supplied a solution of 1:1 sugar water by weight, and returned to the incubator. Queens were recaged and returned to queen banks. Mortality was checked at 24 hr and 48 hr timepoints for both queens and workers. Queen mortality was also checked weekly for six weeks after treatment. Dead queens were removed from queenbanks at the time of their discovery.

Of the five varroacides I tested, queens tolerated four (coumaphos, tau-fluvalinate, thymol, and fenpyroximate) at a higher dose (mg/kg body weight) than workers. In fact, when adjusted for that weight difference, queens (averaging 180 mg) tolerated three times more tau-fluvalinate, six times more thymol, at least 12-fold more coumaphos and 40-fold more fenpyroximate than workers (averaging 108 mg). These extreme discrepancies between castes indicate physiological differences in how the two castes are affected by varroacides. There was one exception to this pattern with queens and workers being equally susceptible to amitraz.

Future Direction:

The varroacides that were stud-

High Fat and Vitellogenin Levels Improve Miticide Tolerance and Overwintering Ability

ied kill arthropods by different modes of action and yet queens were found to be more tolerant of all varroacides tested, except amitraz, suggesting that queens possess a non-specific mechanism of varroacide tolerance. Based on this finding, I hypothesize that workers in a more 'queen-like' physiology will be able to better tolerate varroacides. Short lived worker bees occur in the Summer, living an average of 30 days. Worker bees reared in the late Fall, 'Winter bees', must survive three to five months until Spring. Therefore, a more 'queen-like' physiology in the worker caste is found in that of the '*diutinus* (Latin for long-lived) bee,' occur in broodless periods, as 'Winter bees,' and likely in bees preparing to swarm. *Diutinus* bees are characterized by increased fat body, higher vitellogenin titers, and increased longevity (280 days or more).

Vitellogenin affects worker and queen longevity, temporal polyethism, and aids in immunity and stress resistance. If varroacides applied within the hive lead to a decreased vitellogenin, exposure to these compounds could result in a reduced time to foraging, increased foraging frequency, a higher frequency of nectar (as opposed to pollen) collectors, and a reduced capacity to rear brood. MacKenzie and Winston (1989) found a decreased time to foraging and a decreased lifespan of individual workers treated with diazanon. Wu *et al.* (2011) found, on average, a four day lifespan reduction of bees reared in pesticide contaminated wax comb. On a more positive note, and in agreement with the restoration of vitellogenin production, Wahl and Ulm (1983) found that pollen extended the life of bees treated with pesticides.

If queenliness is a factor in the tolerance of varroacides by honey bees, beekeepers may benefit by delaying applications until late Fall when workers have increased fat body and vitellogenin levels. In addition, pollen, which provides necessary amino acids for synthesis of protein including vitellogenin, has been shown to influence the susceptibility to pathogens. Therefore, beekeepers may also benefit by feeding pollen mixtures or equivalent substitutes in late Winter and early Spring to help colonies rebuild vitellogenin levels that can improve Winter survival and toxin tolerance. I will test my hypothesis in experiments conducted in the Spring of 2013.

I acknowledge Drs. Marion Ellis, Blair Siegfried, and Reed Johnson for their advice and guidance with the study described and ongoing research. BC

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A Closer Look

ACUTE BEE PARALYSIS VIRUS

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

Acute Bee Paralysis Virus has a worldwide distribution.

Acute bee paralysis virus (ABPV) of honey bees was discovered as an inapparent infection of adult bees during work on the transmission and identification of chronic bee paralysis virus (CBPV) (Bailey et al. 1963). Adult honey bees were challenged with the two viruses in three different ways, i.e. by feeding, spraying, and artificial injection of a virus suspension, causing the bees to tremble within a few days. Bees infected with one of the viruses died quickly (ABPV) and bees infected with the other virus survived for several days after first showing symptoms (CBPV). The ABPV LD^{50} (number of ABPV particles per bee that would have killed half of the bees in a group after six days) was equivalent to about 10^2 when preparations were injected into the hemocoel compared to more than 10^{11} particles per bee by feeding and 10^8 to 10^9 particles per bee by spraying, indicating the high virulence of ABPV upon injection.

ABPV since its discovery (Bailey et al. 1963), commonly occurred in Britain, although in low concentrations, in seemingly healthy adult bees especially during the Summer, and until relatively recently, had never been associated with disease or mortality in nature (Ball and Bailey 1997). It was only readily detected by injecting the extracts of infected live bees into other individuals of the same colony (Bailey and Gibbs 1964).

ABPV has a worldwide distribution (Allen and Ball 1996; Ellis and Munn 2005). In addition to honey bees, ABPV has been found in bumblebees and is the only honey bee virus known to have a natural alternate host (Bailey and Gibbs 1964). This virus spreads by way of salivary gland secretions of adult bees and in food stores to which these secretions are added (Ball 1985). ABPV has a single-stranded RNA genome with a poly(A) tail. The virus particles are isometric in shape and are 30 nm in diameter (Govan et al. 2000).

By infectivity assay, Bailey and Gibbs (1964) found little difference in the concentration of ABPV in different parts of the bodies of paralyzed bees previously fed with the virus. The serological titer of ABPV was also much the same in various parts of bees that had been injected with the virus. The corpora pedunculata ('mushroom bodies') of the brains of acutely paralyzed bees appeared abnormal by light microscopy and this seemed possibly associated with brain infection and the death of bees very soon after they show symptoms.

ABPV accumulates in the brain and hypopharyngeal glands of the adult bee host (Bailey and Milne 1969) and can also be readily detected in feces (de Miranda et al. 2010) implying several oral transmission routes involving adults, larvae, cannibalized brood, contaminated food and/or feces (Chen and Siede 2007).

"ABPV accumulates in the brain and hypopharyngeal glands of the adult bee host and can also be readily detected in feces implying several oral transmission routes involving adults, larvae, cannibalized brood, contaminated food and/or feces. ABPV has also been detected in semen."

ABPV has also been detected in semen (Yue et al. 2006).

Many bees injected with ABPV and kept at 35°C remained apparently healthy though they contained at least as much virus as bees injected with ABPV, and kept at 30°C, all of which died of acute paralysis (Bailey and Milne 1969). Bee larvae respond with a sudden deadly collapse after artificial infection with ABPV, accompanied by an extreme retardation of weight gain and a remarkable change of appearance (Azzami et al. 2012).

In contrast to the observed low impact of ABPV infections on the survival of bee colonies for many years, shortly after the introduction of the *Varroa* mite (*Varroa destructor*) to Europe, ABPV was linked to the high mortality of colonies infested with this ectoparasite (Genersch and Aubert 2010). In continental Europe and North America, strains of acute bee paralysis have now been shown to kill both adult bees and brood in colonies infested with *Varroa* mites (Ball and Allen 1988; Hung et al. 1996). The mite induces the virus to multiply when it feeds on apparently healthy but virus-infected bees, and the virus rapidly becomes systemic and lethal. Adult female mites acquire virus by feeding on an infected host and then can act as virus vectors, transmitting ABPV to other adult bees or developing pupae within the brood cell. Adult bees in which the virus is actively multiplying can also infect young larvae by secreting large amounts of virus into their food. In severely affected colonies, the adult bee population rapidly diminishes, and symptoms in diseased brood may resemble those of American or European foulbrood.

Serological detection of ABPV in samples of dead adult bees from *Varroa* infested colonies in Germany and the Netherlands appeared closely related to the level of the mite infestation: the percentage of dead bees that were ABPV positive was 3%, 44% and 80% in colonies with low, medium or high mite infestation rates, respectively. Also, a sharp decline in the adult bee population during the late summer coincided with a peak of ABPV incidence in dead bees (Ball and Allen 1988).

Large amounts of ABPV were extracted from dead, field-collected samples of European honey bees from Russia and German Federal Republic. Virus isolates were compared to the British type strain. Particles of the three isolates were physically indistinguishable and closely related serologically and each produced three well-defined protein bands of apparently identical molecular weights on SDS polyacrylamide gels. In both Russia and Germany the occurrence of ABPV in dead field bees and brood was associated with infestation of the colonies with *Varroa* mites (Ball 1985).

"Serological detection of ABPV in samples of dead adult bees from Varroa infested colonies in Germany and the Netherlands appeared closely related to the level of the mite infestation: the percentage of dead bees that were ABPV positive was 3%, 44% and 80% in colonies with low, medium or high mite infestation rates, respectively."

Azzami et al. (2012) determined the response of newly emerged adult worker bees to serial dilutions of a ABPV suspension upon applications into the hemocoel. As controls, they used uninfected bees and bees that were treated with 10^5 viable *Escherichia coli* bacterial cells. Randolt et al. (2008) previously had shown that challenge of young adult bees (one to two days old) with a high dose of *E. coli* cells (i) had no deleterious effect on bees and (ii) resulted in a pronounced stimulation of the humoral immune response, as deduced from the expression of antimicrobial peptides and immune-responsive proteins. Furthermore, it was demonstrated by Bedick et al. (2001) that newly emerged adult workers respond to bacterial challenge with strong nodule formation, indicating that cellular immune reactions are also activated in young bees.

Almost all individuals of these two control groups survived in small cages up to 48 hours, and about 84% and 94%, respectively, were still alive after 72 hours. Dilution of the ABPV suspension by 10^{-7} prior to injections of 1-µl samples (containing ~ 10^2 virus particles) did not have a pronounced effect on the survival rate or on the pathological symptoms of the infected bees. They looked healthy even at prolonged culture times ($\geq$ 96 hours). In contrast, injection with 10^3 and 10^4 virus particles had a severe impact on both the pathological effects and the survival rate of infected individuals. None of the bees were alive at 72 hours post-infection. Bees were regarded as "dead" when they were motionless and had turned on their backs. Symptoms of beginning paralysis, i.e. trembling of wings and bodies of affected bees occurred between 18 and 48 h, depending on the dilution of ABPV. None or only a few bees survived after the application of ~ 10^4 ABPV particles, and about 60% were still alive after 48 h upon infection of ~ 10^3 virus particles (Azzami et al. 2012).

The response of fourth-instar larvae to AVPV infection was also studied (Azzami et al. 2012). At this developmental stage, i.e., four days after hatching, bee larvae have an average weight of 30 to 40 mg and survive aseptic and septic wounding to a great extent (Randolt et al. 2008). Injection of 10^5 *E. coli* cells resulted in 80 to 90 % survival of bee larvae 24 hours post-infection. A similar survival rate was observed if larvae were challenged with 10^1 ABPV particles per larva. No larvae survived injections of ~ 10^3 ABPV particles, whereas about 50% of larvae were alive 24 h after injection of ~ 10^2 ABPV particles.

The hemolymph of infected bee larvae and of adults is the site of massive ABPV propagation and accumulation within the host (Azzami et al. 2012). Larvae and adult workers do not produce a humoral immune reaction when challenged with ABPV infection in contrast to control individuals challenged

with the bacterium *Escherichia coli*. ABPV-infected bees produced neither elevated levels of specific antimicrobial peptides, such as hymenoptaecin and defensin, nor any general antimicrobial activity. Additionally, adult bees did not generate any general melanised nodules upon ABPV infection, an important cellular immune function activated by bacteria and viruses in some insects. Challenge of bees with both ABPV and *E. coli* showed that innate humoral and cellular immune reactions are induced in mixed infections, albeit at a reduced level.

Azzami et al. (2012) studied the time course of virus propagation by collecting hemolymph samples from adult bees at different times post-injection with different amounts of ABPV particles and analyzed the total protein patterns. In newly emerged worker bees (one to two days old) apolipophorin (ApoLp)-I and –II, transferrin and imaginal disc growth factor 4 (IDGF-4) are prominent hemolymph proteins, whereas expression of vitellogenin is still low at this early developmental stage (Randolt et al. 2008). Upon infection with ABPV, little change in the overall protein pattern was observed between six and 24 h post-injection as compared to hemolymph samples derived from uninfected and mock-infected (phosphate-buffered saline) individuals. Upon infection with 10^3 ABPV particles per larva, newly synthesized ABPV capsid proteins were clearly visible in the hemolymph of infected bee larvae or adults between nine and 12 hours post-infection (h.p.i.) and their amount increased rapidly up to 24 h.p.i. No virus specific capsid proteins were visible in larvae infected with only 10^1ABPV particles, which correlates well with the healthy appearance of these larvae and a high survival rate. Uninfected larvae and larvae challenged with 10^1 ABPV particles gained weight from about 45 mg at the time of injection (fourth instar stage) to about 95 mg per larva upon hemolymph collection at 24 hours post-injection. Quite another image emerged if larvae were challenged with 10^3 ABPV particles. All of them were dead at 24 h p.i. and exhibited a severe weight retardation (49 mg per larva) combined with a change in color from yellowish-white to brownish-black as compared to healthy control larvae. The hemolymph protein pattern likewise changed dramatically. Up to 12 h p.i., it remained rather unaltered although ABPV had already multiplied to a great extent, but thereafter, a striking change in the overall protein composition could be observed. BC

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The Voice Of The South

Honey Management

May is upon us, and it seems that only yesterday many of my colonies were meager four to five frames of bees coming out of Winter (if you can really call the season by that name down here). Now, colonies are literally busting at the seams. This is the truly magical time in the beekeeping year when nectar dribbles out of the combs when one inspects the broodnest. Apiaries are literally buzzing with intense foraging traffic, and colonies can gain pounds of nectar weight every day. That is – if you are ready!

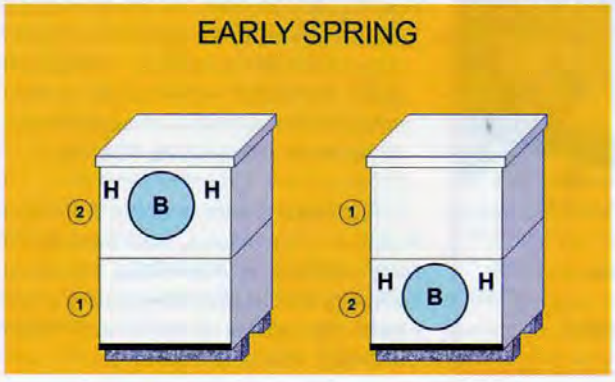
It's so hard to generalize beekeeping information for the entire South when all that I know comes from Mississippi, Alabama and Louisiana. However, beekeeping activities as related to blooming of food plants can be predicted by a crude geographic rule of adding a one-week delay in bloom for every 200 miles or so northward in latitude. For example, if Sumac is blooming heavily in southern Mississippi during the first week of May, a person living near the Mississippi-Tennessee border might expect Sumac to bloom at either the very end of May or beginning of June. Why is this important? All beekeeping activities during this time of year are directed toward maximum honey production, which of course depends on the availability of nectar and pollen from major bee forage.

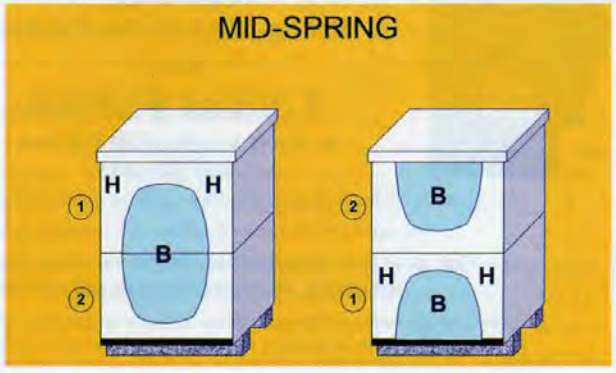
Honey yield also depends on colony size. In many ways, the success of your honey crop has already been determined by your early Spring management. Any failure to get colonies ready for the current period of primary bloom can mean the difference between a bumper crop and having to feed your bees to survive the remainder of the year. Early season inspections in mid-January or mid-February should have been used to gauge the amount of food stores remaining in hives coming out of the Winter. Colonies will do best if they still retain 30-50 lbs. of honey from the Winter stores. Supplemental feeding of sugar syrup (a 2:1 ratio of granulated sugar to water by volume) would have been used to boost the food stores in colonies that were short on food.

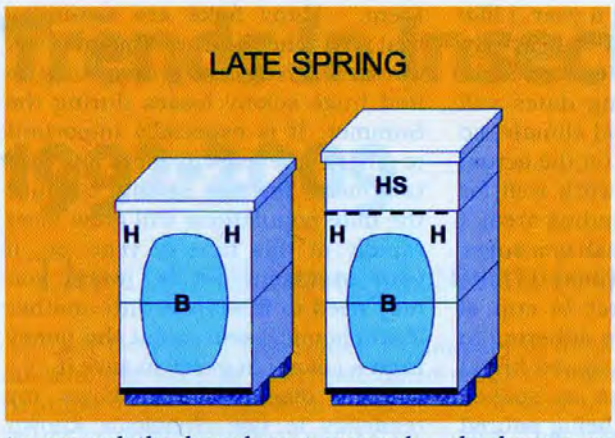
Generally, pollen is readily available from maple and other plants beginning in early January in Mississippi, and supplemental feeding of protein or pollen (irradiated to kill pathogens is best) patties is usually not necessary for stimulating brood rearing. However, colonies may benefit from supplement provisions of pollen or protein should inclement weather occur for an extended period of time. Hopelessly weak colonies would have been combined to avoid losing hive equipment, and the presence of a good egg-laying queen should have been confirmed in all colonies. For our area, good colony strength in mid-February would equate to at least three lbs. of bees covering 6 or more brood frames.

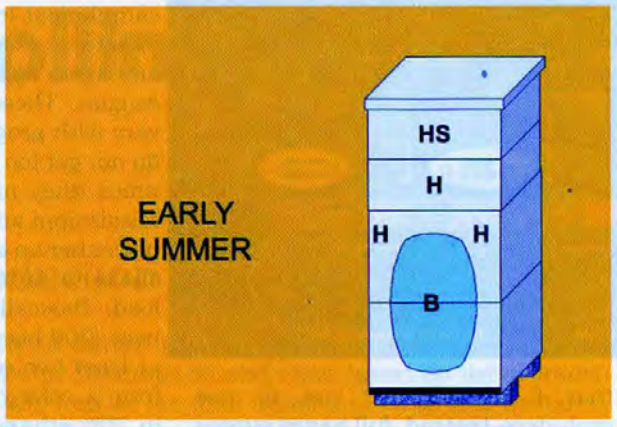
Typically, adult bee populations will reach critically high levels needed for maximal honey production by mid-March for southern Mississippi and mid-April for northern Mississippi. Several beekeepers reported swarms and the presence of abundant swarm cells by the end of February and beginning of March this year! Swarming is indeed the biggest management challenge in March and April. Any colony that swarms is unlikely to have a foraging force large enough to accumulate a harvestable surplus. So, swarm prevention is necessary for maximal production from each hive.

Swarm prevention begins in mid-February (southern Mississippi) and mid-March (northern Mississippi) with the "early Spring" reversal of hive bodies in the brood chamber. Generally, the broodnest (B) and remaining stored honey (H) coming out of the Winter cluster will be located in the top brood box (2), while the bottom brood chamber (1) will contain empty combs that were left after the bees had eaten stores and moved the cluster upward during the Winter. Rotating these two chambers moves the empty combs above the developing broodnest, which gives the queen space for laying eggs (remember that bees like









to expand the brood nest upwards as they grow).

Many southern beekeepers will reverse the two brood chambers a second time about three to four weeks (mid-Spring) after the first reversal. During the second reversal, frames of uncapped brood (eggs and larvae) are moved to the center of the bottom brood chamber, and all frames of capped brood and honey are moved to the upper brood box. The capped brood will eventually emerge and free up some space above the young brood for the queen to lay eggs. Hopefully, there has been no tendency to make queen cells, and this rotation of brood chamber boxes will give the queen another two to three weeks of room for egg-laying.

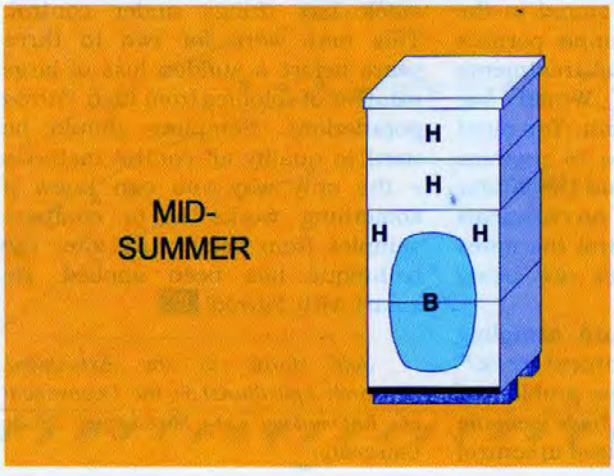
Sometimes it may be necessary to rearrange or expand the broodnest a third time at about two to three weeks after the second rotation. Frames of uncapped brood are again moved to the bottom brood chamber, and older capped brood is moved upward. Empty combs may need to be added to the second brood chamber to provide egg-laying space for the queen. The swarming tendency can also be reduced if the beekeeper ensures that queens are young by requeening colonies every one or two years.

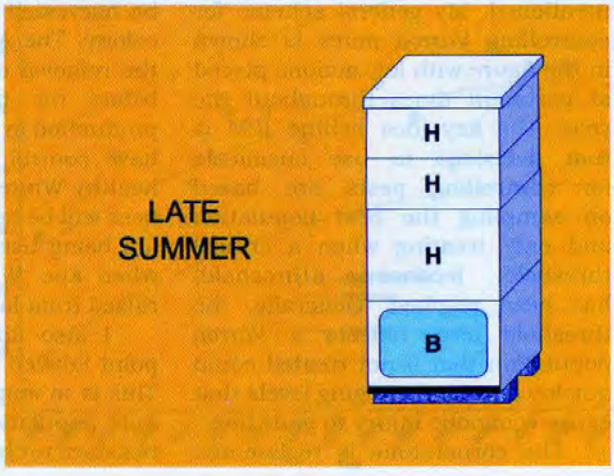
By "late Spring" it is time to add your first empty honey super (HS). Once the height of the swarming season has passed (end of April – early May), you will need to provide enough space for nectar storage. When conditions are perfect, bees can fill honey supers in two to three days. So, it will be important to stay ahead of the storage needs of your hive by supering. Honey production depends on the quality of the bloom. In a typical year, weather conditions may permit near optimal production. Obviously, unusual weather conditions such as droughts or lengthy periods of rain during what should be the blooming period can diminish yields.

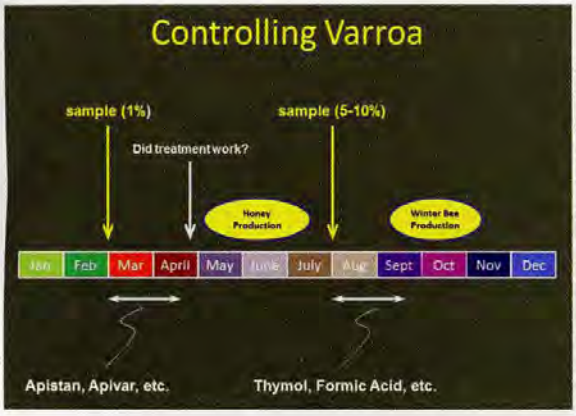
Hopefully, your hives have been placed in close proximity to adequate plant sources to secure your crop. In northern Mississippi, the major nectar plants available this month are Rattanvine, Privet, Tulip Poplar and White Clover. For southern Mississippi, major nectar sources include Privet, Palmetto, Yaupon Holly, Rattanvine, Highbush Gallberry and Sumac. Blue Vervain, Sumac, Sourwood, Cotton, White Clover and Peppervine are major nectar sources in northern Mississippi in June. White Clover, Cotton, Summer Ti-ti, Palmetto, Chinese Tallow and Sumac are the major nectar sources for southern Mississippi during the same period.

Many southern beekeepers use the two-thirds full rule as a guide for when to put on the next super. Simply stated, when six combs of a 10-frame honey super are full (or nearly full), it will be time to place another empty super onto the hive. By "early Summer," many commercial beekeepers add the empty super to the top, while some small scale beekeepers with more time (and stronger backs) will place the empty super below the nearly full one. Either method works – just do what feels right for you! Supering will continue from "mid-" to "late Summer" until the availability of nectar and pollen diminishes and the broodnest shrinks in size. Generally, by the middle or end of June, the harvest of the honey crop can begin.

Some people use queen excluders to prevent brood production in the honey super, but most beekeepers







that I know prefer not to use excluders. Instead, full honey supers are used as a barrier to the upward movement of the queen. If a queen puts some brood in a few frames of the first honey super, those combs are replaced with full frames of honey, and the brood is moved upward into the second additional super. The brood will emerge before the honey flow is over, and the bees will fill the emptied brood cells with honey. The full honey super below will prevent the queen from wandering into any additional honey supers (assuming that all supers are added to the top).

Most beekeepers in this area will begin harvesting honey in July. Small scale beekeepers will typically produce more honey per colony because they can manage each unit more intensively for optimal production. The testament for your skills in Spring management will be the soreness of your back by the middle of July!

I would be extremely negligent not to discuss the importance of controlling *Varroa* mites. I do not want to get into a lengthy discussion of integrated pest management (IPM) for this particular article, but some of the highlights for seasonal management of *Varroa* need to be mentioned. My general scheme for controlling *Varroa* mites is shown in the figure with key actions placed at pertinent times throughout the year. The key idea behind IPM is that decisions to use chemicals for controlling pests are based on sampling the pest population and only treating when a critical threshold (economic threshold) has been reached. Generally, the threshold level reflects a *Varroa* population that if not treated could quickly grow to damaging levels that cause economic injury to your hive.

The cornerstone is regimented sampling at least twice a year. I like to sample near the end of February and again after the honey harvest in August. These sampling dates will vary with geography and climate, so do not get too hung up on the actual times (they may only work well for Mississippi and surrounding area). I use either an alcohol wash or a sugar shake to estimate the phoretic mite load. Basically, I collect ½ cup of bees (300 bees) that are adhering to at least two combs of capped brood from a colony. The bees are soaked in 70% ethanol before being poured onto a hardware cloth mesh that retains the bees but allows the mites to filter into a catch pan. I use a 1% threshold for deciding whether to use chemical treatments in February, and a 5-10% threshold for August (I actually like the 10% threshold, but many beekeepers prefer the more conservative 5% threshold). So, in February, I will use a chemical treatment if more than three mites are found in a sample of 300 bees. In August, I will treat if more than 15 mites are found on 300 bees. As with the sampling dates, the economic threshold for *Varroa* mites will also vary with location. There are few published thresholds for different locations even within the U.S. It may take trial and error to find levels that adequately protect hives under your conditions.

The horizontal white lines (with double-headed arrows) represent a 50-day period required by some of the chemicals used to control *Varroa*. I placed these arrows into the diagram to emphasize the logic of when to sample and treat. The sample in February needs to be done far enough in front of the primary honey flow that chemical treatments are removed before honey that will be harvested is being stored in the colony. The August sample permits the removal of chemical treatments before the period of Winter bee production in the autumn. You must have control of *Varroa* to produce healthy Winter bees, and the Winter bees will be healthier if no chemicals are being used to control the mites when the Winter bees are being raised from larvae.

I also show a third sampling point labeled "Did treatment work?" This is to emphasize the problem of mite populations that have become resistant to chemicals used to control them. Many folks are assuming that the chemical treatments will work effectively every time, only to find huge colony losses during the Summer. It is especially important to check the effectiveness of your treatment in the Spring because the mite populations will grow most rapidly at this time of year. So, if your treatment did not work, you may need to intervene with another legal chemical and forfeit the honey from a colony in order to save it.

The diagram also shows my tendency to use chemicals known to have higher kill rates (at least before the onset of resistant mite populations) in the Spring treatment, while opting for treatments that may have lower efficiency in killing mites in the Autumn. By using different types of chemicals during the year, one can slow the development of resistance to a particular chemical by the mite population. Admittedly, there are many, many more considerations in deciding which chemicals to use, but I will save that for another time.

Lastly, I encourage all small scale beekeepers to try and delay the growth of mite populations by non-chemical means. Learn to use drone brood as traps for *Varroa* and make this technique a key feature of your beekeeping repertoire. Try *Varroa* resistant stocks. Use screen floors. Make it fun to try and keep the populations low enough that threshold populations are either never reached or delayed. However, whatever non-chemical methods are used – sampling must be used to gauge the effectiveness of these methods. Too many people are not treating colonies for years at a time because they are using a resistant stock and ASSUMING that the stock has things under control. This may work for two to three years before a sudden loss of large number of colonies from high *Varroa* populations. Sampling should be used to qualify all control methods – the only way you can know if something works is to compare samples from before and after the technique has been applied. Be smart with *Varroa*! BC

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Trends In Insect Pollinated Crops 1992-2009

Nick **Calderone**

The role of honey bees in food production continues to expand.

Last December, I presented a summary of the production and value of insect pollinated crops to U.S. agriculture in 2010 along with a discussion of some of the issues involved in arriving at good estimates. That report was based on an addendum to a much larger study that examined trends in the production and value of insect pollinated crops from the period 1992 through 2009. There are several reasons for doing trend analysis. First, a single-year study may not be representative of the degree to which agriculture depends on pollination, suggesting values that are either too high or too low. Second, trends reveal changes in our dependence on pollination and provide some insight into the level of our dependence on pollinators in the future (here, I refer only to our reliance on pollinators for the production of agricultural crops; pollinators also provide a vast wealth of non-agricultural services often referred to as **ecosystem services**, including, among others, the pollination of plants that limit soil erosion as well as those that provide food and shelter for wildlife). Lastly, we can examine trend data for evidence that the decline in the number of honey bee colonies has limited the production of insect-pollinated crops. In this article, I want to focus on the first two of these reasons.

Remember from last time, there are two broad groups of crops that depend on or benefit from insect pollination. One consists of **directly dependent** crops like apples, almonds, cherries, oranges, squash, vegetable and legume seeds. For these crops, the fruit, nut or seed develops from a flower that must be pollinated by an insect. This is in contrast to **indirectly dependent** crops like alfalfa hay, clover hay, sugar beets, asparagus, broccoli, carrots and onions that do not require pollination but that are grown from seeds that *did* require pollination. This month, I will focus on trends in the production of directly dependent crops, or DD crops for short (see Insert for list of crops). We will look at the total number of cultivated hectares, total production in tonnes, yield in tonnes/hectare, total farm gate value in constant 2009 USD and the portions of farm gate value attributed to honey bee and non-*Apis* pollination. We will also examine these data in light of changes in the U.S. population, the total number of hectares in U.S. farms and the value of U.S. cropland. All data were obtained from the USDA National Agricultural Statistics Service (NASS). Cultivated acres were converted to hectares (1 hectare = 2.47 acres); production data in various units were converted to metric tonnes (1 metric tonne = 1.1023 short tons = 2,204.62 pounds); farm gate values are given in 2009 USD. Coefficients from previous studies by Robinson et al. (1989ab) were used to partition farm gate values between honey bees and non-*Apis* pollinators.

Trends in hectares and production of insect-pollinated crops

The total number of hectares in U.S. farms (all crops) declined steadily from 395.99 million in 1992 (roughly the combined area of the seven largest states: Alaska, Texas, California, Montana, New Mexico, Arizona and Nevada) to 372.23 million in 2009 (**Table 1; Fig. 1**). This represents a loss of farm land equivalent to an area just a bit larger than the state of Minnesota. However, while the total number of hectares in farms declined, the number of hectares of DD crops increased significantly from 26.65 million in 1992 to 34.11 million in 2009, an increase of 27.99% (**Table 1; Fig. 1**) with most of that increase coming between 1992 and 2004 followed by a slight decline thereafter. The reduction in 2007 was due

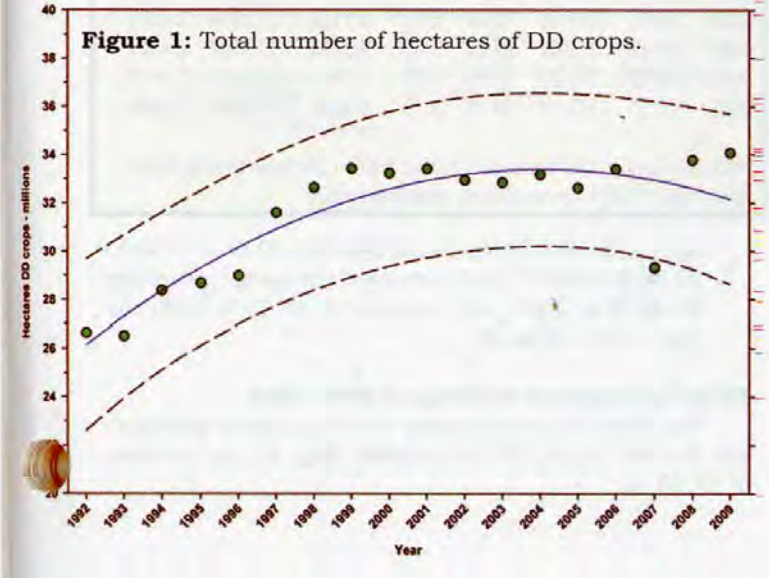

Figure 1: Total number of hectares of DD crops.

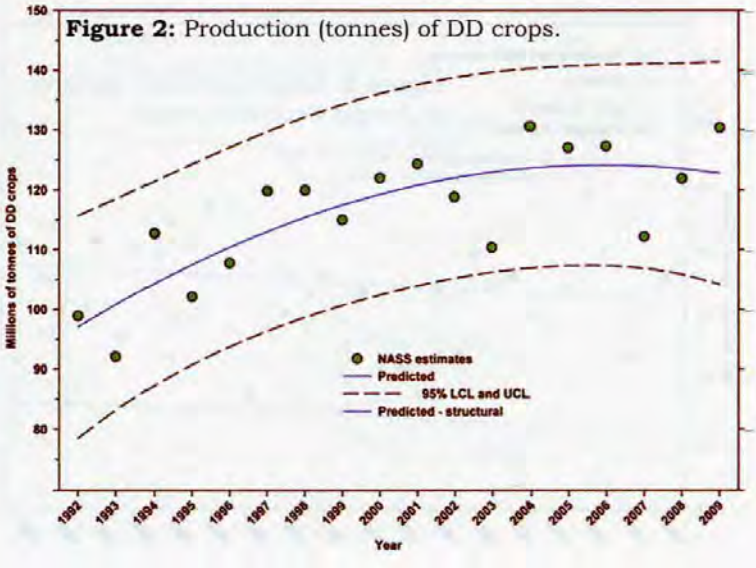

Figure 2: Production (tonnes) of DD crops.

to a transient reduction in hectares in soybeans and, to a lesser extent, peanuts. As a percentage of total hectares in farms, this increase represents a change from 6.73% in 1992 to 9.15% in 2009 (**Table 1**). The rate of increase slowed around 1999 but maintains an upward trend.

Along with the increase in hectares devoted to DD crops, we see an increase in the production of DD crops from 98.93 million tonnes in 1992 to 130.34 million tonnes in 2009, an increase of 31.75% (**Fig. 2; Table 1**), although the rate of increase also slowed around 1999. During this period, the yield of DD crops ranged between 3.97 tonnes per hectare (1994) and 3.36 tonnes per hectare (2003); but there was no significant trend (**Fig. 3**).

Trends in production of insect-pollinated crops relative to changes in the U.S. population

The U.S. population has grown in a linear (straight line) manner from 256.51 million to 307.01 million during the period from 1992 - 2009 (**Table 1**). During that same period, the number of hectares of DD crops per person increased from 0.1039 in 1992, peaked at 0.1198 in 1999, and declined to 0.1111 by 2009 (**Table 1**). The production of DD crops expressed as tonnes per person rose from 1992 to 2001 when it reached 0.48, but has since trended slightly downward (**Table 1**).

Trends in the value of insect-pollinated crops

Data for the farm gate values were limited to the period from 1996 - 2009 because the data prior to that could not be modeled. Data for those years are presented in the graphs for informational purposes.

- ***Total value (billions of 2009 USD)*** The total value of DD crops decreased from $52.18 B in 1996 to $36.30 B in 2001, but increased thereafter, reaching $55.99 B in 2009, an increase of 7.30 % since 1996 and 54.24% from the low in 2001 (**Fig. 4**).
- ***Total value attributed to honey bees (billions of 2009 USD)*** The portion of the total value of DD crops attributed to honey bee pollination decreased from $11.20 B in 1996 to $8.33 B in 2001, but increased thereafter, reaching $11.68 B in 2009, an increase of 40.22 % from the low in 2001 (**Fig. 5**).
- ***Total value attributed to other insects (billions of 2009 USD)***: The value of DD crops attributed to insect pollinators other than honey bees (the non-*Apis* pollinators) decreased from $3.09 B in 1996 to $2.36 B in 2001, but increased thereafter, reaching $3.44 B in 2009, an increase of 45.76 % from the low in 2001 (**Fig. 6**).

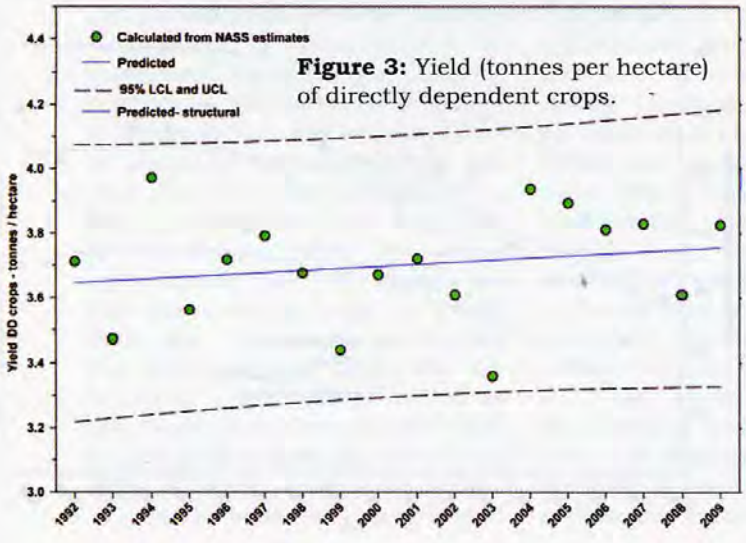

Figure 3: Yield (tonnes per hectare) of directly dependent crops.

Value of cropland (billions of 2009 USD)

The value of cropland rose from $4,194.81 per hectare in 1997 to $6,597.71 in 2009 (**Fig. 7**), an increase of 57.28 %.

Crops Included In This Study

BERRIES	CUCURBITS	TREE FRUITS
blackberry	cucumber [fresh]	apple
blueberry [cultivated & wild]	cucumber [pickled]	apricot
boysenberries	muskmelon [cantaloupe]	avocado
cranberry	muskmelon [honeydew]	cherry [sweet]
loganberries	pumpkin	cherry [tart]
raspberry [all (CA)]	squash	kiwifruit
raspberry [black (OR)]	watermelon	nectarine
raspberry [red]		olive
strawberry	**LEGUMES**	peach
	peanut	pear
CITRUS	soybean	plum
grapefruit		prune
lemon	**SEEDS**	prune & plum
lime	alfalfa [seed]	
orange	almond	**COTTON**
tangelo	canola	cotton [lint]
tangerine	cotton [seed]	
temple	macademia	**LEGUMES**
	non-alfalfa legume seed	peanut
GRAPES	rapeseed	
grapes	sunflower	

Table 1. Hectares and Production of Directly Dependent crops.

Year	US Population[1]	THIF[1,2]	HDD[1,3]	HDD as %THIF[2]	HDD[3] crops per person	TDD[1,4] crops	TDD[4] crops per person
1992	256.51	395.99	26.65	6.73	0.1039	98.9255	0.4251
1993	259.92	392.08	26.52	6.76	0.1020	92.0909	0.3906
1994	263.13	390.90	28.38	7.26	0.1079	112.7269	0.4722
1995	266.28	389.52	28.68	7.36	0.1077	102.1451	0.4228
1996	269.39	387.96	28.99	7.47	0.1076	107.7844	0.4410
1997	272.65	386.88	31.60	8.17	0.1159	119.8173	0.4844
1998	275.85	385.29	32.63	8.47	0.1183	119.9575	0.4793
1999	279.04	383.83	33.42	8.71	0.1198	114.9755	0.4542
2000	282.17	382.46	33.26	8.70	0.1179	121.9736	0.4765
2001	285.08	381.24	33.45	8.77	0.1173	124.3230	0.4807
2002	287.80	380.53	32.97	8.67	0.1146	118.8422	0.4552
2003	290.33	379.09	32.89	8.68	0.1133	110.3651	0.4190
2004	293.05	377.27	33.21	8.80	0.1133	130.5823	0.4912
2005	295.75	375.52	32.66	8.70	0.1104	127.0099	0.4734
2006	298.59	374.65	33.44	8.92	0.1120	127.2814	0.4699
2007	301.58	372.90	29.34	7.87	0.0973	112.2107	0.4101
2008	304.37	372.27	33.81	9.08	0.1111	121.8626	0.4413
2009	307.01	372.23	34.11	9.16	0.1111	130.3399	0.4680

[1]millions; [2]THIF = total hectares in farms; [3]HDD = hectares directly dependent crops; [4]TDD = tonnes directly dependent crops

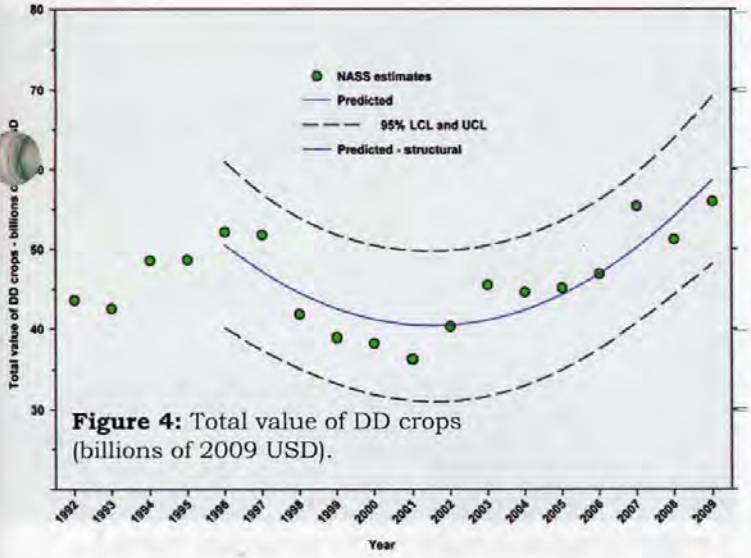

Figure 4: Total value of DD crops (billions of 2009 USD).

Summary

U.S. agriculture's reliance on insect pollinators and the honey bee in particular, grew rapidly between 1992 and 2000; and it has remained near 2000 levels since that time. The number of cultivated hectares of DD crops increased from 26.65 million in 1992 (first year for production, cultivated area and yield data in this study) to 34.11 million in 2009, an increase of 27.99 % (**Fig. 1**). As a percentage of total farm hectares, this represents an absolute increase from 6.73 % to 9.15 % and a relative increase of 35.96 % (**Table 1**); this growth occurred in spite of the rising price of cropland (**Fig. 8**), reflecting the relatively high value of DD crops.

Production increased from 98.93 million tonnes in 1992 to 130.34 million tonnes in 2009, an increase of 31.75 % (**Fig. 2**). The majority of growth in cultivated hectares and production occurred between 1992 and 2000-2001 with flat or significantly reduced rates of increase thereafter. Yields measured as tonnes/hectare were flat over the study period (**Fig. 3**). These trends differ somewhat from those in other developed countries that show steady increases in yield and cultivated acres and more modest but continuing increases in production over the same period. They differ significantly from trends in the developing world where each metric continues to increase rapidly, albeit from a lower baseline.

The cultivated area and production of DD crops in the U.S., measured as hectares or tonnes per person, kept pace with growth in the population from 1992 through 2000-2001, but neither has kept pace since (**Table 1**). These results are consistent with land use patterns reflecting rising cropland values and growing access to imported food. They may also suggest opportunity for US farmers and beekeepers seeking to increase their market, but the economics are complicated.

The total value (2009 USD) of DD crops declined between 1996 and 2001 from $52.18 B to $36.30 B, but rose thereafter, reaching $55.99 B in 2009 (Fig. 20), an increase of 54.24 % from 2001. Revenues attributed to insect pollination decreased from $14.29 B in 1996 to $10.69 B in 2001, but increased thereafter, reaching $15.12 B in 2009, an increase of 41.44 % from 2001. Revenues attributed to honey bees decreased from $11.20 B in 1996 to $8.33 B in 2001, but increased thereafter, reaching $11.68 B in 2009 (Fig. 5), an increase of 40.22 % since 2001. Revenues attributed to insect pollinators other than honey bees decreased from $3.09 B in 1996 to $2.36 B in 2001, but increased thereafter, reaching $3.44 B in 2009 (Fig. 6), an increase of 45.76 % since 2001.

The data presented here are aggregated over 58 crops. While this can provide a useful overview of the trends in insect-pollinated crops, it can be somewhat misleading. Different crops may exhibit significantly different rates of change for both cultivated hectares and production and these differences may not be evident in aggregated data. A few crops with large numbers of cultivated hectares and/or high levels of production can mask significant changes in important crops with smaller numbers of cultivated hectares and lower levels of production. In future

The value of directly dependent crops due to only honey bee pollination was nearly $12 billion in 2009.

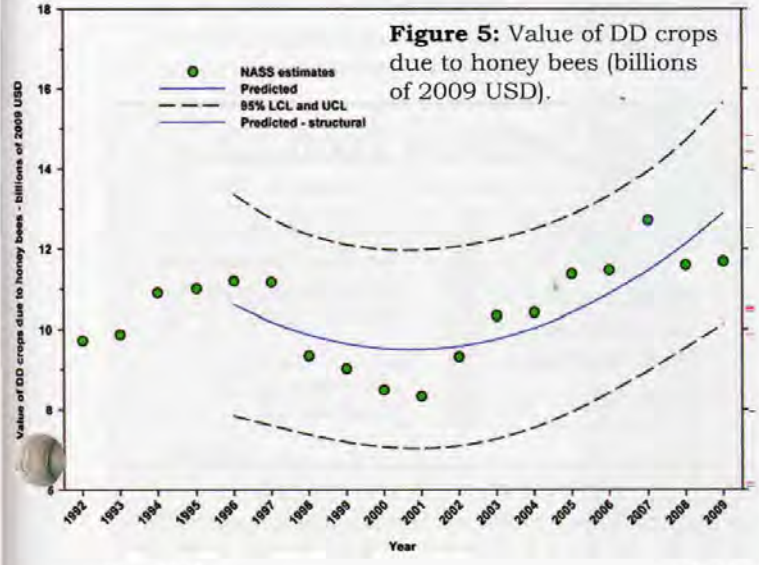

Figure 5: Value of DD crops due to honey bees (billions of 2009 USD).

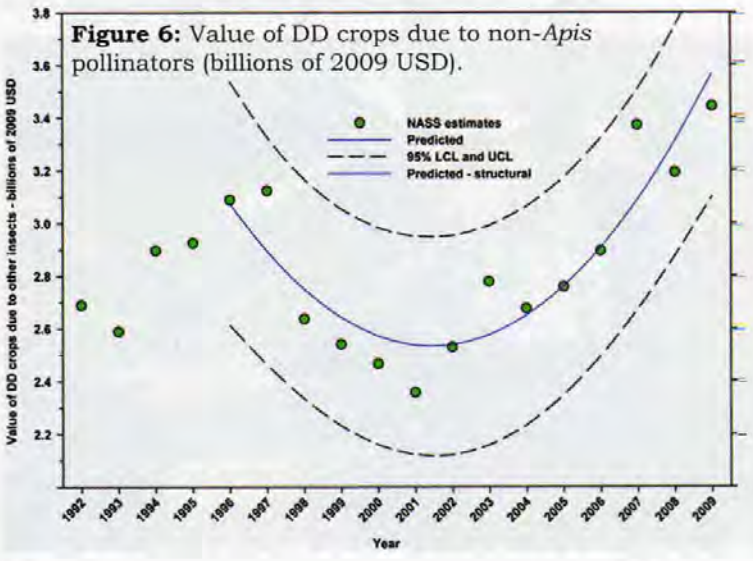

Figure 6: Value of DD crops due to non-*Apis* pollinators (billions of 2009 USD).

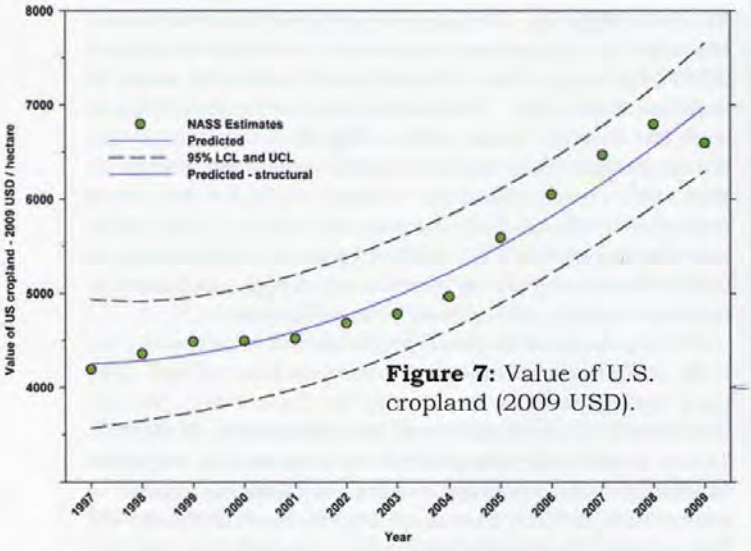

Figure 7: Value of U.S. cropland (2009 USD).

articles, I will present data on subsets of this dataset so you can see what is going on with individual crops and crop groups in greater detail. BC

Acknowledgments

I thank Mark Jandricic for coding the crop database and for data entry. This article draws on the following article for most of its materials, tables and figures: *Calderone NW (2012) Insect Pollinated Crops, Insect Pollinators and US Agriculture: Trend Analysis of Aggregate Data for the Period 1992–2009. PLoS ONE 7(5): e37235. doi:10.1371/journal.pone.0037235.* Funding for this project was provided, in part, by the National Honey Board.

Figures: DD = directly dependent crops; NASS National Agricultural Statistical Service; LCL and UCL = lower and upper confidence limits.

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THE PROS & CONS OF
LIVE & LET DIE

David **Tarpy**

Is it tougher bees, or weaker mites?

For all you fans of James Bond out there, you can relate to the following analogy of equating various honey bee pests with Bond villains.

- Auric Goldfinger has to be American foulbrood, one of the original and most memorable diseases who really helped launch our respective State Apiary programs just like Goldfinger defined the Bond villain in the then-fledgling Bond franchise.
- Mr. White is IAPV (Israeli Acute Paralysis Virus), linked by some to Colony Collapse Disorder: relatively new on the scene, mysterious, and hard to pin down.
- Emilio Largo from *Thunderball* reminds me of chalkbrood, with the white hair and black eye patch not unlike those spore-ridden mummies that pesky fungus create, but otherwise harmless (without stealing an atomic bomb, at least).
- Rosa Klebb, the Russian arch-villain, is about as harmless as sacbrood; compared to the others, a poison-tipped blade in a shoe isn't really all that scary anymore.
- Dr. No from the very first *Bond* film of the same name was a Chinese nuclear physicist aimed at holding the West for ransom, just like wax moths were the first notorious pest of beekeepers but have lost their notoriety in light of newer diseases.
- Elliot Carver, the media mogul modeled after Rupert Murdock, created fictitious military conflicts to sell newspapers. He is clearly analogous to tracheal mites (internal, blood-sucking parasites—need I say more?!).
- Janus, the double-agent from *GoldenEye* is named after the two-faced Roman god, is just like Nosema disease with its two forms *Nosema apis* and *N. ceranae.*

While each posed their own problem for James Bond and MI-6, none live up to the notorious Ernst Stavro Blofeld—the bald, scarred, cat-petting super-villain that keeps popping up from movie to movie and served as Bond's great nemesis. Just as he was "Number 1" in SPECTRE (**SP**ecial **E**xecutive for **C**ounter-intelligence, **T**errorism, **R**evenge and **E**xtortion), Blofeld quite obviously represents public enemy #1 to beekeepers, which of course is the varroa mite: ubiquitous, insidious, and devastating.

To take the analogy just a little bit further, Blofeld's character was summarily dispatched in the opening scene of Roger Moore's debut *Live and Let Die* (and hence the demise of SPECTRE from the film franchise). Some beekeepers and apiculture scientists have argued that the same approach is the best answer to finally defeating *Varroa* mites. The "live and let die" approach to *Varroa* control is based on the premise to allow natural selection to take its course – impose the (extremely high) parasite selection pressure on honey bees, let the "weak" die out so that only the "strong" will survive and leave us with resistant bees.

There have been several studies that have used this approach in an effort to breed bees tolerant or even outright resistant to *Varroa*. These studies have shown that it is possible for bees to be able to co-exist with mites without the need of beekeeper intervention (particularly with chemical controls). In doing so, there is a raging debate as to the means by which this new harmonious balance is reached: by fostering resistance among the bees, or by avirulence among the mites.

The answer? Both. Evidence on the "resistance" side, a research team in Europe let an isolated population in Sweden of honey bees go unmanaged for seven years. They called it the "Bond Project", since they were letting them *Live and Let Die* (and no, I'm not making that up). This population survived *Varroa*-mite parasitism without chemical treatment, letting those that succumbed die and those that lived reproduce. The researchers then produced queens from these 'Bond colonies', placed them into standard commercial hives, and compared them with those headed by queens from Control colonies (main-land hives regularly treated for *Varroa* using standard chemical applications). Not only were the mite levels lower in the Bond colonies compared to controls, subsequent genomic studies showed that there were indeed genetic differences between the two bee populations, showing that selection really did change the host bees towards being more tolerant of mites.

For evidence on the "avirulence" side, Tom Seeley at Cornell University discovered a population of feral honey bees, all infested with *Varroa* mites, living in an isolated nature preserve in upstate New York. He measured mite levels in the hives using sticky boards over the course of the Summer and showed that the number of mites remained relatively low over time (maximum mite drop of 21 mites in 24 hours, well below the suggested threshold for being a problem for the bees). He then raised new queens from one of the captured feral colonies, let them mate in the forest, transferred them back to his research station, and placed them along side an equal number of hives headed by commercially produced queens. He then measured each of the six pairs of 'Arnot Forest' hives and 'New World Carniolan' hives for mite levels every month, again using sticky boards. He showed that mite

levels increased over the course of the summer, and they did so similarly in both types of colonies in each pair. These results suggest that the feral bees were not resistant to the mites in some way, but rather that the mites are more virulent in a managed setting compared to a feral setting.

So these studies show that it is indeed possible to reach a new balance with *Varroa* mites by letting bees "live and let die". However, such an approach will ONLY work under certain conditions. First, the honey bee population needs to be *isolated*. Selection only works in closed populations so that the favorable alleles have a chance to increase in frequency. So if you take a live-and-let-die approach but then buy new packages from out-of-state to replenish your colonies every year, you will never make any progress and your bees (and mites) will never be selected for resistance (and avirulence). Second, a closed population has to be *sufficiently large* to start out with sufficient genetic diversity and allow genetic change while avoiding inbreeding. Population genetic studies have shown that this requires at least 50 colonies or more to make this possible. Third, survival is a very general trait; that is, many other factors influence whether or not a colony dies (e.g., nutrition, other diseases, etc...). Thus the rate of selection for *Varroa* tolerance is much increased by *measuring the trait in question* (*Varroa* mites). So you will never make a lot of progress by letting bees live and let die if you don't routinely measure the mite levels in your colonies.

While it is just prior to the new year as I write this article, I predict that this Spring will likely see an unusually high level of Winter mortality among honey bee colonies. In some ways, this can be predicted by the long-term cycle that beekeepers have experienced over the past year. The previous Winter was one of the mildest on record, meaning that the broodless period was shorter than normal or non-existent. This resulted in *Varroa* mites getting a head start in building up their populations, so that they were higher than normal by the end of the season. For beekeepers who did not measure their mite levels or took no action to control their numbers last Fall, the long-lived "Winter bees" that overwinter in the cluster were unusually parasitized and thus much weaker physiologically than required to survive until the next Spring. As such, I predict that there will be many more reports of "colony collapse," particularly among beekeepers who "live and let die" but do not account for a closed population or routine mite monitoring.

If the Bond villains teach us anything, it is that the criminal mind comes in many forms. But unlike Bond's ability to eventually overcome the seemingly impossible odds, there is no simple or magical solution. So if you do subscribe to a live-and-let-die approach to beekeeping, this inherently assumes that you keep your population closed and isolated, have a sufficiently large number of colonies (>50 hives), and routinely monitor your mite levels. To do otherwise is to simply allow the SPECTRE of *Varroa* to persist. BC

David R. Tarpy, NC State Extension Apiculturist, Department of Entomology, NC State University, ***http://entomology.ncsu.edu/apiculture***.

History Project
APPALACHIAN BEEKEEPING
An Exhibit, Pollinator Garden And Bees

Dan **O'Hanlon**

Many thousands of schoolchildren each year will learn about bees and beekeeping thanks to a living bee exhibit at Heritage Farm Museum in West Virginia (www.heritagefarmmuseum.com). Two years ago Mike Perry, co-founder of the Heritage Farm Museum, and I met with Speaker Richard Thompson of the WV House of Delegates to share our vision for the project. We envisioned an observation hive, bee cams on the web and touch screens telling the story of the history of beekeeping in Appalachia. We included a Pollinator Garden of native plants, fruit trees and shrubs to demonstrate the importance of bees in farming.

Speaker Thompson told us that his father was killed in a coal mining accident before he was born and that he had been raised by his grandfather, a beekeeper. He wanted to help us tell the story of bees in our history as a tribute to the man who raised him. With his help the Cabell Wayne Beekeepers Association [CWBA] wrote a West Virginia Community Participation Grant and a USDA Specialty Crop Food Grant. The West Virginia Department of Agriculture became an enthusiastic partner and we received full funding for both grants.

A hillside of native plants for pollinators planted by perennial Favorites Nursery.

Heritage Farm Museum was established more than 30 years ago to preserve the farming heritage of Appalachia. Every year thousands of schoolchildren from Kentucky, Ohio and West Virginia come to see how their ancestors lived and farmed in this region. Mike's son, Audy, always dreamed of changing the Museum from a collection of things into a living entity that would come alive right before the eyes of schoolchildren and adults who visit throughout the year. The CWBA had long wanted to have a location to demonstrate the importance of bees to the survival of our ancestors and to farming in the present day. For us, Heritage Farm was the perfect location for our 'living history' project.

Once the grant money was received, we bid out the project and began to design things with the winning bidders: Perennial Favorite Nursery and Trifecta Productions (**www.trifectaproductions.net**). Trifecta spent many hours filming short videos with Wade Stiltner, Mike Perry, Dr. Jim Tew and myself. But the star of the show was Gabe Blatt whose father and grandfather actually owned the land and kept bees where Heritage Farm now stands. Gabe is the President of the CWBA and donated the actual bee outfit his ancestors wore when managing bees on the property. Trifecta also worked with Haagen-Dazs Ice Cream to share content on the educational touch screens now located throughout the Farm. Kids and their families can watch short educational videos which trace the path both immigrants and the bees they brought with them took as they crossed the mountains and settled in Appalachia. There are also many illustrations of how bees work together in a hive to make honey, beeswax and the many products important to us all for survival.

In addition, Trifecta put wifi all over the Farm and set up webcams to allow visitors to watch the bees all year long as they fly from the observation hive on the property. Perennial Favorites Nursery researched what plants, flowers and fruit trees were native to the area. They planted a Pollinator Garden now visited by the bees from the observation hive and visible from the webcams.

The CWBA and Heritage Farm have joined with the Cabell Midlands High School FFA to plant and maintain a demonstration vegetable garden at the Farm. FFA Advisors Mary Philips and Brian Clagg helped choose and supervise the students each year. FFA President Jonathan Black has taken charge of organizing the effort with three other FFA students from the school, Sierrah Gaddy, Scott McCallister and Brooke Holley. Together, they earn money for their Club and themselves by tilling, planting and hoeing the garden.

And so the dream we had became a reality on October 26th when we celebrated the Grand Opening of the "History of Appalachian Beekeeping Exhibit" at Heritage Farm with those who helped create it. BC

Dan O'Hanlon is a beekeeper and retired Judge living in West Virgina.

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

Send your questions to Dr. Phil at
phil@philcrafthivecraft.com
www.philcrafthivecraft.com

A beekeeper in Washington state asks:

I am in Washington state, and I have two questions: 1) Several years ago a swarm moved into a hive which was empty because the bees had died. We know this hive has swarmed since, and although we had another empty hive set up with one deep all last Summer, it's still empty. How do we attract another swarm? 2) We have heard that old frames need to be replaced for the health of the bees. When is the best time to do this? How many old frames can be switched with empty comb at one time? Do you have guidelines for us?

Phil replies:

There are various strategies we can use to attract swarms, though none guarantees success. Research on swarm behavior has shown that swarms are attracted to potential colony sites with certain features, and the best bait hives mimic those. The first requirement is a dry cavity of a certain size; a single deep hive body is fairly close to the ideal. Another is the presence of old comb from a previous occupancy. Most beekeepers putting together a bait hive place some old brood comb in a single deep – comb removed from an existing hive like the one in your second question. You could put in several frames of comb (no need for more than that), and then fill the hive body up with frames of new foundation. I suggest using the best of your culled brood frames and plan to replace them later if you are fortunate enough to capture a swarm. Most beekeepers prefer to use old comb, because of the chance of wax moths' finding it in the Spring before a swarm does.

Another of the features bees tend to seek out is not as convenient to duplicate; the ideal height for a colony is 15 feet off the ground. You might build a platform against the trunk of a tree, or a framework of scrap lumber to set a hive on. I once met a beekeeper who had hives sitting on the lower limbs of a tree. At first I scratched my head over the "tree houses," until it dawned on me – bait hives. If you do decide to elevate a hive to attract a swarm, keep in mind that, if successful, you'll have to get it back down, bees and all. An alternative is to buy a fiber swarm trap from a supplier. They are light weight, and easy to raise and lower, but they will not hold frames like a brood box. It is necessary to keep a close eye on them, in order to transfer the swarm to a box before it starts building comb. That may only be practical if the trap is mounted near at hand. Some beekeepers find that it helps to place bait hives a short distance (as far as 150 feet) away from the apiary instead of directly in it. This may be convenient for you, or it may not. Bait hives placed further away could possibly attract a swarm originating from outside your apiary – a bonus catch. However, I have found swarms in old equipment in my apiary, so distance is not always a factor.

If you want to go high tech in your efforts to trap swarms, you could also consider purchasing a pheromone lure from a beekeeping supply company. These are small plastic tubes containing chemical components of Nasonov pheromones, which honey bees use to mark colony entrances. (See *A Closer Look Nasonov Pheromone* by Clarence Collison and Audrey Sheridan in the February 2013 *Bee Culture* issue). Lemongrass oil is the poor (or cheap) beekeepers' alternative. It smells similar, but won't last as long. Place the lure inside the box with the brood frames.

Back before mites, when we had lots of feral colonies in trees, it was easier to attract swarms. Beginners were told that catching a swarm was a good way to acquire bees. I would not give that advice these days. Still, many beekeepers put out bait hives. I have one friend with several out-yards who keeps a bait hive in each during the spring. At least it gives you an opportunity to recover swarms from your own hives.

In answer to your second question, the best time to replace old brood comb is in the Spring or early Summer. At that time of year, the bees are stimulated by strong nectar flows to produce large quantities of new wax and comb. How many at a time? If you replace two frames per brood box, that represents 20% of the frames in the hive, allowing you to replace all the brood comb in a five year cycle. Three to five years should be the maximum life of brood comb. Not only do bees produce more brood in newer comb, but the wax in old comb can also be a sump for pathogens and pesticides. I have heard different researchers suggest various maximums, but the trend in recent years is to recommend more frequent turnover. If you have not replaced comb for several years and need to speed up the rate, you might replace two frames, allow the bees to draw them out, and then replace two more. In culling, look for comb which has holes in it, is deformed, consists of more than about 15% drone cells, or which you know is old enough to need replacing.

A caution on splitting the brood nest early in the year: the brood nest is the area where the queen is laying eggs, the bees are raising brood, and the colony is clustering in order to keep warm during cold days and colder nights. During frigid spells, the cluster must contract in order to maintain the temperature required to prevent damage to brood. Moving brood comb around or inserting frames with new foundation (or even empty comb) into the middle

of the box may force bees to spread out over too large an area in an effort to keep the brood warm. Brood not well covered with bees is in danger of being damaged or destroyed – chilled brood. Once nighttime temperatures are consistently in the 60s (°F), the risk is minimized. When inserting new frames, it is better to put them on the ends of the brood area rather than in the middle. The bees will draw them out and expand the brood area into the new frames.

Good luck. I hope this helps! Good questions.

A beekeeper in the Carolinas writes:

I am a novice beekeeper with one hive. I live near the coast along the North Carolina/South Carolina coast and our winters have been pretty mild the last couple of years. Each of the previous two years I have gone to rotate the hive bodies around this time of year but each time, the bees have not moved up from the bottom hive body. There are plenty of bees and even brood in the bottom. The second deep hive body is completely full of honey. I keep hearing the bees are honey bound. What does this really mean?

Any guidance would be of great help. Thanks a lot.

Phil replies:

It sounds like you have a good news/bad news scenario. The good news is that it was a mild Winter and you have plenty of bees. The bad news is that you do seem to have a honey bound hive.

In parts of the country which experience true Winter, the normal progression is for the colony to store more and more honey and less brood in the top box as Autumn wears on. The cluster then starts out the Winter in the bottom box – often continuing to rear some brood there. (Here in Kentucky, it's not unusual to have the top boxes full of honey by late Summer or early Fall.) This mirrors the behavior of feral bees, which move up within a hollow tree or other cavity to store surplus honey above the brood nest. As winter proceeds, honey in the bottom box is consumed, and the cluster moves into the honey stores above – which is where we find the colony in the Spring. That's when many, though not all, beekeepers follow the procedure you mentioned of reversing or rotating the brood boxes. Placing what had been the top box, containing bees and brood, on the bottom board and placing the empty box on top of it encourages the bees to spread into the upper box as brood rearing picks up in the Spring. As I say, many beekeepers practice rotation, and some bee books instruct beginners to do it, but other beekeepers consider it unnecessary and do not. There is nothing wrong with it, but more often than not, I myself don't bother. I find that the bees will move down into the bottom box as they need more space.

If Winter is mild, as in your situation, the natural progression is disrupted and the move to the top box may not occur. That's when a hive becomes honey bound, meaning that a large percentage of the brood comb is full of honey and there is insufficient empty comb for the colony to rear brood on. The same condition can be caused by beekeepers' feeding excessively to the point where virtually all the comb is full of a combination of honey and sugar syrup. The problem with a honey bound hive is that the colony has so little space on which to lay eggs that its population declines. The number of bees dying (of old age – not disease) is greater than the number of new bees emerging. Sometimes lack of brood space will cause hives to swarm, further weakening the colony. I have seen this condition occur when a beekeeper feeds heavily in Fall and into the Winter without checking stores to find out whether or not the colony really needs more food. It can also happen when well-meaning beekeepers continue to feed new hives on into the Summer, long after natural nectar begins to be brought in. Honey bees will continue to bring in food whenever it's available, regardless of the amount of empty comb. I suspect that their instinct tells them they can always build more, even when, due to lack of space in a managed hive, they cannot. Of course, over feeding is not always the cause of a hive's becoming honey bound in the Spring; bees can bring in enough natural nectar during a good flow to fill brood boxes. That's when a good hive manager will add honey supers, providing more space above the brood boxes for honey storage and more inside them for rearing brood. (The instinct for producing large amounts of honey as long as nectar and space is available is one of the qualities that make honey bees so valuable to us.)

As far as what to do once you have a honey bound hive – not being familiar with your nectar flows, I'm not sure whether your bees will eat enough of the honey in the top box before they need the comb for rearing brood. If they do not, you will need to remove some of the full frames of honey and replace them with empty comb (if you have it) or with frames of foundation. You can always store the honey for later use in your hives. You might also be able to extract it if 1) it is pure honey (no sugar syrup) and 2) neither the honey nor the brood comb has been exposed to medications or miticides.

How to prevent this from occurring in the future? Sometimes, as in your case, it cannot be prevented. It may just be the luck of a mild Winter and the bees' not consuming as much honey as expected. However, if you fed in the Fall, you should ask yourself whether or not you might have overfed. Find out how much stored honey is needed in your area for winter and ascertain how much is in the hive before feeding, or continuing to feed, in the Fall. I always say that we should feed bees when they need it, not by the season. BC

honey

GLASS BOTTLES OLD & NEW

Jim **Thompson**

There's More Than One Way To Sell Honey

After you've spent a year or two in the beekeeping business, you'll probably come to the point where a decision is made on how you are going to sell or give away your honey. Part of this decision will be based upon what you have produced and what you plan to do with your crop. Some of these choices include plastic, glass, cans, jugs, buckets or barrels. The next obvious choice has to be what kind of containers are available. If you plan to give your honey crop away as gifts, you can use non-traditional containers and even make needlepoint covers for the lids. Designing labels for your product can get expensive and you should do your research to see what is required to be printed on the label. There is data on what colors are preferred by customers and you should check into having the likeness of a bee, award ribbons, bee hive, skep or flowers on the label. Some objects can be objectionable to people.

Plastic containers may be shipped from the manufacture or dealer to you cheaper than glass. Plastic containers full of honey may be shipped from you cheaper than full glass containers. If the plastic container doesn't get distorted during shipping, the contents will arrive safely. Plastic usually can withstand a bump better than a glass container. Honey in jars that is being shipped should have either safety seals or shrinkable cover rings to prevent leakage and prevent the lid from coming off.

If you plan to show honey at a fair or a honey show, the requirements usually state that only glass containers are used. Most shows even stipulate which glass containers are acceptable. Some honey in the granulated and chunk classes should be shown in a straight sided container if the rules permit.

Some of the glass jars that were used in the past have so many curves and designs that it is difficult to use them at honey shows but these are the bottles and jars that I will discuss, as you might use them for gifts or creating a collection. However some of these jars were popular over 100 years ago and are quite valuable by themselves. How do you find some of these jars to add to a collection? The first technique is to dig up sites where people used to dispose of glass which means old privies or dumps. Another source would be to visit resale stores that recycle products. You might go to bottle shows that are held in practically every state which are usually one day events with an early bird privilege option. Lastly, you might search the Internet. The Internet option is somewhat tricky as some items may not be represented correctly and care must be used to find the best search words. Sometimes food blenders are described to have a bee hive shape and other objects may have a honey color. If you are looking for jars for bottling your honey, the best source is to visit your bee supply dealer.

I have an extensive collection of old glass honey containers that I will describe in this article. In Part 1, I cover glass bottles and jars that were and are used for honey. In Part 2, I mention bottles and jars that contained a mixture of honey and others substances. Part 3 includes glass objects that look like they have been used for honey or relate to beekeeping or the honey industry, but may have been used for an entirely other purpose. A discussion of honey pots, comb dishes, salt and pepper shakers, and measuring cups is an entirely different subject area.

Remember that there is a difference between a fluid ounce and an ounce of avoirdupois weight. A one pound honey jar filled correctly to the center of the neck ring holds 16 ounces of honey by weight. That same volume of honey, (1-1/3 cups) would be 10.667 fluid ounces.

Muth Jar – original models were made of clear or aqua glass and some lacked the background embossing. The jars were developed by Charles F. Muth, Cincinnati, OH about 1831. An easy way to tell if they are an original Muth Jar is to look at the bottom of the jar and it should be clear or sometimes just have a single letter or number. In the 1895 A.I. Root catalog, there was a similar jar for sale that had warranted printing instead of the skep and bees.

Original Muth jars.

Reproduction Muth Jars are made of clear glass and are available in four oz., eight oz., and one lb. The largest size seems to be one pound. But the real identifier is that the bottom of the jars are embossed "Honey Acres." The reproduction jars are available from most bee supply dealers and make good bottles for gifts or honey sales at a special market. You have to be careful in purchasing these jars from the internet as some people will refer to them as vintage or antique and ask exorbitant prices.

Reproduction Muth jars - Honey Acres

Strittmatter & Wife – Embossed "Strittmatter's, (bee), Pure Honey, Put up by, F.J. Strittmatter & Wife, RD #1, Ebensburg, PA " currently valued in the $80 to $100

Strittmatter Honey Jars - different heights.

per jar price range. There are two different styles, and in aqua glass. They were made about 1908. When his daughter was contacted and asked why Mr. Strittmatter didn't list his wife's name, the answer was because he had been married five times and didn't want to continually be changing the glass mold. There is a difference between the two styles of jars in the height, the size of the pontil marks, and a small difference in the lettering. The taller of the two jars was made on the older Owens machine.

Golden Tree Honey Jar

Golden Tree Pure Honey jar, about 1909 – 6" tall clear and blue glass cylinders. The clear glass jar is the most common. It was made by the Maine Honey & Maple Syrup Company, Boston. The jar was also used for maple syrup, mustard and occasionally cane syrup. The company was first mentioned in 1904 and advertised as late as 1920. There were also two sizes of containers, the pictured four oz. and a pint.

Honey "milk" Bottle – L.F. Wahl, Chili, NY sold honey in a quart bottle. A close examination shows MTC which were makers of the bottle Thatcher Glass Manufacturing Company. These bottles were made from 1923 to about 1949. Notice that this bottle lists honey as the contents unlike the regular milk bottles that list their names as honey gardens or that show bees, skeps, or flowers. Premium Dairy has a nice Eagle and Skep embossed in their crest on the bottle, but the emphasis is on milk.

Honey Milk Bottle

Lake Shore Honey Jars – were made in three sizes, patented 1932, 1933, and 1935, The 6" high bottle had a sliding metal top. Lake Shore Honey was located near Chicago, Illinois and Walter F. Straub was at the helm and the holder of the three patents.

Lake Shore Honey Jar

Beehive Jars

Beehive Jars – were listed for sale in 1935 in *Bee Culture* and were made by Hazel-Atlas Glass Company, Wheeling, West Virginia. They were made in three sizes from ½ pound to two pounds. The Killions of Illinois were strong supporters of these jars.

Noble Ornamental Honey Jar – embossed on the bottom D.E.S. Pat. 94984. The patent was granted March 26, 1935. Olbert C. Noble of Washington, PA. is the inventor. Evidently he worked for the Tygart Valley Glass Company, which was a corporation in West Virginia. The jar is approximately 4-7/8" tall and is embossed with skeps, honey bees and honeycomb.

Noble Ornamental Honey Jar

Queenline – Originally patented as the J.B. Smurr jar, May 22, 1951. John B. Smurr lived in San Francisco, California, but evidently had a connection with the Hazel Atlas Glass Company, of Wheeling, WV who was the first to produce the jars. The queenline jars were one of the first jars approved for displaying honey at shows and fairs. They are available at many bee supply companies and were/are made in many weight sizes.

Queenline

Honey Jar by Armstrong – two sizes. The Armstrong Cork Company (Glass Division), Lancaster, Pennsylvania made these jars. The smaller jar is approximately 5¼" tall and the larger jar is 6¼" tall. They were made in a two piece mold, leaving a ridge in the center of the side. The top and the bottom of the jars have three bands to indicate layers of a skep and there is a bee in the upper right hand "corner" of the jar.

Honey Jar by Armstrong

Anchor Hocking Honey Jars – were made in two different sizes and carry the model numbers L-627A and L-628A. The trademark indicates that they were made during the time period of 1937 to 1968. The jars are somewhat oval in shape and have a honeycomb pattern at the top and bottom of the jar. In the upper left "corner" of the jar there is a bee. The smaller jar is 4½" tall and the larger jar is 5½" tall.

Anchor Hocking Honey Jars

Anchor Hocking Jar

Anchor Hocking Jar – marked 1232 Patent applied for, three, six, and the Anchor Hocking trademark are on the bottom of the jar. The jar is 5 ¼" tall and has curved sides. The markings on the jar a Honeycomb pattern top and bottom with a bee in the upper left of the jar. It is estimated that this jar was made in 1944.

Brockway Honey Jar – is 5-3/8" tall and has a honeycomb pattern at the top and bottom of the jar. It was made in Muskogee, Oklahoma in 1944, by the Brockway Glass Company.

Brockway

Gamber Classic Jar– is available from most bee supply dealers. These jars are made in different sizes and have been approved as another display container at most honey shows. Since they are slightly thinner in total thickness than a queenline jar, the same honey will appear lighter in color.

Gamber Classic

Hexagonal Jars – available from most bee supply dealers. Some of the sizes available are: 1.5 oz., 3.75 oz., and 9 oz. These jars make good gift bottles but are generally too small for show requirements. Original patent 1,073,459 granted September 16, 1913.

Straight sided pickle jar, 2½ pound square jar, and the five pound honey jar – are jars that are not always specifically mentioned in show rule books, but make excellent jars to use. These jars are also available from most bee supply dealers.

The following are jars that have been made or patented, and though I don't have a sample I do have a patent drawing of most of them.

Larry M. Taylor – jar patented Feb. 17, 1987 Gales Ferry, Conn. The Monsanto Company, St. Louis, Mo. was the assignee for Patent Number Des. 288,294.

R.H. Dallas – Feb. 22, 1938, Southgate, California. The jars were made by Glass Containers, Inc., Los Angeles, California. Patent Des. 108,592.

Cole's Honey – about 1980, California

Taylor

Dallas

Stoller, July 2000

Bertrand

Stoller, November 2000

Corbett

Dwight Stoller – bottle patented Des 428,342 on July 18, 2000. The bottle has many curves to the sides and honeycomb patterns on the top. I suspect that this bottle was not a glass bottle.

Dwight Stoller – bottle patented Des 433,948 on November 21, 2000. The bottle has straight sides with the exception of an indented part for a hand grip. There is a honeycomb pattern on the top part of the bottle. Again I suspect that this bottle was not a glass bottle.

Francois Bertrand – of Boulogne, France. He was working with Famille Mchaud Apiculteurs, Gan, France. Patent US D513,188 S, granted December 27, 2005.

John Corbett – April 11, 2006, Little River, SC., working with Cadbury Schweppes plc., Birmingham, Great Britain. Patent US D518,722 S

There were several more honey jars that I noticed in advertisements were made by the various companies but the jars must not have caught on to be used by the beekeepers or the jars were plastic and could be covered in this article. BC

Skyline Jars

Tall Cylinder Jars

Hazel Atlas Glass Co.

Exceline Jars

It's Spring, Time To Make Strawberry Mead

Jack and Toni **Blackford**

Spring is Upon Us

Bees are out gathering nectar to make that sweet early light honey from dandelions and locust trees. Beekeepers are doing splits and searching for swarms. Strawberries are soaking up the sunshine. Put them together and you have the makings for a taste of springtime sunshine in a bottle of strawberry mead ready to revive your summertime spirit during next Winter's blizzards. Our strawberry mead fills the room with the smell of warm strawberries baking in the sun. But, you are going to have to put in as much work as the bees to be rewarded so highly. For our five gallon batch we need 50 pounds of ripe strawberries. Forty at the start and 10 to boost the flavor later. I told you there was work to be done, start picking early and freeze them every day until you have enough strawberries. Quality frozen berries from the grocery store are almost as good.

Strawberries macerating in Pectinase for 12 hours before adding yeast.

Smash Those Berries Good

Thaw 40 pounds of your sweet ripe berries overnight in a five gallon food grade bucket. In the morning smash them with a potato masher or use an oak post to crush them well. You can even run them through a grape crusher. We want to make sure nothing nasty grows on our strawberries so dissolve ¼ teaspoon of Potassium Metabisulfite in a ¼ cup of water and stir it into your pulp very well. Macerate this pulp with pectinase enzyme to digest all the berries. Cover your bucket with a tea towel and secure against fruit flies with a tight fitting bungee and let set about 12 hours or more to let the pectinase eat all the pectin.

Strawberries after maceration and smashing with potato masher.

Testing the Acid Levels Made Easy

With this many strawberries we won't have to worry about the acid level being low, we should have plenty of acid for a healthy fermentation and enough to balance the sweet honey at the end. The total acidity should still be checked with each batch as the ripeness of the berries can change over the season. A simple acid test kit is available at home brew shops. Simple plastic spoons and cups can be used as lab equipment instead of buying glass beakers. A 10 ml syringe is supplied in the kits to measure each reagent. Each kit has a specific concentration of sodium hydroxide used in the test. Our batch of 40 pounds of berries in a total volume of four gallons of juice gave a reading of 0.94% acid. The usual target for a red wine is around 0.60-0.65%. We still have to add honey which will dilute our acid levels as honey has a very low acid level. After the addition of the honey the level should drop to around 0.72% acid, and since we are going to add more honey at the end to sweeten this mead the acid will be balanced with the sweetness of the honey.

Macerated strawberries strained through a filter bag supported by a China Hat Strainer to remove the bitter seeds from the pulp.

No Bitter Mead Allowed

Strawberry seeds can lend bitterness to our mead that we don't want so let's get rid of them. Strain the strawberry pulp through a honey straining bag or fine fermentation bag or even a paint strainer bag, best supported by a china cap strainer, after they are done macerating in the pectinase enzyme. Gently squeeze, do not go muscle man on this or you will get a ton of sediment. We just want the juice. Keep dumping the bag and refilling a gallon at a time until you have strained all the juice. Don't go King Kong squeezing it or you will be sorry later, this is why I am telling you twice. The juice should go into a bucket big enough to allow for foaming of the yeast and have room to stir the must very well, a 10 gallon food grade Rubbermaid Brute trashcan works very well as a primary fermenter.

A cheap postage scale works well for measuring small amounts of ingredients like Pectinase and Tannin. Plastic cups make clean and cheap weighing containers.

Enter the Springtime Honey

Now add your gallon of light springtime honey and dilute the must to about 5.5 gallons with water to allow for loss due to sediment during racking. Our starting gravity should be about 1.10, if not add a little more honey and don't forget to stir everything very well. There are long spoons and paddles just for stirring the wine must that work very well for this, and drill mounted stirrers work especially well at stirring up the must. Now is also the time to add yeast nutrients like Fermocel P, Fermaid or Superfood, whatever your local homebrew shop likes will work. Try to use a complete and balanced nutrient, not just DAP. Honey has a lot of sugar but little other nutrients for the yeast, DAP is just nitrogen without vitamins and other nutrients the yeast need, so a complete nutrient will give a much better fermentation. We also want to add a little tannin, or one of the new tannin products like Opti-Red, to help keep our strawberry color and protect the mead while aging. Stir it again well to mix everything and now you want to add a little oxygen into the must to get a good fermentation started.

A simple test kit for total acid, labware is plastic spoons and cups, reagents available as a kit, white ceramic plate allows easy color detection.

Using Powerhouse Yeast in Mead

We are going to keep feeding the yeast honey so we want a strong yeast for this mead such as EC-1118, K1-V1116, Pasteur Red or Premier Cuvee. You can either sprinkle your yeast on top of the must or better yet, rehydrate it following the instructions on the packet. The best way to get the yeast started is to make a starter in two cups of warm water by dissolving two Tbs sugar, ¼ tsp citric acid or acid blend ane one tsp complete yeast nutrient or a starter nutrient like GoFerm. Sprinkle the yeast on top of the starter and place it in a warm spot like on top of a refrigerator and let it grow a few hours while you get the mead must ready. Gently pour the starter on top of the must, no need to stir it in. Now set your fermentation bucket in a warm place covered by a tea towel secured tightly with a bungee cord and wait. Keep stirring it two times a day making sure to get all the yeast suspended off of the bottom. Keep tracking the falling specific gravity. Once it reaches about 1.050 add half as much nutrient as you did at the start, this will help keep the yeast strong for the upcoming feedings.

Tools that make mead making easy include a big potato masher used as a punchdown tool by winemakers, a drill mounted stirrer and a long handled paddle for stirring, a postal scale for measuring small amounts of ingredients and the most important tool – the Hydrometer for measuring the sugar levels in the mead.

Bee Nice to Your Yeast, Keep Stuffing Them with Honey

We are going to step feed our yeast slowly, called chapatilization, which allows them time to get used to the higher alcohol levels and work on eating more honey. This is a much better way to ferment than just dumping in all the honey at once which can stall the fermentation before enough alcohol has been made to preserve the mead. If you don't want a higher alcohol strawberry mead you can skip this step of course. When the gravity falls to about 1.01 add another quart of that wonderful springtime honey, stir in very well and measure your gravity again. The gravity should have increased by about 0.01 or close to it on your hydrometer. It does not have to be exact, we are just trying to feed the yeast a little more honey to raise the alcohol levels up to balance out the sweetness of the honey and the tartness of the acids in the strawberries. When the gravity falls again to about 1.01 add another quart of honey and the last 10 pounds of thawed strawberries. We are trying to get the flavor from the red outer part of the strawberry and not trying to get all the juice from them. Keep stirring and putting the tea towel over the top of your bucket. When the gravity drops and stays in one place for a couple of days we are done with the primary fermentation. Scoop the must out with a big cup or pitcher and remove the berries with a clean straining bag and drain into a five or six gallon carboy, don't scoop out the sediment on the bottom of the bucket. If your are adventurous now is a good time to add a little bit of medium toasted oak, about 50 grams so it doesn't overpower the strawberry is enough to start with, more can be added later if needed. A vanilla bean is also another alternative to add some more depth of flavor to match the strawberries and honey. A few dried elderberries, one or two ounces for each gallon, will add a little color and add a little more depth of flavor. Install a fermentation lock full of water with a little Metabisulfite in it and let it rest in a cool dark place covered to keep the light out.

Hydrometer showing a specific gravity of 1.04 of just the strawberry juice.

Hydrometer of Must with strawberry juice and honey at 1.100 and a little extra volume in the brute to allow for loses when transferring to a carboy.

Racking Your Mead

Check the mead every couple of weeks to make sure the airlock is filled. When a lot of sediment has settled to the bottle rack off into a clean five gallon carboy. A FermTech Auto Siphon makes siphoning very easy and no saliva gets into your mead from racking. Insert the siphon into the mead, being careful not to spill any and prime the siphon slowly, pump once or twice and the siphon starts flowing. Keep the end of the tube on the bottom of the next carboy, we do not want to make a lot of splashing that would introduce oxygen into our mead, from now on oxygen is bad for our mead. Keep lowering the siphon down into the wine close to the bottom but don't suck up a lot of sediment, a little is ok, try to get all the wine at this stage but leave as much sediment as possible.

Brute Primary Fermenter covered with a tea towel and secured tightly with an elastic strap. This lets the mead breathe at the beginning of fermentation.

Topping Off Mystery Solved

Ever since the carboy was invented people have been arguing over how to fill that little empty space left at the top after you racked your mead into it. Please do not just top off with water and dilute all the taste you have worked so hard to put into your mead. Topping off with a similar wine is best, some white grape juice is ok for a strawberry mead. An excellent topper for strong meads and wines that won't dilute the alcohol or acid levels can be made by mixing one 750ml bottle of 151 proof Everclear with two bottles full of water and adding three tsp of acid blend. Keep this topper sealed up tight and use it anytime you want to top off. For lower alcohol level meads and wines make the topper by adding four bottles of water and six tsp of acid blend. Another favorite topper of ours is to make an elderberry wine very strong with lots of fruit and use this to top off red melomels.

Auto siphon in six gallon Better Bottle makes racking easy. No lips touch this mead during racking.

Get Out the Gas

Put your airlock back on and wait a while longer to see if more sediment drops out. When the mead is clear we are almost done. Rack it off again and this time degass with a stirring rod attached to a drill, a vacuum pump or even let it set another six months. After the mead is degassed, stir in another quart of honey, or less depending on how sweet your want your final mead to be, aiming for between 1.020 and 1.030 being pretty sweet and will balance out the higher acid levels from 50 pounds of strawberries and the high alcohol levels we got chapatilization with honey. Add ¼ teaspoon of Potassium Metabisulfite to protect against oxidation and 2.5 teaspoons of fresh Potassium Sorbate to prevent fermentation of the extra honey.

Mead Fining

After your mead has fallen clear to the eye you can choose to bottle it as is or if you want very clear mead some simple to use fining agents will make it clear. Mead can be clear to the eye but a flashlight shined into the side of the carboy will show a slight haze, this is mostly due to the proteins in the honey we used to back sweeten with. To remove this haze and make perfectly clear stable mead we can add a fining agent. Good fining agents for mead include SuperKleer, Bentonite, Bentogran, or Sparkaliod. Follow the directions on the agent carefully and be patient waiting for it to all fall to the bottom of the carboy. If any agent builds up on the sides of the carboy just give it a little twist to dislodge the agent from the sides and it will fall to the bottom. When the fining agent has done its job rack very carefully off of the sediment into a bottling bucket. If you have a filter this is the time to use it, a medium filter should give a very nice clear finish.

Mead transferred to a six-gallon Better Bottle carboy to allow room for foaming.

Bottle Your Mead

Rack your mead from the carboy, being careful not to suck up any of the sediment on the bottom, into a bottling bucket with a spigot. Elevate your bucket and then attach a piece of tubing to the spigot that will reach to the bottom of your wine bottle. Practice with water first, open the spigot and let the wine flow into the bottle and stop it just as the bottle fills, that should leave enough room when you remove the bottle to allow space for a cork. Adjust the length of the tubing until it is just right, this makes bottling easy and fast.

There are many ways to bottle mead, with many different bottles and

closures to choose from. A standard 750 ml Bordeaux bottle, with its straight sides and neck, stacks well and takes up less room standing than Burgundy bottles. For our strawberry we want to preserve the color so a green bottle should be used, but also use one clear bottle so you can see what your mead does over time in this observation bottle. There are even more closures than bottle types. A traditional cork can be used and will protect our strawberry mead very well. There are also many new kinds of corks, some agglomerated corks made from crushed cork and glued back together, some even have slices of whole cork on the ends, these can easily protect our mead for up to five years or more. You can also choose synthetic corks, these are even gaining acceptance among top grape winemakers, they are very easy to use and can also last up to five years or more. Of course the beer makers can easily use beer bottles or champagne bottles for capping and use a beer cap. This is also an easy way to safely bottle sparkling meads. The quality of the beer cap determines how long the mead can last, we have never had any mead go bad bottled with a beer cap. These methods all require a corker or capper, an example of a cheap but long lasting table top model is the Colonna Bottle Capper and Corker.

Another new closure is the Zork, we have had wine sealed with them for several years now with no problems and aging very well. These are very clever, there is a silicone cone to seal the inside of the neck, the outside of the Zork stretches over the top of the bottle. The Zork has a spiral cut into the sleeve that goes over the bottle top, it's easy to tear the spiral to open the bottle without a bottle opener. The silicone top can even be put back on the bottle to reseal it until you are finished the bottle.

There are also specially made wine bottles with screwcaps, not the ones from the storebought wine, but bottles you can put a new clean screwcap on yourself. So far we have also had good luck with these screw capped bottles with melomels lasting several years in them with no signs of oxidation.

What to do with All This Mead

Hide it from yourself for at least a month. Be prepared when you open your first bottle. The room will fill with strawberry, the sun will shine out of the bottle and you will be transported back to springtime. Try to save a bottle for a year later and plan your next batch of strawberry mead. Store this mead in a cool place out of the light, on their sides of corked or standing straight up with Zorks or screw caps and beer caps. This mead should age well past the five year mark. Its interesting to set a few bottles aside to age and see how they taste later. Meads can age very well and balanced with the acids in the strawberries and the higher alcohol levels from chapatalizing, this should be very interesting and a fine drink from a few months of aging to several years.

Ingredient List:

1 Gallon and Possibly up to 3 More Quarts of Light Spring Honey
50 pounds of Strawberries, Whole or Sliced, No Sugar Added
Yeast; Yeast Nutrient; Potassium Metabisulfite or Camden Tablets
Potassium Sorbate, Fresh; Winemaking Tannin Optional
Medium Toasted Oak Optional; Vanilla Bean Optional BC

Jack Blackford and his wife, Toni, enjoy keeping bees and making mead in WV. Our webpage is www.WVMJack.com.

Your honey can make the most wonderful meads!

Bottle types for meads include Bordeaux wine bottles, screw cap bottles, and Champagne or beer bottles. The yellow and red Zorks are easy to use and remove, beer caps work on the Champagne and beer bottles. White and black screw caps made specially for wine bottles and synthetic and real cork.

Bottling bucket with hose attached to spigot. Lift bottle up so hose is on bottom of bottle to decrease oxidation and foaming.

Colonna table top corker and capper, white part at base is the corker along with the plunger on the left of the base, and a small and large beer capper. Easily adjusts to any bottle size.

HOW I DO IT –

Buy And Manage Colony Splits

Okay, so I'm a new beekeeper

Okay, pretend I'm a new beekeeper – lots of energy and enthusiasm, but not much experience. At a local beekeeper meeting I found a reputable beekeeper who is willing to sell me three splits from his colonies. He wants $135 per split. At first that sounded like a lot, but when I considered the current price of a 3# package plus shipping, I suppose the price was pretty much in line. Roughly, the splits would be two frames of honey and pollen and two frames of both uncapped and capped brood and adult bees to cover; plus another 1 -1½ pounds of bees that he would shake into the splits, all headed by a new queen. He said that I could help with the split procedure so I could see what I was getting for my money, but I can't take time from my job to be there. I will pick them up when he calls me – probably within a couple of weeks. He has another fulltime job also. So now I wait. Other beekeepers have told me that I should be assembling equipment and preparing for the bees' arrival. I have assembled one complete hive for each of my three future splits. Others have told me that I should prepare yet a second deep to put on in late Spring. I may or may not need this, but it's better to be prepared. Overall, I feel that I am pretty good shape. Like expectant parents, I continue to wait.

While shopping at the grocery . . .

While grocery shopping, I ran into another fellow whom I had seen at one of the three bee meetings I have already attended. We spoke and I told him of my pending purchase of three four-frame splits within a few weeks. He asked if I shopped around before making the agreement. No, I did not. I was happy to just find one person who would sell to me. *(Am I doing this right?)* He asked if I knew anything about the seller's disease history. Nope, I didn't know I should have asked about that. At this point, who should I ask? I began to feel my sense of preparedness slipping away. Maybe the state apiarist should be contacted. I will need to get his number from my local extension office contact. *(This is turning into a headache – but I really want the splits.)* I then decide to cut the confusion and phone my seller with the question. I trusted him before and have no reason not to continue to trust him. I already know how to contact him.

He's clean

After leaving a couple of phone messages, I got the return call that my seller has been inspected annually and has always been clean of American foulbrood. Of course, he has had to treat for *Varroa*, but by using soft chemicals he has been able to keep his mite population down. He has not used strips in several years. Initially, he treated for tracheal mites, but he has now stopped doing that. While his chemical program was not initially important to me, I felt better knowing the splits had been treated – but not over-treated.

Then the conversation turns a bit. After I take possession of the splits, the seller tells me I should contact my state apiarist and register them. It will only cost a small amount and the inspectors are good sources of advice and recommendations when they inspect the bees. Now it's somewhat funny that I am the one, not the seller, who is unregistered and uninspected. I will take care of this as soon as I get the bees.

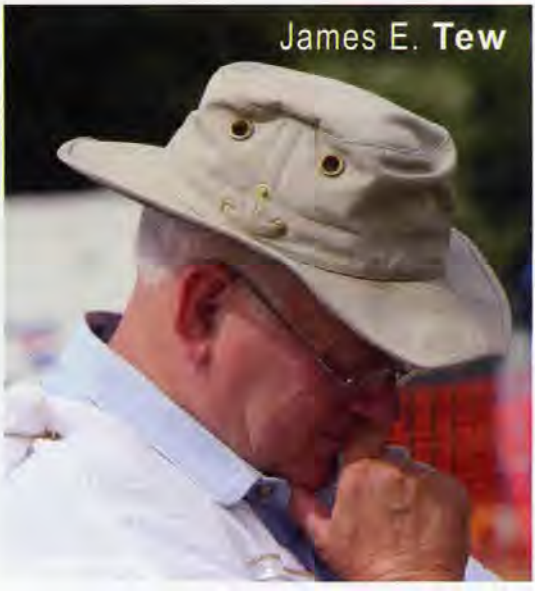
The call

"Come for them tomorrow." The weather has cooperated and happily, all is on schedule. In a way, it's good that I can't go for them until tomorrow afternoon. A late afternoon move will give the bees an overnight rest before taking orientation flights. They will have settled some.

Should I close the lid of my trunk or not? Does one travel with hives inside the car? I decide, and others concur, that I will move them in the trunk but leave the trunk lid ajar. That's my plan.

Bees, bees, bees, everywhere

At my bee provider's bee house (actually a garage minus cars), there are bees flying everywhere. It's like one giant swarm in the air. The smell of smoke hangs in the air. Back behind the garage, I can see about 20 hives and in the shade of the garage I see three waxed paper corrugated board boxes with a screened window in the top and duct tape to hold all together. Now that's a lifetime memory. The first time I see my very own bees.



A five-frame nucleus hive ready for filling.

This is the instant of my beekeeping birth. Never mind that I know nearly nothing about what to do with them, but I've read a lot (I sound like a new parent).

I don't wish to appear antsy, but shouldn't someone be concerned about all this bee flight? Should I be protected? I feel nervous, but refuse to let it show. Those are my bees and I will not leave without them.

A check will be fine.

Money changes hands in the form of a personal check - $405 even. I have one final rational thought, "I am paying $405 for bugs – bugs!", but the thought quickly passes and I am again exuberant. The seller tells me he tried to do me right and put in more adult bees than I actually ordered. Then the first of several surprises – he tells me this is the first time he has ever sold splits. (Pregnant pause here.) So what does this mean – novice meets novice? I don't know. I guess it doesn't matter. I just assumed he had been doing this for years, but in fact, it is the difficulty and costs in ordering packages that encouraged him to consider selling splits. He is starting small but hopes to sell more in future seasons.

A healthy colony suitable for splitting.

Second surprise.

As he folds my check with propolis-stained hands and directs it toward his shirt pocket, he casually says, *"You'll need to release those queens in about four to six days."* Now what? I thought the queen and the bees were introduced and already functioning as a unit. What do I know about releasing queens? My hesitation shows. The provider explains that all the bees and brood in the splits are not from the same hives and that released queens would be attacked. Even if I had gotten the mother queen from the colony, she would have needed to be caged for the transition. *(Oh? I didn't know that.)*

The move and unload

Finally, I take possession. The corrugated boxes are pleasantly heavy and bees are struggling at the screened entrances. I'm as careful as I would be if the boxes were full of eggs. As planned I am transporting the nucs in the trunk, lid partially closed. He told me if I have questions or problems, give him a call. The queens are from good producers and should not be a problem, but he promises help if I need it. Only after the bees are free-flying and the queens laying will the deal be really closed.

The ride to my yard is uneventful. I have a good place near the back of my property where I keep my firewood. Since splitting wood is hard work, few people ever go back there. My bees should be happy.

With my car parked nearby, I unload the clumsy boxes. These units are clearly good for very short term beehive use, but that's all I want them for and they kept my price a bit lower. It would have been possible to take my own equipment to my producer and have him put the splits directly into my deeps. Some producers require new equipment exchange; mine did not. I think I prefer the temporary nuc boxes. They are lighter and easier to transport.

My second memory

I sat the splits on cement half blocks temporarily. I don't know why, but I didn't want to sit them directly the ground. It really should not have mattered. It's late Spring and clover bloom is nearing. Then, my second life-long memory – *my bees in my very own beeyard.* I am now truly a keeper of bees.

I have the colonies sitting about ten feet apart *(I read that in several books).* I put on my veil and gloves (*in retrospect, I really didn't need to do this*), light a smoker *(which was also unnecessary).*

Time to release them. I really wouldn't mind some competent help right about now, but that's not to be. It's like testing your own electric circuit for the first time – someone must do it. I gently pull the tape screen back and bees boil out – not aggressively, but eagerly. The air begins to fill with bees and I briefly wonder if I what I am becoming involved in is bigger than I expect. *(Stay focused and open the other two.)* When the other two are opened, it's a biological wonderment. Bees are filling the air all around the hives. It's a good thing I am more than ten miles from my producer. While some of the bees may drift from one split to another, at least none will drift back to his original hives.

Then there's the late afternoon hum

The buzz is pleasant and soothing. How can that

be? These are stinging insects flying all about, and I am finding solace in the moment. It's late. I'm tiring and dinnertime is near. Rest assured, my family wants to hear ***all*** about my adventures today and I will give them every tiring detail and I will do this for years to come. This is to become a way of life for me.

Now what!

I sit bolt-upright in bed awakening from deep sleep. ***Is that rain?*** My new bee colonies are sitting outside in paper corrugated boxes and it's pouring rain. Should I bring them in? Cover them? What can be done at this hour of the night? Though I am asking myself all these questions, I know the answer, *"There is nothing I can do."* So I just lightly doze the remainder of the night. *(Fine beekeeper I am. Drown my first colonies.)*

They're soggy

They're soggy, and the boxes are clearly wet, but the boxes are holding together without incident. There is pretty good flight, but the bees are still very new to this location and to their individual split. *(Maybe I should wait at least one more day before putting them in permanent equipment.)* In fact, I wait two more days without incident. Even then, the boxes, though tired, are holding together.

The transfer

It has now been three days. The queens are still confined. Actually, I probably could have opened the units and punctured the candy plugs with a small nail on the second day, but I am trying to err on the side of caution.

I put the permanent equipment on hive stands I have built, suit up, and light my smoker. These are small hives. They aren't going to do anything to me, but I need more confidence. I put the four frames right in the middle of the new equipment and fill the surrounding space with new plastic frames. Wood frames are better but plastic frames are faster. The queens are alive in all cages. They have workers in the cages with them and I have been told to remove them, but I really don't have the nerve to try that. *(I'm just going to punch the small hole in the candy plug.)* Using thumb tacks and wire ties, I suspend the queen cage between the frames having brood on them. Though not the best feeder to use, I put a Boardman feeder on each colony with a quart of sugar syrup. I put the entrance reducer in to reduce drifting and close all the units up. The hum is still in the air.

Corrugated wax-coated nucleus boxes full of bees.

Queen progress

Three days later, I check to find all three queen cages empty, but I don't take the time to look for individual queens. Her future is still uncertain in the colony. This is an uncertain, insecure time for me, the beekeeper. Do I have a queen in the colony or not? Again, I wait and wait.

A long six days later, with minimal smoke, I can't stand it any longer. I have a look and ***Yes!*** There are eggs and young larvae in all three units. All look good to me, but the split on the right is smaller and will need some assistance from its sibling colonies at some point. That will require some more reading on my part. Plus, though it is a bit late in the Spring and these are small colonies, there is a chance I will need a second deep. I will need to watch that.

But for now

But for now, I bought the splits, moved the splits, transferred the splits to permanent equipment, fed the splits, and released the queens in the splits. Now a lot is up to them. But, I've done my part. I'm a new beekeeper who has accepted responsibility for three new colonies. This is just the first chapter in my bee life. If all goes well, there will be many chapters to come. BC

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EVALUATING

What you read and hear!

Larry **Connor**

Beekeepers are exposed to a great deal of information with the combined effects of bee journals, bee books, Internet sources, mentors, and speakers at meetings. Every day I see or hear something that concerns me, sets off an alarm, or otherwise is just not right. People ask me about an Internet postings I have not read or a speaker I did not hear and ask what the person meant in their material. It can be daunting.

For new beekeepers, the challenge of pursing new information is enormous. There are tens of thousands of beekeepers in the United States and they all have different experiences and different stories. Each has many stories: they had one result one year and a conflicting result the next. How is a new beekeeper to learn the best way to keep bees with so much conflicting information?

With this in mind we will concentrate on some of the bits of advice that over 40 years of keeping bees and working with beekeepers might offer.

Consider the source

I appreciate magazines like *The New Yorker* that include a short biographical sketch of each person writing articles since the topics are varied and range from solid fact or opinion or fiction. Editors have different policies about running biographical information, and many times they do not. This creates an enormous need to do some work on your own. I am at a place in my life to send an email to the editor and ask about the author. Is this a professional writer who has put together something for submission? Is this an undergraduate student who wrote a nice paper for the beekeeping course? Is this an experienced commercial beekeeper or a first year beekeeper who is handy with words?

Check out the author

Check with friends or the Internet about a particular author. Look for experience and education for starters, but see what else you can find about a particular writer. First time writer or a regular contributor?

A few of us writing for *Bee Culture* have Ph.Ds. That is an indication of extensive training in our respective fields. Jim Tew and Clarence Collison have retired from one career, but are not retired to a golf course or a resort island, although both might not turn down the offer. Others, like Jennifer Berry, work at a university and keep bees on the side, so there is a sharing of both personal beekeeping and scientific experience in her articles.

There are always writers in this magazine who I do not know, personally or professionally. They are new to me. Unfortunately, at my point in my life, I tend to overlook these articles until someone asks about the points they have made. Or I finally meet the author at a meeting.

I have seen copies of this and other beekeeping magazines being thrown across the room by beekeepers who consider an article or a point in an article to be rubbish. I try to duck if aimed at me. This may be a matter of disagreement in technique, or a generalized putdown, that the author does not know what she or he is writing about. Most editors look for a certain mix of opinions, to appeal to a broader audience and contribute perspectives to public discussion – this magazine-throwing behavior may indicate that such ploys were successful.

Unfortunately, there are certain groups that rarely write for the bee journals. In spite of their experiences, few commercial beekeepers are authors in these pages, although they are often written about in interviews and site visits. There have always been female contributors to the bee journals, but that could be increased considerably. We don't see much in print by minority groups, same-sexed partners who are also beekeeping partners, or non-traditional beekeeping activities.

Look for an agenda

When a commercial beekeeper writes an article in a bee journal, there is often a political or influence-changing agenda in their words. This is good, and we need more of it. Bee magazines rarely reflect the political intrigue that takes place at meetings of beekeepers, especially at the national level. As I just said, these authors rarely write in these pages, but when they do, and the editors agree to publish their contributions, there is often an attempt in changing opinion and promoting an agenda or program. These solo voices in the verbal wilderness need to be heard,

- **Consider The Source**
- **Check Out The Author**
- **Look for An Agenda**
- **Experience vs. Research vs. Opinion**
- **Surveys & Polls**
- **Sample size**
- **Location & Bee Stocks**
- **Statistics**

and their messages carefully considered. But always consider the source.

To be fair, you can make the same argument about research reports. While scientific articles (as in recent issue of this magazine), which are subjected to the peer-review process, some scientists are known to take the bully pulpit to preach about a favorite opinion or project. Learn to sort out the facts from the opinions, which may be difficult to do.

Experience vs. research vs. opinion

The experience of the beekeeper should be considered when looking at an article. As a boy I grew up around bees and as a graduate student I studied honey bee pollination. That was four decades ago. This should be taken into consideration when compared to a new, first year beekeeper who has answers to questions I cannot complete.

Surveys and opinion polls

We are seeing more surveys of beekeepers and their colony losses. These surveys may include data about queen and bee stocks, chemical treatments, and other variables in beekeeping. Surveys are interesting constructions of data voluntarily offered up by individuals that may or may not reflect fact. First, not all people respond to surveys, so the absence of a large percentage of beekeepers, or a small number of large beekeepers, puts the results into the Suspicious category. When there are enough participants, and from all parts of the country, the data may have some validity. But a survey is only a slice in time, often by design: What percentage of your bee colonies were alive on March 1st? My answer might be 60%. But by May 1st there may have been even more loss, but the survey does not ask for that data.

Colony loss surveys are an excellent way to document trends in bee colony death, but they are only as accurate as the number of beekeepers who contribute honestly to the survey.

Sample size, region of investigation, and stock of bees

There is no standard honey bee. Genetic stocks vary in their behavior, and thus their management based on underlying gene-based programming for buildup, response to incoming food, shortage of food supplies, drone production and elimination, as well as wintering.

"Colony loss surveys are an excellent way to document trends in bee colony death, but they are only are as accurate as the number of beekeepers who contribute honestly to the survey."

Because of these variations, it is hard to compare a Italian with Russian colonies unless managed in a scientifically controlled procedure. For a new beekeeper, speaking to an Italian-stock beekeeper may result in a different set of management suggestions compared to those of a Russian-stock beekeeper. Neither is wrong, just different based on different stocks. Add a Carniolian-stock beekeeper, and the conversation may become quite confusing.

There is no standard beehive. Today my bees are in eight-frame deep hives. Four years ago they were in ten-frame medium depth hives. Who knows what I will have in the future – all polystyrene hives? Keeping bees in different equipment is likely to contribute different results, although subtle.

Micro- and Macroclimate differences. I have bees in two locations. Here in Kalamazoo, MI the bees are subjected to warmer temperatures and an urban floral diversity that is different from the colonies at the farm in Galesburg, MI. While only nine miles apart, there are differences that make colony comparisons different. The bees in Kalamazoo are in the shade while the bees at the farm are in full sun. That changes things, too. All my colonies will experience a far different season than someone like Jennifer Berry in Georgia. Will one bee type work in both locations? Perhaps. Or there may be subtle advantages of one stock over another in each of these climate types.

Unintentional lying with statistics

Dr. Marshall Levin was a bee researcher at the USDA, and conducted extensive pollination studies during his career. He was in a position as laboratory coordinator for all the government bee labs at the end of his career and handled requests from the general public as well as members of Congress and the White House. If you wrote to your state senator about government research programs, chances are that Levin wrote the letter the senator signed.

Levin once saw the following statistic: that 80% of all the bee pollination done in the United States was done by honey bees. The remaining 20% of the pollination was done by non-*Apis* or native pollinators. He wondered where this little factoid had come from. Using the network of the U.S.D.A. laboratories, the National Agricultural Library, and other resources he traced this down to a single research paper done on alfalfa pollination in a western state. The key author was a researcher by the name of Marshall Levin. He, himself, had conducted this work in a single state, on a single crop, and the results were reported in a single research paper. But through the USDA and other research organizations, this 80-20 ratio had been actively promoted and stuck, and was part of the Facts About Bees in the American beekeeping community.

Every time I see a statistic used by a bee club, in a fact sheet, or a talk given by a new beekeeper, I see statistics that are most likely taken out of context. How many floral visits does a bee need to take to contribute to a pound of honey? There cannot be one answer to this question, since flowers vary enormously in their ability to produce nectar from species to species and even within species from day to day or from season to season. Those factoids are fun but quite often wrong! The research report was accurate within the range of the study, but extrapolating that information to a wider viewpoint was dangerous and inaccurate.

As I write I am forced to constantly self-edit. There are points or factoids I have made that may not be 100% accurate. The challenge of any elf-respecting writer is to make sure that the facts are as clearly and properly presented as possible. It is all too easy to be influenced by other writers, other scientists, and other beekeepers, which results in an opinion that may not be entirely accurate.

When an agenda is added to the discussion, beware. Efforts to sell a piece of equipment, a method, or an idea are often biased toward one viewpoint. Keeping an open view on debates of the day is difficult. Are Langstroth or Kenya Top Bar hives better than the other? Are small cells better or of no consequence to bee colonies? Should you harvest all the honey in a hive and feed back sugar or should let the bees keep the honey to insure winter survival? Is one particular mite control better than another?

These contentions are the essence of the debate in beekeeping, for they are often formed and inspired by the nature of the beekeeper, not the nature of the bee. A Kenya Top Bar hive may be very good for a small-scale beekeeper in Kentucky or central California, but not work for a sideline beekeeper in Michigan or Washington. There are different approaches to beekeeping, and we need to place all management advice into the Unsure category as we do our bee work.

The best sources of beekeeping information help both the new and experienced beekeeper wade through the quagmire of fact, opinion and theory and arrive at a solid footing that is based on good science, experienced beekeeping methodology, and good practices. BC

For information about classes in Queen Rearing, contact the author at ***LJConnor@aol.com****. Or visit the Wicwas Press website at* ***www.wicwas.com****.*

BEEKEEPING BASICS

Ross **Conrad**

The Importance Of Timing

Formic acid mite treatments should be timed so they occur when average daytime temperatures are 55-90°F (13-32°C) for best results.

An eager new beekeeper approached me shortly before I was about to present a talk on bees and expressed appreciation for the work I do to promote alternative approaches for healthy bees in the age of industrialization and chemical agriculture. He hinted at wanting to know how I was I able to keep my bees alive and relatively healthy year after year (since 2000 I have always had better than 81 percent of my hives survive the Winter). Seeing his enthusiasm for the bees and his sincerity in wanting to know how to maintain healthy hives when so many seem to be struggling with large-scale losses, I could have told him to buy a copy of my book, *Natural Beekeeping* 2nd edition, but instead I said to him:

"If you want to know my secret go ahead and ask me . . . go ahead, say 'Ross, what is the secret of your success?'"

"OK" he said, "Ross, what is the secre. . ."

"Timing" I said interrupting him in mid-sentence. "Timing is absolutely critical."

It matters not if you keep your bees naturally, organically, or conventionally, the bees have their own schedule and if you are serious about working with them productively and want to offer your hives a helping hand when needed, you must time your management and manipulations just right. Unlike the attention that some animals require, you don't have to be there for them all the time, but you do have to be there at the right time. The importance of timing starts early in the year, late in Winter when the hives need to be checked to be sure they have enough honey left to see them through till the first blossoms of Spring arrive. Beginners often overlook this simple step, which is so important in preventing Winter starvation. The bees have not been the focus of one's thoughts for several months. It's Winter after all! The bees are inactive and the beekeeper has some time off. So when that first late Winter thaw arrives and the day-time temperature gets up around 45°-50°F (7°-10°C) its easy to just go out and enjoy the day and forget to pay a visit to the bees. Unfortunately, this is the cause of many instances of hive starvation that occur every year during March and April in and around the Northern part of the country. Taking the time to check the bees on the occasion when they are likely to need it most will go far in increasing over-wintering success.

Time your inspections so that they occur regularly or you may be surprised at what you will find under the hive cover when you finally get around to checking.

Once Spring has sprung and the colonies are building up rapidly, the time is ripe for swarming. During the Winter months the bees have moved up into the top of the hive, or to the back of the top bar hive (TBH), and they will tend to feel crowded and want to swarm unless given more room. This is the reason so many beekeepers will reverse their hives. Timing your reversal of the hive bodies in a standard Langstroth hive, or the repositioning of full top bar combs toward the front of the TBH, so that it happens just prior to the start of the first major nectar flow in your area will decrease congestion in the hive and help slow down the tendency to swarm. This typically should occur in the later half of April or the first half of May in most areas of the Northeast.

In Southern areas, the end of Winter is the time when small hive beetles become increasingly active. Failing to get beetle traps on the hives in time and these scavengers can wreak havoc among your hives.

If you want to trap *Varroa* mites or cull the drone brood from a hive to remove mites reproducing in the drone cells, Spring is the time to get those traps or frames of drone comb into the hives. Just be sure to time the drone comb's removal, *before* the drones hatch or you are likely to end up raising lots of *Varroa* mites.

Spring is also the time when some beekeepers like to breed queens. When queen rearing, the beekeeper must follow a very exact schedule. Whether one is making queen cells, preparing mating nucs, sequestering the queen to lay, grafting larva of the right age, checking grafts, moving

When establishing an apiary in ara's known to be frequented by bears, don't take your time setting up a bear fence if you wish to avoid situations like this.

sealed queen cells into mating nucs, checking for successfully mated queens, or shipping queens off after they have reached a proper level of maturity and have been laying eggs for some time, one's timing must be right-on every step of the way. Allow the weather or some other unexpected event to throw off your timing and the entire batch of new queens can be lost.

If you don't want to do the work of raising queens yourself and would rather have the bees do the work, Spring is a good time to make up nucleus colonies (nucs). I find that nucs that are left to raise their queens naturally from eggs, are much more successful if nuc making is timed to correspond with the natural swarming season of the area.

During the Spring and Summer hives should be checked on a regular basis. Regular inspections allow the beekeeper to add more room by supering hives in time to avoid loss of honey. Super hives too early and the bees may ignore the outer frames along the walls of the hive. Super too late, and colonies will become crowded and are more likely to swarm. Ideally, I like to super my hives when the top super (or hive body) is about 80 percent full. When the bees have filled eight out of the 10 frames in a 10-frame hive body and are working on the last two outer frames, that is the perfect time to add another super . . . just ahead of when the hive will need the space but before they run out of room altogether. I like to also reposition the partially filled outside frames toward the center of the hive body so that the bees will finish drawing out the foundation and filling the comb faster than if the frames were left on the outer edges of the colony.

Regular Summer inspections also allow the beekeeper to check for disease issues. Catch diseases early and it can mean the difference between healthy hives or weak struggling hives, a banner honey harvest or a bust, a hive that is strong in Spring or a hive that dies over Winter. The most critical disease is American Foul Brood since robbing of AFB weakened hives can allow the disease to spread to colonies throughout the area.

Even the timing of the honey harvest can play a large role in determining the success or failure of colony survival. Honey should be harvested early enough in the season that there is plenty of time to treat colonies for *Varroa* mites before Winter sets in. Many commercial mite treatments are temperature sensitive requiring their use to be timed to coincide with favorable weather conditions. Treatments must also be applied early enough in the season to allow the nurse bees in the colony to become healthy so that they can in turn, raise healthy Winter bees.

Getting colonies ready for Winter raises additional timing issues. The most time critical wintering jobs are to feed colonies that don't have enough honey for Winter and to place mouse guards in the hive entrances. Since the bees are able to feed and convert sugar syrup into honey much easier during warm weather than cold, timing your feeding so it is all complete before the cold arrives can be critical to colony survival.

Here in the Northeast it is best to get mouse guards onto hives before September's crisp and cool temperatures become the norm and mice move into the hives and set up Winter accommodations. If you are late in getting around to this chore, mice may have already built a nest in your hives by the time you arrive to place mouse guards on the hives. To avoid such instances, it is best to time your mouse guard installation to coincide with a warm sunny day when the bees are flying. This way, any mouse that enters the hive when the temperatures are low and the bees are all occupied in a cluster, will have left the hive as soon as the temperatures increased enough for the bees to break their cluster and resume patrolling the cavity of the hive.

Once the bees are all tucked in for Winter, it is a good time to start thinking about next year. If you are going to need more bees, now is the time to place your order for Spring nuc or package delivery before suppliers sell out. The end of the year is also a great time to purchase and assemble additional beekeeping equipment that you anticipate will be required during the upcoming year. It is always better to have all your equipment built and ready to go before packages and nucs arrive or swarming season rolls around. If you delay you may find yourself scrambling to catch up after the fact.

Luckily timing in beekeeping is often measured in days, weeks, or even months rather than hours, minutes, or seconds that so much of our culture's scheduling and deadlines are measured in. This article for example is due on a certain day of the month and it just happens that on the day it is due I will be traveling in Canada, visiting with beekeepers in the Maritime Province of Nova Scotia. Since I am leaving for Nova Scotia very soon, I need to submit this article before the end of the day today if I want it to be considered for publication in the May issue. Timing . . . it is everything. BC

Ross Conrad will be teaching an Organic Beekeeping For Beginner's Class in Lincoln, Vermont on May 18th and 19th, for more information visit ***dancingbeegardens.com****, call him at 802) 349-4279, or email* ***dancingbhoney@gmail.com****.*

DOWNTOWN

Cooperation goes a long way when trying to save a swarm.

When asked about when and how to expect swarms around here, old timers tell newbees that they have to listen: listen to local bee club message boards, to other beekeepers, even to lame-o news reports about "20,000 Bees Besiege Local Fire Hydrant!" Why? Because swarms start to appear locally the way popcorn kernels begin to explode in your air popper: first in ones and twos, and then BLAM BLAM BLAM. If you hear what is coming, you have a chance get ready and work it to your apiaries' advantage.

I'll be among the first to tell you that swarm prevention is the supreme urban beekeeping must-do: city beekeepers need to know what is going on inside their hives and practice *swarm prevention* in preference to *swarm collection*. But there are feral hives in trees and building cavities where no one is watching, unsuspecting beekeepers away on business trips, and happy healthy bees looking to do their reproductive thing in almost any setting, so swarms will happen.

Every season is different, and individual colonies behave differently, but in most cities, each swarm is a very recognizable sort of event: they are hard to miss in densely populated neighborhoods, non-beekeepers are freaked out, public safety officials want to know whom to call, and beekeepers are in a position to come to the rescue and replace winter losses with free, proven-successful bees.

Here in the MidAtlantic, on a bet I would say that we are going to blow past the 40% losses that appear to be the emerging average nationwide. Everyone has run out of packages, nuc prices are skyrocketing, and the replacements that folks thought they could make with splits from strong hives are not going to materialize. If the feral bees suffered like the managed colonies around here, even this mild winter will not result in the early, exuberant swarming we saw in 2012. But if it does, we'll be ready.

Urbanites, with a little cooperation and some planning, we are in an excellent position to take advantage of this combination of crisis and opportunity if it comes our way. Because we live in small spaces, most of us are used to borrowing gear – not owning everything we use – and relying on community ties when special circumstances come up. We can use this when swarms start popping.

Often, it is very hard to find an available, prepared beekeeper on a weekday to collect a swarm, and the few who are on call can tire out quickly. But it is possible, instead, to build a network, pre-position tools, and have a neighborhood-by-neighborhood plan that spreads the load and saves the bees in a fair and distributed way. It requires developing, in advance, a list of interested swarm catchers, creating one or a few publicized points of contact for beekeeper help, and making sure that beekeepers can get to the necessary tools faster than an ill-informed landlord can call an exterminator.

For example: Here in DC, we have an outfit called the Urban Forestry Administration, led by Chief Forester John Thomas. The UFA has arborists on the move in each ward of the city, watching out for our trees and carrying around tools, etc., to do so. For the past couple of years, the arborists have also been learning how to keep bees in order to save the interesting feral genetics they encounter in colonies found in downed trees. This year, they will be pre-positioning basic swarm catching kits in their areas,

The UFA saves a feral tree colony.

City Swarms

and helping to collect swarms that land in *public* areas. The UFA also has some winter losses to replace, and would like to expand their apiaries to include as many successfully adapted local strains as is practical, in order to share these genes with others in the city.

Working with a local beekeeping community, the plan is to alert local neighborhood message boards, police precincts, community centers, schools and so on that help is available should a swarm land, and to send requests for swarm collection out to both interested beekeepers and the UFA. If the swarm is on DC land, the UFA can collect and hive it. If not, a beekeeper downtown without a veil will probably be able to quickly borrow necessary tools from someone not far away!

I'd like to expand this collaboration even farther, to community gardens and nature centers, for example, where there might be room in a shed for a brush and a box!

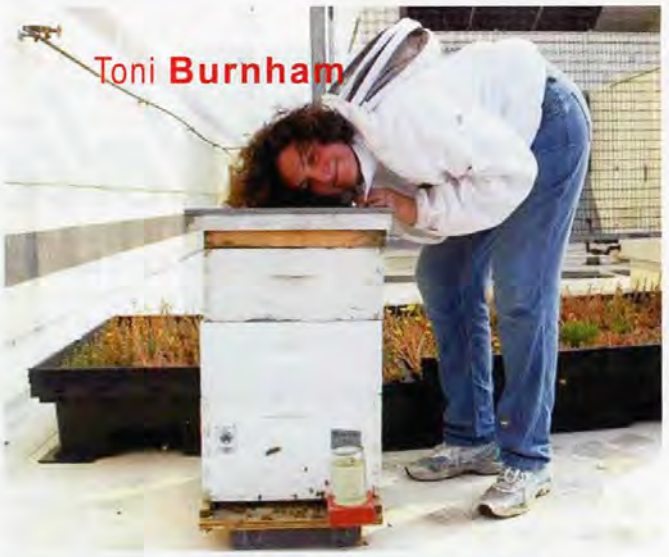
What are we putting in our basic swarm collection kit? Stuff that helps out with a swarm located somewhere near ground level, where folks freak out the most:

- A copy paper box (containing...)
- A hat veil
- A bee brush
- A bed sheet
- A squirt bottle
- Pruners (tough scissors or a small saw might do)
- A length of clothes line

This is not going to cut it for some swarm locations, such as those that land way up or that weave themselves into a chain link fence (for the latter, we are actually lending out a bee vac now and again). There have been several occasions here when ladders (or bucket trucks, or front end loaders) appeared to help lift the beeks to the bees, so don't give up without asking if a little elevation might help.

Some might also ask here, "Hey, do I need a car?" Here in DC, we are aware of more than one time that a swarm went home on public transit, though we recommend a "box-inside-a-box" approach if you are going to do that. Most corrugated containers are not airtight, so don't worry about airholes, but don't dally, either.

And remember, a swarm in a box only gets you a part of the way home: you need either a nuc box or an empty hive. Consider asking a responding beekeeper if he has an apiary and some woodenware at the ready, and put a call out for any missing pieces if events outstrip preparations. City beekeepers need to have each others' backs, and this is a truly sweet way to do that.



Most of the time, swarm collecting itself is kind of fall-off-a-log easy once you've done it once or twice. In the city, I like to come back to a site where a swarm was collected right around sunset in order to grab what returned scout bees I can. There are often calls afterwards about these poor confused orphans anyway, and I would just as soon see them reunited with mom (spritz 'em with sugar water before dumping them in, though: it helps with acceptance and reduces fighting).

In summary: collecting city swarms makes the public happy, makes public safety folks happy, makes beekeepers happy, and makes the bees happy (I think). In the city, this is easier if the tools are widely available, communication and cooperation channels are established, and a wide variety of beekeepers have prepared themselves just a little bit. A calm and controlled swarm collection also creates an awfully positive and powerful public relations opportunity, making passersby feel that they have participated in "saving the honey bee" and making them primed to advocate for city bees in the future. BC

Toni Burnham keeps bees and rescues swarms in the Washington, DC area where she lives.

An urban construction crew gives swarm collectors a lift.

Dandelions

Connie **Krochmal**

Beekeepers are maybe the only ones happy to see these blossoms in the Spring.

Beekeepers greet the early Spring dandelion blossoms with much delight. These are often so numerous that the flowers appear as a carpet of gold. The Latin name for the genus, *Taraxacum*, comes from the Arabic for 'bitter herb.' These plants occur in a wide range of habitats. Worldwide, there are around 25 species.

Due to the long taproot extending several feet, these tenacious plants are very difficult to remove. However, those seeking to have immaculate lawns never cease to give up the battle. Dandelion refuses to be suppressed. It has been referred to as "the tramp with a golden crown."

This plant spreads very easily by seed that can blow for miles in the wind and by new shoots arising from the root.

Habitat and Distribution

The common dandelion (*Taraxacum officinale)* occurs from 6500 feet to sea level. Partial to rich soils, it inhabits a range of habitats, including pastures, damp and dry sand, cultivated and undisturbed ground, waysides, open woods, grasslands, meadows, fields, waste places, and especially lawns. Winter hardy to zone three, the dandelions are generally native to the northern hemisphere.

This can be found pretty much over the entire country, including Hawaii and Alaska.

Description of the Common Dandelion

Typically a perennial, it sometimes behaves as a biennial. The stem is largely underground out of sight. The most visible part is the basal rosette of foliage.

The leaves are quite variable in shape and size. Up to 10 inches in length, they can be entire, lobed, toothed, notched, or very finely cut.

Much of the flower stem develops underground where it is sheltered from cold and inclement weather. The solitary, orange-yellow to gold, daisy-like flower heads follow the sun. They can vary in size from 1½ to two inches in diameter. These composites have rays resembling petals, which are in fact individual flowers. The underside of the outer rays is purplish.

Below the flower heads are two rows of bracts, some of which bend downwards. The hollow leafless flower stem is about 1½ feet in height.

The globe-like seed head is packed with fluffy seeds. These often freely drift like parachutes on the breezes. Children delight in blowing on these fuzzy heads.

Dandelion candy and coffee.

Red-Seeded Dandelion

Also called rock dandelion and lesser dandelion, the red-seeded dandelion (*Taraxacum erythrospermum or T. laevigatum*), a cultivated species, is a special case.

This was one of the four dandelion types that the Massachusetts Horticultural Society displayed at its exhibit in 1871. The others were French large leaved, French thick leaved, and American Improved. When grown in a dry soil, red-seeded dandelion leaves will be more finely cut than usual.

Once considered an introduction from Europe, it was later classified as a native species in the U.S. This is found in almost all states, including Alaska and Hawaii. It is absent from New Mexico and the lower half of Louisiana. Red-seeded dandelion occurs on thin dry soils and in waste places, meadows, fields, pastures, and lawns. This is most commonly found along roadsides and railroad tracks.

An easy way to distinguish red-seeded dandelion from the common dandelion is to look at the seeds. These are purplish-red or red, while those of the ordinary dandelion will be green, brown, or olive.

A repeat bloomer, it first begins flowering from March to July. However, it continues for much of the year. Less than six inches tall, red-seeded dandelion is quite tolerant of inclement weather. The deeply dissected leaves are two inches wide.

Other Species of Dandelions in America

There are perhaps ten species in the U.S. with some of those being cultivated. Several are considered to be natives. These largely resemble the common dandelion other than some minor difference in the height or size of the leaves or blossoms.

The range of the California dan-

delion (*Taraxacum californicum*) is restricted to California where it is classified as endangered.

The woolbearing dandelion (*Taraxacum officinale ssp. ceratophorum)* was once considered a species by some. It is now classified as a subspecies of the common dandelion. This is found in much of the western half of the country, particularly the Rocky Mountains. It doesn't occur in Arizona and rare in California.

Others that are native to America include the northern dandelion (*Taraxacum phymatocarpum or T. alaskanum*). This occurs only in Alaska, parts of Canada, and Greenland.

Another species, the fleshy dandelion (*Taraxacum carneocoloratum*), is also found in Alaska as well as in the Yukon, It blooms June to August. Less than six inches tall, it has leaves that are 3¼ inches in length. This occurs on calcareous ledges and meadows.

Common Names for Dandelions

The list of common names for this cosmopolitan weed is vast. In fact, one English flora has almost an entire page of preferred names. The name dandelion is based on medieval Latin meaning "tooth of the lion." No one seems to have a good explanation accounting for this peculiar name. Some of the other popular common names include doon-head, Irish daisy, puffballs, fairy clock, clock flower, and cankerwort.

Growing and Using Dandelions

Dandelions are made into wine and beer. These have been grown as a vegetable for over a hundred years, especially the larger leaved ones. They can be propagated by seed and root cuttings.

All parts of the plant are edible including roots, flower buds, and tender young leaves as well as mature ones. Since pollen serves as a food coloring, beekeepers might find there's a market for surplus pollen.

I tried one of the coffee substitutes made from roasted dandelion root. It tasted similar to other drinks containing roasted grains and seeds. In some instances, the root is used in place of chicory for flavoring coffee. Typically, the varieties used for drinks have larger roots than the usual dandelion.

Dandelions are cultivated commercially to a limited extent in the U.S. They're mostly sold at local markets. The cultivated types tend to be larger plants, around two feet across. As a commercial crop, they take about three to four months from sowing to harvest.

Vineland, N.J. is widely known as "the Dandelion Capital of the World." At one point there were at least a dozen or so growers in the town. Each year the Dandelion Dinner Festival takes place in Vineland during the dandelion harvest season. This includes a full course dinner of dandelion dishes.

History of the Dandelion

In addition to their culinary uses, dandelions are used as healing herbs, and were touted by herbalist Nicholas Culpeper and John Gerard, both of whom published herbals in the 1500s-1600s, which are still widely popular even today.

It isn't clear as to when or how the common dandelion was introduced to the U.S. What is known is that it became ubiquitous very quickly. Perhaps the French introduced them as a garden vegetable. These could have been a weed seed among garden seeds sent to the American colonies. Dandelion was one of those introduced plants that quickly became quickly widespread after the European settlers arrived.

At one point, the New York Agricultural Station in Geneva had plots of the different cultivated varieties. The fresh salad greens were sold in Boston markets in the 1830s. Native Americans also adapted these as a food source.

Europeans often turned to these during times of hardship, such as famine, wars, crop failure, and droughts. These were particularly popular among the French and Dutch.

The French were likely the first to cultivate it after they could no longer find enough wild dandelions growing in the countryside around Paris to meet the demands of Parisian markets. In the late 1800s the French grew several special varieties. *The Vegetable Garden* by M.M. Vilmorin-Andrieux was first published in English in 1885. Based on the family's experiences, this title explained how to grow dandelions and its cultivation in France.

Specializing in vegetable seeds, the author's family owned one of the

oldest and large seed companies in the world at the time. The company is still thriving today. Recently, they opened a vegetable seed subsidiary in Moscow and announced plans to move into the Delhi, India market as well.

In his book, Vilmorin-Andrieux described various varieties of dandelions, particularly ones that he and his company bred. These included Improved Early dandelion, a variety of the Thick Leaved.

Very Early dandelion is also known as the Broad-Leaved. It has leaves with few lobes or teeth.

Curled Leaf is a compact form that yields fewer leaves than some others. The Moss-leaved, which is a variety of the Curled Leaf, has very finely cut foliage.

The Thick Leaved or Cabbaging is very productive, and produces large numbers of leaves.

Dandelion's Value to Bees

Dandelions begin blooming in the Spring when the temperatures are often still on the cool side. These open before the fruit trees flower buds emerge. In warm regions, they can bloom almost year-round. In colder areas they often have a second blooming period in the Fall, but this crop tends to be smaller than the Spring one.

Considered an excellent bee plant, all of the dandelion species easily attract bees. It remains a mystery as to why the dandelion would bother producing generous quantities of nectar and pollen as the plant isn't doing this as a survival strategy in order to attract pollinators (it can produce viable seeds without pollination).

The nectar and pollen is readily

accessible to bees. Each flower head has about 100-300 individual floral tubes – one for each petal or ray of the flower head. In effect, this offers a veritable feast.

If given a choice, honey bees often select dandelion blossoms over those of apple and pear trees. In some cases, orchardists have reportedly mowed orchards in order to remove this competition from the fruit tree blossoms.

Bees visit the dandelion blossoms often during the day for both nectar and pollen. The latter is especially attractive since the large grains are easy for the bees to carry. The golden yellow or yellow color of the pollen, which is quite plentiful, shows up in the comb and ends up in the honey as well.

Typically, dandelion blossoms open between 6-9 a.m. However, the time on a given day varies according to the latitude and month. They tend to open later in the North. During mid-Summer they open earlier than other times.

The blossoms close some time later in the day before sunset or sooner in case of rain. The fact that they close at night and during stormy, cloudy weather helps to protect them from dewfall and rain.

Both the nectar and pollen play a major role in building up strong colonies. According to USDA, the much valued dandelion is considered a major nectar and pollen plant in the Northeast, North Central, West, and mountainous states, Alaska, and Hawaii. It tends to be an important honey plant in some locations but not in others.

If colonies are strong in the Spring, there is a potential for large honey crops in some locations, although this isn't necessarily common. In some instances the surplus is small, which likely means the colonies are still too weak to harvest all the dandelion nectar and pollen that is available. In most cases, the honey is fed to bees. A typical surplus would be about 30-40 pounds per hive. However, IBRA reports that worldwide there has been as much as 700 to 800 pounds per acre in some areas.

The honey is often a little strong tasting for some American consumers. It typically has a characteristic, rather sharp, strong flavor that mellows somewhat with age.

The honey can be cloudy. It can vary widely in color from any shade of amber to various shades of yellow. This thick honey crystallizes quickly, developing either fine or coarse, hard grains. BC

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

The Fear Of Being Stung . . .

. . . Is Worse Than The Sting

Ann **Harman**

Humans are fearful of many things and so are other animals. Perhaps fear is what keeps us safe. However humans seem to be overwhelmed by fears whereas many animals feel fear and take action. The zebra recognizes the stalking lion and flees to safety. But the lion sleeping under a tree poses no threat and is ignored by the zebra.

Humans, however, live with their fears. Each fear has a name, and there are many. It would be difficult to find something that someone, somewhere, does not fear. The fear of bees is termed apiphobia. The 'api-' part is, of course from '*Apis*' meaning 'bee.' The fear of stings is called cnidophobia. Those who fear wasps, separate from bees, suffer from spheksophobia. But we could also find those who fear all insects – entomophobia.

Those suffering from any of the above phobias are sometimes a danger to themselves. People have crashed their cars, sometimes fatally, when an insect thought to be a bee flew in through an open window. Others have injured themselves either trying to escape from or annihilate an insect flying or crawling inside the house. Sometimes even a dead insect causes a bit of fear.

How do fears arise? Undoubtedly we could find many reasons. Someone who, as a child, received a sting from a bee could indeed become fearful of bees and their stings. This fear could certainly persist into adulthood. However in our society today fear can be passed on from adult to child. The two-year-old child watching a harmless beetle cross the sidewalk is fascinated. But the entomophobic mother whisks the child away and exclaims 'no! don't touch!' Lesson learned: fear things that creep and crawl. In another society that beetle might be a desirable snack.

I am certain that people in rural environments must be much more tolerant of bees, wasps and a myriad of other insects. Those people may not wish to be stung but their world contains insects of many kinds. The city dweller will naturally encounter fewer insects on a daily basis. In an apartment setting cockroaches may provoke a fear, or at least a dislike. Those that live in houses with a modest lawn and garden may only come across insects on weekends if the weather is suitable. Those in suburbia with a lawn service that sprays for insects have found a solution to their entomophobia.

Eric Mussen being stung. (photo by Kathy Keatley Garvey)

Non-beekeepers are frequently amazed that someone actually likes bees enough to become a beekeeper. Just ask any beekeeper who has given demonstrations at county fairs, sold honey at a farmers' market, given a presentation to the Lions Club. I would think that the most common question is: 'Do you get stung?' The non-beekeeper is frequently puzzled by the casual attitude of the beekeeper answering the question.

Beekeepers – think back on the swarm calls you have received. True, a few may have been from someone calm and sensible but still with a bit of apprehension. Other calls have well illustrated the hysteria of apiphobia and cnidophobia. The sense of urgency is apparent. The family, along with pets, is under siege even though the swarm is 15 feet up in a tree and no flying bees are close to the ground. Here again the beekeeper's casual attitude is a source of amazement to those peering from windows from the safety of their house. We may try to educate these fearful people but have to realize that the next swarm they see will still provoke their fears.

Perhaps the view of bees, and their stings, is changing somewhat. Can we thank CCD for that? Perhaps. Ten or 15 years ago few people were interested enough to learn to keep bees. Some classes were given with modest participation. Then, with CCD, we moved into a different kind of fear. This was the fear that not enough bees were available for pollinating our crops. Would shortages of fruits and vegetables harm our health? (I could not find a word to represent fear of not enough fruits and vegetables.)

Then CCD arrived with tremendous publicity. The public, already aware of conservation in a broad sense, began to be champions of honey bees. Beekeeping classes became overwhelmed with people wanting to become beekeepers. Many of these were at least somewhat comfortable with insects and willing to try keeping bees with their stings.

Those who are teaching beekeeping classes have noticed that families are taking the classes. The children want to become involved. They are fascinated with bees. Just set up an observation hive at some event and the first to arrive for a look are the kids. The equipment suppliers are now offering children's clothing, appropriately-sized veils, coveralls and gloves. Children may howl when stung but the sting usually does not deter them.

As I am teaching my local bee club's bee course classes I look out at the audience and think – they are wondering about stings. When will they get stung? What will they do? How many of these class members will actually become beekeepers? Is that sting – or possibility of a sting – the end of their beekeeping? I don't know, of course. I will just wait and see.

I do tell them that no matter how well protected they are, at some point they will be stung. I offer a long list of sting remedies – the ones from the equipment supply catalogs plus the home remedies of mud, ice, onion, meat tenderizer, baking soda, and others gleaned from beekeepers.

In addition I feel that education into why bees sting helps overcome the thought that bees viciously attack because they want to. I do include the overly defensive Africanized bee. I find that teachers of beekeeping courses do emphasize slow, calm, quiet movements and proper clothing.

Beekeepers who are mentors of beginning beekeepers can help allay fear of being stung. Being quiet, calm but deliberate when opening a hive and inspecting a colony does demonstrate that bees can remain calm and go about their daily bee tasks in spite of interference from beekeepers. If a bee club has organized mentors for the students perhaps that mentor is the best way to overcome that beginner's fear of being stung.

However in a family situation where parents and children are participating in beekeeping it is also up to the parents to quell their own fears. Perhaps it is also important not to over-react to a child's sting. Provide a child with a sting remedy and let them treat their own sting would be one answer. Children are resilient. One sting will not stop their being inquisitive.

What can urban or suburban beekeepers do about their neighbors' cnidophobia when those neighbors find they are living next to bees? First of all one would hope that the urban beekeeper is following Good Management Practices and is trying to be a Good Neighbor.

A present of a jar of honey is always a good idea. A beekeeper could invite a neighboring family to come for a meal. Here is where bee behavior could be part of the evening's conversation. Emphasis on the enjoyment a beekeeper receives when working with bees would be important.

What about inviting a neighbor to watch a hive being opened? A great idea, but this visitor must be equipped with appropriate clothing: no fuzzy dark socks, perhaps a pair of coveralls with veil and definitely gloves of some type. And, of course, pick a day when the weather is ideal, bees are actively foraging and, in general, being very busy bees.

It would be nice if you have a marked queen. For some reason everyone peering at an observation hive wants to see the queen. Well, we have exploited the queen in many anthropomorphic ways, calling some imperious person a 'queen bee.' Cartoons depict queen bees complete with a fancy crown. If your queen is marked you have a chance of finding her quickly and pointing her out with pride.

A somewhat apiphobic neighbor who is visiting is a good recipient for a drone bee. Just pick one up and put it in the neighbor's hand (probably a gloved hand). Yes, the drone will probably immediately fly away but even that fleeting 'up close and personal' encounter will go a long way to overcome a cnidophobic neighbor. Don't overdo the first visit. As long as your bees are behaving themselves all is well, but at the first sign of crabby bees, close up the hive but promise another visit.

Now the stage is set for another invitation. Would the neighbors like to participate in extracting honey? Promise a jar of honey to each but explain that the honey may have to settle for a few days before bottling. Turn the day or evening into a pizza party after the honey is extracted. Let the neighbors try their hand at uncapping, spinning the extractor, moving buckets around. Some honey might get spilled, everyone will get very sticky but nobody will be thinking about stings. With all the sweet and delicious honey, the bees now seem more friendly, less threatening than before.

If the neighbors have elementary-school-age children offer to pay a visit to their classroom. Teachers are frequently happy to have a beekeeper visit. What about older children, perhaps in high school? Contact the biology teacher and see if the behavior of a social insect, the honey bee, would be interesting to the students.

If the neighbors are members of garden clubs, civic organizations and other groups, offer to give a presentation about bees and their value in pollination. Yes, you will be asked if you ever get stung. Don't forget to give a little smile when you answer.

Beekeepers will probably never remove all the apiphobia and cnidophobia from those non-beekeepers they encounter. Just keep this thought in mind . . .

The thing I fear most is fear. Michel Montaigne (1533-1592) BC

Ann Harman keeps bees and occasionally gets stung in Flint Hill, Virginia.

This Year

Establish A Hive Inspection Program

Linda **Tillman**

The ongoing mission of educating members is the lifeblood of a bee club. With members each year who are eager beginners, the bee club has an opportunity to help them learn how to be the best-informed beekeepers possible.

In Atlanta, our Metro Atlanta Beekeepers Club offers our short course in January. The timing of our course allows new prospective beekeepers to get exposure to beekeeping early enough still to be able to order bees, but the timing does not allow hands-on experience in the hives. In addition, new beekeepers often wish for mentors and we wanted to provide that in an efficient way.

So in 2009, the Metro Atlanta Beekeepers Club developed a hive inspection program as part of the educational provision for beginning beekeepers in our membership. Giving the new-bees a chance to go through a hive with an experienced beekeeper during the course of a year could provide hands-on practice that would be a worthy addition to what they might have learned in their short courses. If the inspections occurred throughout bee season, the participants could be exposed to bee life over the different parts of the bee year. And by having groups of people join one hive inspection, there is a great possibility that lots of mutual learning would occur in a time-efficient way, unlike a one on one mentor system.

There were several issues to address to set up such a program.

First, we decided that the hives used for the inspections would be the property of individual bee club members, who would purchase the bees and the equipment. This way if a hive location were no longer needed, the bees still had a home. It also meant that each hive had a main manager who would feel personal responsibility for the welfare of the hive. To get the program off the ground, the club paid for a nuc of bees for each location, but since that time in 2009, the bees have been the property of the individuals and the costs of replacing bees, buying equipment, etc. have been the expense of each individual who owns the hives. The lead beekeeper conducting each inspection does get paid $50 by the club, which helps defray the ongoing maintenance costs.

Second, we needed locations that would be relatively easy for people to access. We knew we needed the apiaries to be in public places to avoid personal property liability issues for the hive inspection leaders. We found places in three parts of the city where we could put hives that would be available for inspections with groups of attendees. We placed the hives at Zoo Atlanta, located south of the city (on the top of the reptile building!); the Dunwoody Nature Center, located north of the city (which has an observation hive in the facility); and the Blue Heron Nature Preserve, located in a central residential area. The Blue Heron Nature Preserve, a relatively new community garden and a protected area of woods and trails in the center of Atlanta, is the site where I have been leading hive inspections.

While the first two sites already had established hives, we had to write a proposal for the Blue Heron to get permission to put an apiary there. Luckily the manager of the Blue Heron community garden was a beginning beekeeper and wanted to place hives there as well so we had a pretty easy time getting permission to put our hives at the Blue Heron.

Third, we addressed the issue of who could come to the inspections. We decided that the inspections would be open to a maximum of 10 participants so that everyone would be able to see and so that each person might have an opportunity to hold a frame, look at eggs, etc. We invited members of our club and people who had taken our short course to take part. We also agreed to accept members of the community not on those two lists who were willing to contribute $15 to the club.

Fourth, we needed to cover the liability issues. One of our members who is an attorney designed a release for the Metro Atlanta bee club that each participant must sign. We found at our public locations that each location also wanted a release signed, specific to them. So before a person can be a part of one of our inspections, he/she has to sign two releases. We also required everyone to wear protective clothing – at minimum a long-sleeved shirt, long pants and a veil. Each of us conducting the inspections

Macey showing inspection participants the new honey comb built by the bees in a foundationless frame.

Noah Macey showing all of the participants the bees on a frame.

has some extra gear that we loaned to participants. At the Blue Heron we placed a sign at the apiary entrance to warn any curious passersby that a hive inspection was in progress.

We schedule dates throughout bee season with at least four inspections offered at each hive site. By attending an early-in-the-year inspection at the Zoo, one might observe a nuc installation while later in the year, an attendee at a Zoo inspection might observe a honey harvest. In other words, we conduct the inspection to answer the needs of that particular hive and the participants observe different things because of what the hive requires at that point in bee season. We encourage people not to sign up for a second inspection unless the lead inspector has room (that is, after people who hadn't been before had a chance to sign up). At the same time, we suggest that people try to go on inspections at each of the sites so they can experience the different ways each beekeeper approaches the hive inspection.

We chose inspection leaders who were experienced beekeepers, leaders in our bee club, and comfortable in front of a group. To spread out the workload, we give as much responsibility as possible to the person leading the inspection. The dates and locations for hive inspections are found on our club web page and when possible, what might be done at that particular inspection, such as install a package of bees, or harvest honey. On each date, the interested participant can click to email the person in charge of that specific inspection. Each inspector can then be in control of who signs up for his/her date.

Generally we send two emails to the people who sign up. The first email lets them know that they are included in the list for that inspection date. The second email is sent the week of the hive inspection to let each participant know what time to be there, where to meet, where to park, and what the leader's cell phone number is in case they get lost or can't make it. We also attach the waivers so that the participants can take care of the paperwork ahead of time if possible.

We set up a Google Document spreadsheet to provide a central data collection point, which all the hive inspection leaders could access. Each hive inspector enters his/her participants on that spreadsheet. Since the document is in the "cloud," we can all see it and work on it. As a result, we can each see who has already been on an inspection in that particular bee season and whether the participant is a MABA member, came to the short course, or is a beekeeper from the community at large.

This program has been going strong now for four solid years and we began our fifth year in March, 2013. We often have more people who want to go on an inspection than our maximum of 10.

At the Blue Heron site, I've led inspections, along with my friends, Julia Mahood and her son Noah. Although one of us is the person in charge that day and the main leader of the inspection, all three of us try to be there for each inspection so we can collaborate with each other. In the process we have demonstrated the old adage about if you ask three beekeepers a question, you may get three different answers! Generally, however, the three of us agree on our philosophy of beekeeping in a very conservative and natural way.

As a result, together we've had the joy of helping new beekeepers see eggs in the frame for the first time. Usually all ten participants are eager egg viewers! In almost every inspection I've been involved in, we've seen the queen in at least one hive. We often see the bees festooning as they make wax. We've taught people about minimal use of the smoker, using hive drapes, and employing foundationless frames. We've demonstrated how to use powdered sugar as a mite deterrent. Once Noah showed the participants how to implement a powdered sugar roll to do a mite count. We have added boxes, moved frames, and made beekeeping decisions with input both from each other and the participants. We've made splits and added frames of eggs to help a queenless hive make their own new queen.

We've used our hive inspections as opportunities to support conservative approaches to beekeeping. Most importantly we've shown our new beekeepers that you can conduct a hive inspection gently and slowly and rarely be stung. Actually on our inspections so far, the only stings have happened to the leaders of the inspection!

In joining a hive inspection, our club members and our short course attendees have the valuable bonus of being able to learn about the bees in this special hands-on way. In addition to learning from the hive inspection leaders, many of whom are now Master Beekeepers, our participants learn from each other. Often at the end of the inspection, we treat them to a taste of our honey as inspiration for their own future harvests.

This is a worthy program to set up for your club. It's easy to put together and simple to run. Learning as a group at a hive inspection offers a unique opportunity for all the people who come. Since no two beekeepers practice the art of beekeeping in exactly the same way, each participant goes home with some new tidbit of beekeeping knowledge or a beekeeping tip to try on their own hives. BC

Note: If you have questions beyond what this article provides about how to set up a hive inspection program for your club, please contact me (**beekeeperlinda@gmail.com**) and I'll be glad to help you.

BIGGER PICTURE

Jessica **Lawrence**

Mary, Mary . . . The Value Of Insect Pollination

"Mary Mary quite contrary, how does your garden grow?"

I love to garden. I am working furiously to destroy all of the grass in my yard by way of raised beds. If it's tasty or pretty, it can find a home in my yard. There are some flowers that I plant for the bees, some for insects in general, and some just for me. Vegetables are a different matter. I want to plant everything and anything, sometimes even if I don't like it just so I can say I grew it. As we have paid homage to the alternative pollinators in a previous article, I think it's a good time to delve into fruit/vegetable pollinator territory for the avid home gardeners.

First and foremost, what is a fruit and what is a vegetable? For the purposes of this article, everything is a vegetable as you would commonly know it. However, this is a serious point of contention that can be "fighting words" in some groups. I am a trained botanist, so my perspective is the botanical response. If you are a horticulturalist, you might take the "common sense" approach. In the vaguest of terms, a fruit is sweet and a vegetable is savory. The tomato is usually the whipping boy of this argument. A tomato is botanically a fruit, but nutritionally a vegetable. In fact, everything in the nightshade family that you would want to eat is technically a fruit, including eggplants, peppers, tomatillos, etc. I am leaving out the potatoes – while they are nightshades, you eat the tubers, not a fruit of the plant. In pretty much any instance, if you are eating a seed pod of some sort, it's a fruit. That leaves you with leafy vegetables and tubers – but we don't care about those unless you're letting them go to seed, because we want the flowers for the bees!

A honey bee visits a strawberry flower.

Tomatoes are one of my favorite things to grow, and also one of the easiest fruits to produce. There is nothing like a home grown tomato straight out of the garden and into the kitchen. The tomato is a common staple for most gardeners, and people who just have containers. Everyone knows you can't buy the same quality tomato at the store. If you're trying to grow tomatoes at home, which of the pollinators do you want to befriend?

Tomato blossoms are hermaphrodites, meaning they have both male and female parts (a perfect flower) and are self-pollinating. They do produce a lot of pollen, but no nectar, as most plants that are self-pollinating. The best way to ensure proper pollination is by vibrating the plant for pollen fall. Unless you are planning to do this by hand, bumblebees are the way to go. They vibrate the flowers by biting the staminal tube and moving their wing muscles to obtain pollen (this is called buzz pollination). Honey bees are not especially attracted to tomatoes, so in this case, all awards go to the bumblebees. Eggplants are similarly pollinated, as well as peppers, but occasionally sweet peppers can have bad fruit if they are over pollinated by bumblebees (normally only in a greenhouse scenario). Peppers are more desirable by honey bees because they produce nectar, but that's only in relation to the desirability of other plants in this family.

Carrots are great insect attractants, that is, if you let them go to flowering. You can bring in several different types of insects, like the larger predatory wasps (like spider hunters), as well as different types of pollinating flies, bumblebees and honey bees. They are a good source of nectar and pollen, so they are beneficial for everyone. This is a reason that it is often recommended to plant carrots with your tomatoes. The carrots will help bring in beneficial insects, and deter some tomato pests. If you are unwilling to sacrifice your carrot haul, Queen Anne's Lace is a suitable substitution.

Beans, a common staple in the southern garden, are typically pollinated by bumblebees more so than honey bees. The tubular flower shape common to the bean family is a little annoying to honey bees because they have short tongues. In red clover (*T.* pretense), for example, honey bees often have a difficult time getting to the nectar because of the long flower tubes, and rely on bumblebees to chew holes in the sides of the flower for access. Several types of insects are attracted to beans because some have extrafloral nectaries, so pollination may not occur during a visit.

Most of the cucurbit family (watermelon, squash, cucumber, etc.) is known to be pollinated by honey bees, but bumblebees and other native pollinators will be attracted to these plants. Pumpkin in particular has a large quantity of nectar available. Honey bees are not attracted to these plants, but are used to increase fruit set in commercial settings. This family is a lot less tolerant of cold conditions, and usually starts blooming a little later in

An Agapostemon sweat bee visits a melon flower.

the year because they are planted in May-June rather than March-April.

If you would like to raise beets to seed, you will need to let it grow as a biennial. When it grows the seed stem in the second year, the plant will die. Beets are wind pollinated, but insect pollination helps for seed set. The most important pollinator for beets are Syrphid flies, followed by solitary bees (especially sweat bees and leafcutters) and honey bees.

For onion seed, syrphid flies and sweat bees are excellent pollinators, but in their absence, honey bees can be used, but they are not overly attracted to onion. There are several vendors available online that will sell you blue bottle flies for onion seed production, if you feel that you do not have enough naturally available. Blow flies will not return to the same areas like honey bees because they are not looking repeatedly for nectar. In commercial settings, you have to bag them with the flowers.

Bees will also pollinate many herbs, but it may alter the flavor of the honey. I raise some of mine to seed – basil for example. The bees seem to prefer it for pollen more so than nectar. I have noticed that the bees will frequent it so much that predators will hang out to eat the visiting bees! When you raise things to seed, you will likely have a later blooming time than other crops, so there may be little else available for foraging.

I know some of you are going to be fruit enthusiasts, like myself, who have at least a few strawberry plants or several varieties of blueberry or blackberry bushes or fruit trees (the permanent or semi-permanent fruit givers) planted around your yard. Here is a little background information on those:

A honey bee with basil pollen was attacked by a wheel bug.

Strawberries are producers of both nectar and pollen, but are not attractive to honey bees unless nothing else is available. In most cases, wild bees such as bumblebees or leafcutter bees, flies, thrips or beetles are sufficient for pollination, but honey bees will sometimes pay a visit.

If you are growing a small apple orchard, honey bees are helpful but not necessary in a non-commercial setting. Bumblebees, sweat bees and leafcutter bees will all be ready to pollinate for you. The blue orchard bee is a fantastic pollinator for apple trees, as well as other fruit trees such as almonds. Having several types of pollinators in the area has been proven to increase the fruit yield.

Blueberries are not pollinated well by solitary bees, but bumblebees can be just as important as honey bees in blueberry pollination, if not more so. The vibrations of the bumblebees and the attractiveness of the flowers draws in bumblebees, but only if the local population is adequate. Honey bees can sometimes be lazy and wait for other bees to chew holes in the sides of the flowers so they can easily reach the nectar, and they never even touch the pollen!

Pawpaws, a southern indigenous fruit tree, are one of the stranger fruits available. They spread underground and can cause a thicket of pawpaw trees and actually crush out oak and maple competition if they are growing in the wild. Their large yellow fruits have a sort of custard-like quality and are highly nutritious. Unlike most fruit trees, pawpaws have dark purple flowers and are pollinated primarily by flies, particularly blow flies, flesh flies, carrion flies or syrphids. They are nearly scentless, although the leaves have an odor if you crush or damage them.

If you are lucky enough to live in a citrus-friendly climate, often the trees do not have to have pollination, but the honey bees are more than willing to help you out. Citrus has a high nectar content and will attract not only bees, but many other insects.

Cherries, Peaches and Pears are all mostly pollinated by honey bees, but they will also attract a few other bees, such as the blue orchard bee, and perhaps a hover fly or two.

All of this applies only to the home gardener, of course. If you are working on a commercial scale, honey bees or other commercially available bees will have to be used to obtain proper set. A monoculture environment is not suitable for most native species. The portability of honey bees makes them the hands-down winner of commercial pollination, but we can opt for more sources on the small scale.

My biggest point here is that variety is the spice of life. Yes, honey bees are a major pollinator for us here, but they were not native to the United States. Indigenous plant species will likely not be pollinated by honey bees, but most of our favorite garden plants are not indigenous. The native bees can make a difference in the fruit set of your garden, and help honey bees become more productive via competition and multiple flower visits. I am sure there are more plants that could be named that I have not listed, but I am hoping to at least give you an idea of the importance of preserving and encouraging your local insect populations. BC

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

Of Trees & Bees

Predisposing, Inciting, and Contributing Factors and Their Impact On Diseases Of Different Organisms (Or It's Not Easy Being Green, Part 1)

Michael **Johnston and** Michael **Griggs**

As graduates from the State University of New York College of Environmental Science and Forestry, we both can remember similar lessons learned, some from life's lesson book and others from our professors. The forestry school had a great mix of classroom teaching with a stiff dose of practical, in the woods, observational validation. In this way many concepts taught next to a chalkboard were demonstrated in the field soon afterwards, making these lessons endure in memory after all these years.

One of the most memorable classes was a 300 level forest and shade tree pathology course. In that course we learned that a combination of disease factors often work together to negatively affect the health of a tree. Further more, when working together the total impact on tree health by these factors can be greater than the sum of their independent effects. Reconstruction of likely events or disease agents leading to the current condition of a tree could be valuable to an understanding of the disease process and provide insight to future instances encountered.

A convenient way to look at this is by dividing these agents into Predisposing, Inciting, and Contributing factors. The current condition of a tree could then be determined by one, or a combination of these factors, as deduced by clues gained from observation, analysis and experience. In this article we will discuss this process and how an understanding of describing tree disease concepts might be translated into a method to better understand how honey bee disease can disrupt normal colony function. We will leave lessons learned outside of class for another time, (or perhaps at the bar at our next state bee meeting).

Generally, a disease can be identified as a deviation in the normal functioning of an organism (or super organism in the case of a honey bee colony) caused by some type of agent or multiple factors working in combination over time. We were taught that agents causing disease can be separated into two main categories; biotic or living agents and abiotic or the non-living agents. Biotic agents include wood boring beetles, leaf eating caterpillars, fungi, or bacteria. Abiotic agents include things like acid rain, soil compaction, drought, salt, or unusually hot or cold temperatures. Abiotic factors that evolve from the environment often have a regional affect over a large area in space and time. A separate category of abiotic agents, not usually relevant in a forest setting, but of prominence to beekeeping, is the effect of agricultural chemicals. We will talk a bit on this later as it is often a controversial topic leading to heated discussions by beekeepers.

Lets take a look at the basics of this model. There are three factors used to describe the stages of disease development within a tree. Starting with **Predisposing** factors that take place first by initiating a stressor, which can weaken a tree. **Inciting** factors subsequently ratchet up this stress by adding to the disease symptoms caused by the existing stress while **contributing** factors invade a stressed diseased tree taking advantage of this weakened state to complete tree necrosis. This way of looking at a disease sequence in a tree can be applicable to studying the sequence of events of a declining honey bee colony. Now we are not going to attempt to equate trees with bees, we are only using this approach to describe and understand how to separate the multiple factors that interact to produce disease in a honey bee colony.

Two major things to keep in mind are that disease factors usually occur in sequence and an event or disease life cycle is more likely to occur during certain times of the year than others but often not year round. Predisposing, inciting or contributing factors if unabated and when multiplied together can and often do lead to the death of a tree. These disease agents work in combination either concurrently but more often sequentially building off the previous agents detrimental effects. Remember that any one of these disease agents, if severe enough, can actually kill a tree outright but usually it is in combination with multiple factors over time that leads to a tree's eventual demise.

Let's start with a simple example analysis of death of a tree during a hot period in an early Summer drought. Environmental stress or abiotic agents are usually the most common **predisposing** factors to tree disease. Unfortunately for the tree, it cannot move or migrate in order to get away. Trees have a set of responses to these conditions that leave telltale symptoms. For example, a tree can form scar tissue in response to sunscald or frost checking or it can ooze pitch (a sticky material derived from tree sap, think pine pitch) in response to a physical wound. Before the tree can heal, it is in a compromised

Disease agents work in combination either concurrently but more often sequentially building off the previous agents detrimental effects.

state allowing numerous living organisms to exploit this predisposed condition.

An insect infestation, an example of an **inciting** factor, is able to exploit this tree in its now weakened state. Quite often a healthy tree can resist these same insects. It can exude enough pitch to cast out bark beetles and can form new leaves to replace the photosynthetic nutrients lost during defoliation by leaf-eating caterpillars. But since the tree is already in a state of siege, in effect weakened or predisposed, the second insult further incites the conditions, which might otherwise be of little consequence. Each additional insult increases the chance that a tree might further decline leading it closer to death.

Once this process gets a grip on our tree, successive factors **contribute** to further hasten decline! Fungi can invade the tree at the site of the wound, often observed by fruiting bodies or discoloration. Wood boring insects may be attracted to the stem near the wound further spreading fungus as they damage tree tissue in their pursuit of food or as a site to incubate progeny. Further vascular damage above the roots could put the final nail in the coffin of our arbor friend because fungal spores, often present in the soil right next to the tree roots, living separate lives, never interacting, never threatening, until conditions allow, cross the soil root interface infecting the roots. Once gaining this foothold, the fungus weakens the tree's immune defenses, disrupts nutrient flow, water flow and further contributes to its demise. Within a forest this may take many years and multiple insults for the process to unfold while at other times a quick succession of insults might result in rapid collapse: causing death within a single season.

This complex of interacting disease factors can be observed in the present situation affecting the evergreens of Western Canada. Drought and abnormally high temperatures are stressing and **predisposing** trees to disease, weakening their ability to produce the sap needed to fight off boring insects. At the same time, a longer growing season is helping bark beetles produce more generations per year. These insects boring into a tree's bark are the **inciting** factor for serious disease. A fungus, in this case carried by the insect, is the **contributing** factor that ultimately leads to the tree's death. These multiple factors assault the organism, which is unable to respond and it ultimately dies.

Without dating our education or ourselves, we must admit this wording is a bit dated but the concept is sound. The beauty of this terminology is that people understand you when you use consistent descriptive language. These lessons can be translated into an understanding how to diagnose your colony condition by backtracking based on the expression of symptoms observed today and knowledge of what has occurred at your apiary site. The overall goal would be to anticipate when activities would be best used, to intercede, prior to the expression of inciting and certainly before onset of contributing factors. Fortunately, we have an arsenal of tools to bring a colony back into health and honey production, if utilized at the right time. Early recognition of conditions would allow proactive intervention before a colony deteriorates such that your only option is nothing more than cleaning up a box to be stored for next year with the need to purchase replacement bees.

Since 2006 or so we have been hearing reports of collapsing bee colonies that have been given the moniker CCD for Colony Collapse Disorder. The name but not the symptoms of CCD, are not entirely new to the bee industry even though before 2006, many of us had never heard of it before. In the past, beekeepers have experienced "disappearing disease" and "Fall collapse." Previous occasions of collapsing populations in bees were probably not caused by all of the factors present today but some factors are probably shared across time. The intent of us-

Trees dying on a hilltop near Georgetown, NY in 2010. These trees succumbed after being defoliated two years in a row by forest tent caterpillars. Why did these trees die and not those on the surrounding slopes? Soil type is Lordstown on a 3 to 8% slope with a depth to bedrock of 20 to 40 inches. This soil receives no runoff from adjacent soils. Droughtiness, an environmental factor, was probably a predisposing factor while the defolation would be the inciting factor. The usual suspect for contributing factor would be the ever-present funguses.

ing "disorder" was to acknowledge that multiple factors, not a single disease-causing organism was most likely to blame. There is a long laundry list of causative agents cited to contribute to CCD but it seems to be clear that it is a combination of factors causing symptoms that might be individually addressed to minimize the synergistic effects of each additional factor. While we do not know what is really causing CCD we can see hives with various levels of problems which could be potentially abated by diagnosing any predisposing, inciting or contributing factors causing these observed symptoms.

Pesticides specifically, insecticides, kill insects, and bees are insects! This is a very complex subject with lots of gray area that many can find something to disagree with. We will say that the improper and excessive use of chemical insecticides kill non-target beneficial insects like bees, can cause contamination and can lead to insect resistance. One only need look at beekeeper experience with Fluvalinate, Coumaphos and Amitraz during the first 20 years of *Varroa* in the USA to start to get an understanding of the ramifications of this complex and emotionally charged topic.

In the early 1900s farmers were introduced, and quickly adopted various insecticides that allowed them to protect their crops from injurious insects. These products helped to increase the quantity and quality of salable products while reducing the cost and time needed to control pests. One can look at the blemish free vegetables in the local grocery store today to see how successful pest control using chemicals has been. However, we are constantly reminded of the negative consequence of products that were once manufactured or marketed as safe to humans and the environment but are now banned.

Beekeepers have always been alarmed by insecticide use because of the potential negative impact on our bees. Over the years the threat of insecticides has fluctuated with various products marketed. Some formulations have been exposed as more toxic to bees, more likely misapplied or used more excessively than others raising concern. It is thus not surprising that beekeepers are citing problems with this new class of systemic pesticides, the neonicitoids, based on their widespread use. Some are going so far as claiming them as the sole cause of CCD and calling for a complete ban on their use.

Several recent studies in the news have fueled the debate by claiming this category of insecticide is certainly to blame for pollina tor decline while there are other studies from France and the U.S. showing there is not enough evidence to outright point a finger at this class of insecticide as causing widespread honey bee toxicity based on exposure amounts. This is a very complex issue, which is still not settled. We will hear more on this matter, as science will be revisiting the subject in hopes of proving or disproving these disparate hypothesis'. Beekeepers are still righty skeptical on insecticide and the neonicitoids may still prove to be a possible predisposing factor or an inciting factor especially when interacting with the huge numbers agrochemicals in use today. This research into the sub-chronic toxicity of pesticides on beneficial insects will have an impact on the future of pesticide registration and will influence which chemicals in the development pipeline will be brought to market in the future.

So according to the model that we were taught so many years ago, insecticides, weather, poor nutrition, viruses, parasites, and bacteria are all factors causing disease, which adversely affects our bees. We can better protect our bees from these ever present factors, by understanding how they interact and how the symptoms are expressed in our colonies. In our next article we will make our best effort to describe more specifically how honey bee disease factors work together to weaken and ultimately kill colonies. We will offer an opinion about how to manage our colonies so that the effects of these disease factors can be minimized. BC

Michael Johnston and Michael Griggs raise bees and trees near Ithaca, NY.

BUILD A SWARM BOX

Ed **Simon**

I've tried both a Cloake Board and the Horizontal Frame Support to raise queens. Now it's time to try a Swarm Box. The swarm box is an artificial, extremely highly populated nucleus size box with large areas of screen that provides massive ventilation. The ventilation is required to dissipate the heat that an extremely large volume of bees produce.

The University of Minnesota in their bee raising class, and Dr. Larry Conner in his book "Queen Rearing Essentials", recommend this as the better way to produce quality queens. The premise behind this method is that a massive number of nurse bees feeding a relatively small number of grafted queen cells will produce a large quantity of royal jelly to feed the larvae which then gives the larvae an excellent start on their life as a queen.

Basically the swarm box is a five-frame nuc with extensions to the bottom that allow for ventilation and a place to put a water supply. There is also a sliding top that can be easily shut and secured so it won't be opened by mistake. The need for the secure top is because swarm box is usually placed in a cool dark area for eighteen to twenty-four hours. In my situation this means a basement room and I don't need five to ten thousand bees loose in the house.

Parts (Thickness x Width x Length) – for a five frame swarm box

1. ¾" x 9 ¼" x 19⅞" – Sides (2) (1" x 10" board)
2. ¾" x 7¾" x 15" – Ends (2) (1" x 10" board) – vertical orientation
3. ¾" x 9¼" x 20¼" – Box bottom sides (2)
4. ¾" x 9¼" x 20¼" – Box bottom ends (2)
5. ¾" x 9¼" x 20¼" – Box sides (2)
6. ¾" x 9¼" x 20¼" – Box ends (2)
7. ¾" x 2½" x 19⅞" – Sliding top side (2)
8. ¾" x 2½" x 10¼" – Sliding top closed end (1)
9. ¾" x ¾" x 19⅞" – Sliding top side guide (2)
10. ¾" x ⅜" x 7⅛" – Sliding top closed end guide (1)
11. ¾" x 1½" x 10¼" – Sliding top open end (1)
12. ¼" x 9½" x 21" – Sliding top (1)
13. ¾" x 7¼" x ??" – Frame stabilizer (2)
14. 1/8" hardware cloth or aluminum window screen

Construction

This swarm box is designed for use with deep frames. If it is used with medium frames there is a little more room for the bees and the ventilation should improve.

The building of a swarm box is more complicated than the usual devices I build. This is because of the number of parts needed. Be sure you study and understand the drawing before you cut any wood. Remember it's impossible to cut a board longer or wider that it's current dimensions.

Step 1: Trim a ⅛" slice from one end of the board to square the end of the board.

Step 2: Cut the sides (parts 1) from your board.

Step 3: Cut the ends (parts 2) from your board.

Note: The ends are used with the wood grain running vertically. This provides strength to the wood that holds the screen on the bottom ends and sides. They look like legs in the pictures.

Step 4: Cut a ⅜" x ⅝" frame rest in one end of each of the end boards.

Step 5: Cut the ventilation windows in the ends. Leave a 1" wide leg on each side of the ventilation cutout. See the diagram marked "Front View"

for the positioning and dimensions of this cutout.

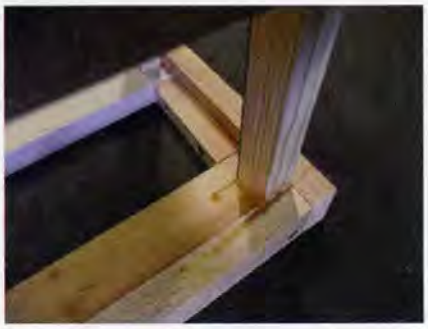
Step 6: Using the ends and sides (parts 1 & 2) construct the body of the box.

Note: The box must be square so the top/lid will operate correctly and smoothly and not allow any bees to escape.

Step 7: After cutting the parts for the framing of the bottom of the box (parts 3, 4, 5 and 6), assemble the bottom of the swarm box as follows:

A) Attach the box bottom sides (parts 3) to the bottom of the legs.

B) Add the box sides (parts 5) to



the sides of the pieces attached in step "A".

C) Add the box ends (parts 6) to the end of the swarm box.

D) Finish the bottom by installing the box bottom ends (parts 4) inside the box ends and between the box bottom sides (parts 3).

Note: What you are accomplishing in this step is providing a frame on the bottom of the swarm box to which you will attach the hardware cloth.

Step 8: Cut the sliding top parts 7, 8, 9, 10 and 11 from available wood. Glue and screw the sliding top pieces 7, 8, 9 and 10 into an open ended assembly. This assembly should just slip over the top of the swarm box with the slide guides resting on the top of the box. The sliding top open end piece (part 11) will be used after this assembly is attached to the swarm box.

Step 9: Select a ¼" piece of hardboard or plastic and cut it for the sliding top (part 12).

Note: I like to use plastic because it doesn't swell and bind up when used in a groove.

Step 10: Place the sliding top (part 13) on top of the swarm box and then put the sliding top assembly built in step 8 on top of the sliding top. Add a set of shims under the sliding top guides to provide the spacing so the sliding top (part 13) will be able to move in and out with ease. Then screw the sliding top assembly into the sides of the box.

Note: The top must be able to be closed very easily. You will have four to seven thousand bees milling around and you need them confined in the swarm box.

Note: Do not glue the sliding top assembly to the box. You may want to remove it at some time in the future.

Step 11: Finish the top by adding the sliding top open end (part11) to the open end of the top assembly. It needs to allow the top (part 12) to glide in and out of the grooves with minimal resistance.

Step 12: Drill a hole through the sliding top (part 12) into the sliding top open end (part11). This hole should be big enough to allow a nail or a piece of wire to be inserted to hold the sliding top closed.

Note: You don't want the swarm box to lose its lid when you are moving it around. Five thousand bees loose in the house would mean the end of your bee keeping career and possibly a divorce.

Note: If the wire or nail is loose then give it a slight bend to make it stick in the hole. Then add a tether to the wire so you won't lose it.

Step 13: Cut the frame stabilizers (parts 13) and drill the holes in them. These are used to provide a path for the bees to get to the water on the bottom of the swarm box and to keep the frames from moving.

Note: The length of this part is entirely dependent on whether you are using deep or medium frames in your swarm box.

Screw the frame stabilizers in place. Do not glue these in. You may want to use different size frames in the future.

Step 14: Paint you swarm box.

Note: Free paint is usually available at your local recycling centers.

Step 15: Staple the hardware cloth (part 14) to the swarm box. Use plenty of staples. A hole or leak for bees to escape through is not a good situation.

Note: Because the staples are in tight corners use a staple hammer and a hammer to apply the staples.

Conclusion

This swarm box is solidly built and a little complicated to build, but if constructed carefully it will give your queens a good start for many years.

Thoughts

A queen-less swarm box with an over population of nurse bees and no larvae to attend to, is the recipe for queen cell building. Adding the grafted cells with a vertical orientation kicks the nurse bees into a nursing frenzy and the grafted cells will be well filled with royal jelly. In less than twenty four hours, a batch of queens will have an excellent start.

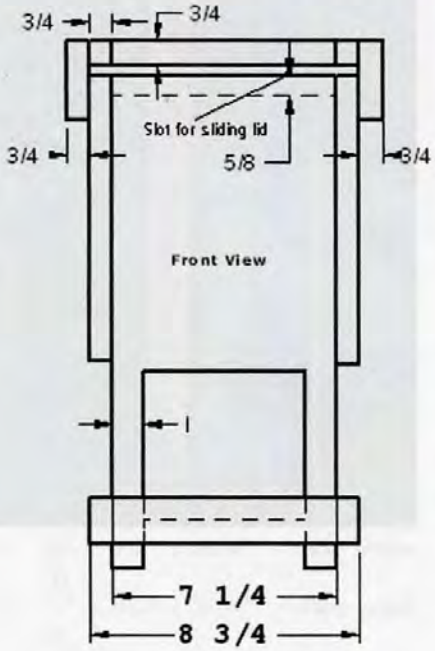
Usage

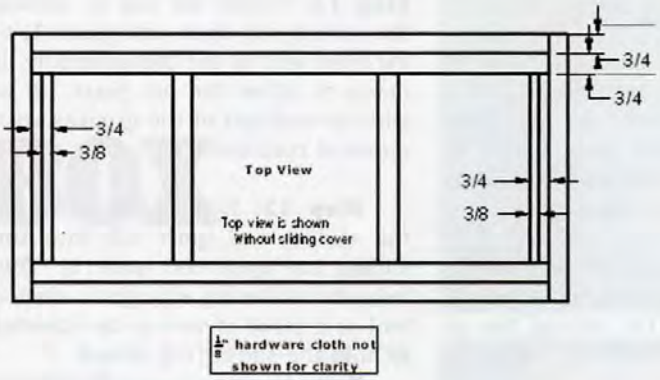
It is just like baking a cake (take two cups of flour and add...)

1) Place a shallow container of water with a wet wash cloth on the bottom or a wet sponge.
2) Add two frames of honey & pollen (uncapped honey works just fine, pollen should be fresh)
3) Add two frames of drawn comb for cluster space.
4) Add a frame of young larvae in the center position in the box.

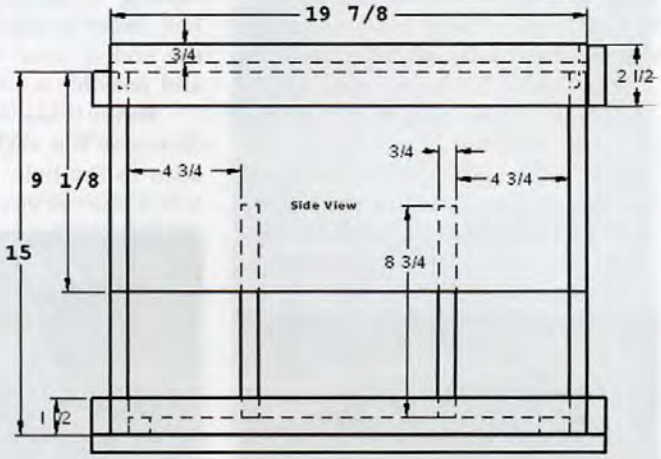
Note: This will start the nurse bees producing royal jelly and at the same time provide a second check for a queen that you miss when you shake the nurse bees into the swarm box.

5) Shake five to 10 frames of nurse bees into the box (no queen).
6) Let it sit in a cool dark place for 24 hours.
7) Check for the start of queen cells to make sure that there is no queen in the swarm box.
8) Fill your grafting frame with young larvae.
9) Replace the young larvae frame with your newly grafted frame in the center position in the swarm box.
10) Return the swarm box to the cool dark place.
11) Wait 18-24 hours.
12) Place the newly started queen cells into your finishing hives.
13) Return the nurse bees to their original hives. BC



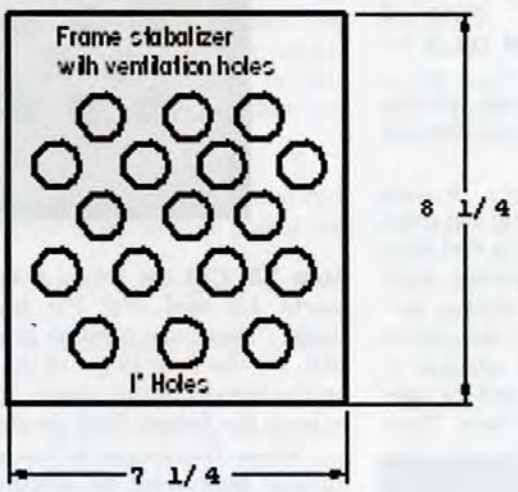


Top View



Side View

Measure to fit - dimensions are approximate for medium frames



Frame Support

Front View

GLEANINGS

MAY, 2013 • ALL THE NEWS THAT FITS

APIMONDIA 2013

The next global beekeeping summit is expected to be the biggest ever with 800 scientists among 10, 000 participants from 115 countries due in Kyiv, the capital of Ukraine, from Sept. 29 to Oct. 4.

Organizers say the XXXXIII Apimondia International Apicultural Congress will involve amateur and professional beekeepers, leading experts of beekeeping sector and specialists in related areas, scientists, representatives of commercial sector, non-profit organizations and government.

Participants will hear the latest first-hand scientific information from researchers worldwide, check-out the cutting-edge technological innovations in beekeeping, present their products - ranging from honey and mead to the most advanced beekeeping equipment, establish new contacts with exporters and importers and listen to scientists' reports.

Organizers say participants will get to discover Ukraine – the true European Honeyland.

The key program of the congress will last five days and involve a scientific conference themed "Beyond the Hive: Beekeeping and Global Challenges" that encompasses plenary sessions and symposiums. More than 800 scientists from around the world will present about 300 scientific papers and 800 poster presentations;

The International Exhibition Api-Expo-2013 will feature more than 200 participants, while the World Beekeeping Awards will recognize excellence, creativity and innovation in beekeeping.

Members of Apimondia are represented by different beekeepers association from more than 115 countries. Every two years since 1897, Apimondia holds in different countries International Apicultural Congresses that are the largest events in the world of beekeeping.

International Apimondia Congresses have an aim to give an opportunity of exchanging of information, personal experience and achievements among beekeepers, scientist, honey-traders and equipment manufacturers, agents for development, technicians and legislators.

Alan Harman

VARROA IN THUNDER BAY

Varroa continues to push into new territory with beekeepers in Thunder Bay, Ontario, on full alert after the mite was found in an apiary there.

Thunder Bay Beekeepers Association head Barry Tabor tells the Canadian Broadcasting Corp. that beekeepers in the city had worked hard to keep the area mite free for years.

There's been an unwritten rule that people shouldn't bring in bees from outside of Thunder Bay, which is located on Lake Superior about 870 miles northwest of Toronto or 340 miles north of Minneapolis.

Despite this, the mite was found in low concentrations in one yard.

"It's an extremely sad day for Thunder Bay and for Thunder Bay bees and beekeepers," Tabor says.

The next step is to find out if and where the mite has spread.

"The biggest thing right now is we need to know every single beekeeper in Thunder Bay," Tabor says. "We need to know where every single colony is."

Beekeepers are supposed to be registered with the Ontario Ministry of Agriculture, but Tabor says he knows some people are not registered.

He estimates there are about 500 bee colonies in the city.

Alan Harman

MESSY CHINESE HONEY

There's going to be a free-for-all involving the murky world of Asian honey shipments at a trial later this year involving a dodgy Michigan processor, a wily Chinese honey shipper, 200 loads of Indonesian honey, claimed U.S. government interference and a lost $4 million.

Groeb Farms of Springville, MI, is suing for the $4 million it claims it lost when China Industrial Manufacturing Group failed to deliver on the contract for the Indonesian honey in 2010.

The Daily Telegram newspaper in Adrian MI reports the Chinese company is claiming U.S. government interference made the honey deal go bad.

A lawyer for Groeb Farms told the Lenawee County Circuit Court that perjury should disqualify the import company from presenting claims a customs bond kept the honey from being delivered.

This after a defense witness who claimed knowledge of a customs bond problem turned out to have no first-hand knowledge when he was questioned under oath.

An affidavit signed by Cherry Paniman, a businessman involved in importing honey, was the foundation of China Industrial's defense in the case.

Seabolt said after a year-long chase around half the world, Paniman finally admitted under questioning that he had no personal knowledge of an import bond preventing the Indonesian honey from being delivered to Groeb Farms.

"He has perjured himself," Groeb Farms attorney Scott Seabolt is quoted as telling the court. "Let's not split any hairs. He perjured himself in his affidavit."

As a result, Seabolt wanted the court to block China Industrial from presenting evidence of customs delays at the trial due to begin in May.

As well, Seabolt said China Industrial waited until the day before the deadline for attorneys to complete research in the case, to hand over a list of eight new witnesses in an intentional effort to prevent him from preparing for trial.

"What I do have a problem with is being blindsided and sandbagged," Seabolt told the court.

Defense attorney Morley Witus said Paniman was confused about the legal definition of personal knowledge. China Industrial then located other witnesses of the customs bond put on honey intended for Groeb Farms, he said, including two customs agents.

Witus says in a written brief it was illegal honey trading by companies such as Groeb Farms that caused the U.S. government to impose enormous import bonds in 2010.

Companies were knowingly purchasing transshipped Chinese honey and circumventing the anti-dumping duties applicable to Chinese honey, he stated.

Groeb Farms was fined $2 million in a settlement earlier this year with U.S. Immigration and Customs Enforcement.

Witus asked the court to dismiss charges of intentional fraud added to Groeb's contract complaint.

The newspaper reports Judge Margaret M.S. Noe rejected all motions.

"I feel an overwhelming obligation to allow a jury to see and hear everything they should see and hear," Noe is quoted as saying.

She ordered China Industrial to pay the costs of having its new witnesses testify at depositions before the trial and also ordered that Paniman be present and available to testify.

Alan Harman

FAKE CHINESE HONEY

It's getting bad when the Chinese complain about fake honey.

Bee industry officials in Shanghai say sales of fake honey products are common in the city due to loopholes in the national standards,

Sun Deguan, director of the bee industry council of the Shanghai Association of Agricultural Science Societies tells the government-owned Shanghai Daily that honey sold cheaply by virtually all street vendors is fake because demand far exceeds supply.

Sun says street vendors use low prices to lure consumers, claiming their products are directly from producers, but they almost always turn out to be made from syrup and gum.

The cost of fake honey is only a tenth of the price of real honey.

China Bee Products Association senior official Lu Zetian says fake honey products account for nearly half of the market volume and it is hard for consumers to tell the difference between the fake and the real one.

The industry officials say new technologies for manufacturing fake honey products have emerged and traditional testing cannot always detect the fakes. Fake honeycomb made of gum and fake honey can pass tests such as those for flavonoid plant compounds and the oxidation index.

They say national standards issued in 2011 lag behind the market and while new standards are being discussed, nothing definite has been decided. – *Alan Harman*

A LIVING BEE SCULPTURE

Although honey bees typically draw comb on vertical flat planes, Hillary Berseth and Jim Bobb have been coercing bees to create wax sculptures. Starting with thin pieces of wax, called foundation, the bees have been offered many starting constructs, such as cylinders, squares, cones, and rotor shapes, as the initial point for their nest building. At the end of the season, the bees are removed from the structure and placed in a normal hive for the winter. The finished pieces of wax artwork have been featured at a gallery opening in the New York City East Village for the past five years

This year, the Tyler School of Art, Temple, University in Philadelphia, commissioned a living sculpture – requesting a uniquely shaped honey bee observation hive. Hillary and Jim have created what might be the first circular observation hive. The exhibit is free to the public, open now through February 15, 2013.

Tyler School of Art, Temple University, 2001 North 13th Street, Philadelphia, PA, 215.777.9144; **www.temple.edu/tyler/exhibitions**; Wednesday–Saturday, 11:00 a.m.–6:00 p.m.

LOGICAL BEES

Bees are smart enough to pick out the most attractive flowers by watching other bees and learning from their behavior, UK researchers report.

By using simple logic, the bees see which colored flowers are the most popular and conclude that those of the same color must also contain lots of energy-rich nectar.

Scientists at Queen Mary, University of London and the Zoological Society of London (ZSL) say the reason why bees copy each other when looking for nectar is remarkably simple.

"Learning where to find nectar by watching others seems fantastically complex for a tiny bee, but it's something that almost any animal could do, in the right circumstances," says Elli Leadbeater of ZSL's Institute for Zoology and co-author of a study published in the journal Current Biology.

Most worker bees visit thousands of flowers every day in their search for nectar. Copying flower color choices may be a shortcut to success, bypassing the exhausting process of exploring each flower to see if it contains hidden rewards.

The research team carried out their tests in wooden laboratory "flight arenas" stocked with artificial flowers. Bees were trained to know that sugar could be found on flowers where other foragers were present. The bees then watched through a screen as their companions chose a particular flower color, and ignored another.

When later allowed to choose a flower color alone, the test bees copied their companions' choices. Naive foragers, who had never learnt to equate other bees with nectar, did not copy other bees' behavior.

University of London PhD student Erika Dawson says the research shows how bees use past associations to make decisions about when to copy others.

The scientists also found that bees consider whether their companions are making good choices. In the laboratory flight arenas, test bees did not copy other bees if they knew that those bees were visiting bitter-tasting flowers.

Instead, the test bees actively avoided the flower colors that other bees chose. The flowers were made bitter using quinine - a flavor used in tonic water, which bees typically dislike.

Alan Harman

NZ HONEY

The New Zealand honey crop for 2011/12 was estimated at 10,385 tonnes, up 10% from the 2010/11 crop of 9,450 tonnes.

The Ministry for Primary Industries says the North Island averaged 43.99 lbs of honey per hive in 2011/12, while the South Island averaged 77.1 lbs a hive.

This resulted in a national average of 54.2 lbs a hive, up slightly from 53.3 lbs the year before, but still well down from the six-year average of 64.7 lbs.

Prices paid to beekeepers for all honey types increased by 5% to 20% throughout the season, due to strong world demand and reduced honey production in parts of the North Island.

Live bee exports were down after three years of strong live bee export trade as better hive survival over winter in Canada led to reduced demand for live bees from New Zealand.

Sugar prices fell about 13% from a 29-year high of NZ$1,500 (US$1,232) a tonne in late 2010, with most beekeepers paying around NZ$1,300 (US$1,068) a tonne in 2011/12.

The ministry says sugar is still a major expense and some North Island beekeepers will need to feed more sugar because of reduced honey crops.

The number of registered beekeepers increased 16% from 3,267 in 2010/11 to 3,806 in 2011/12 – the third year of increase since the Varroa mite arrived in 2000.

The number of beekeepers with five or fewer hives increased 20%.

The number of hives increased by 8% to 32,205. – *Alan Harman*

FOOD PRICES TO RISE

The world is entering another a period of "agflation" with food prices forecast to reach record highs in 2013 and to continue to rise well into the third quarter next year, the agricultural banker Rabobank says.

This is the result of weather-driven events in large exporting countries – principally the worst drought in the U.S. since 1936 and similar water shortages in Russia and South America.

The rise in grain and oilseed prices will have a significant knock-on effect on other food and agriculture supply chains especially the animal protein industry, resulting in rising meat prices.

Rabobank global head of agri-commodity markets research Luke Chandler says unlike the staple grain shortage 2008, this year's scarcity will affect feed intensive crops with serious repercussions for the animal protein and dairy industries.

"The impact on the poorest consumers should be reduced this time around, as purchasers are able to switch consumption from animal protein back towards staple grains like rice and wheat," he says.

These commodities now are 30% cheaper than their 2008 peaks.

Nonetheless, the bank says the price rises are likely to stall the long-term trend towards higher protein diets in Asia, the Middle East and North Africa.

"In developed economies – especially the U.S. and Europe – where meat and corn price elasticity is low, the knock-on effect of high grain prices will be felt for some time to come," Chandler says.

Due to the long production cycles of the animal protein and dairy industries, the affects of grains shortages will be more sustained as herds (especially cattle) take longer to rebuild, maintaining upward pressure on food prices.

However, food makes up a smaller proportion of budget spend in such countries, so the current period of agflation should not lead to the unrest witnessed in response to the shortage in 2008.

Rabobank estimates the Food and Agricultural Organisation food price index will rise by 15% by the end of June next year.

The bank expects prices, particularly for grains and oilseeds, to remain at elevated levels for at least the next 12 months.

While the impact of higher food prices should be reduced by favourable macroeconomic fundamentals (low growth, lower oil prices, weak consumer confidence and a depreciated U.S. dollar); interventionist government policies could exacerbate the issue.

Chandler says stockpiling and export bans are a distinct possibility in 2012/13 as governments seek to protect domestic consumers from increasing food prices. Increased government intervention will likely encourage further increases in world commodity and food prices.

Rabobank expects localised efforts to increase stockpiles will prove counterproductive at the global level, with those countries least able to pay higher prices likely to see greater moves in domestic food price inflation.

"This is a vicious circle, with governments committing to domestic stockpiling and other interventionist measures earlier than usual – recognising the risk of being left out as exportable stocks decline further," the bank says.

On top of that, Rabobank warns that global food stocks have not been replenished since 2008, leaving the market without any buffer to adverse growing conditions. Efforts by governments to rebuild stocks are likely to add to food prices and take supplies off the market at a time when they are most needed.

Alan Harman

FINDING HOMES FOR BEES

A British supermarket is seeking to link beekeepers with honey gathering locations.

The 4,000-styore Co-operative Group says there has been a surge in urban beekeeping, but many would-be beekeepers have nowhere to locate a hive.

However, it says, there are many gardeners and allotment holders who want bees on their land.

Its Hive Talking website is designed to connect these people, allowing them to register their location on an interactive map.

The supermarket chain has committed more than $1.58 million (£1 million) to its Plan Bee campaign to highlight the plight of the British honeybee population – which experts believe has halved in England between 1985 and 2005 – and has supported the growth of urban beekeeping by financing courses and establishing city hives.

"By bring these parties together, Hive Talking could help reverse honeybee decline in the UK," says the chain's sustainable development manager Chris Shearlock.

Urban Bees co-founder and director Brian McCallum came up with the idea for an interactive map.

"Some of the beekeepers I have trained have struggled to find land on which to keep their bees, but as honeybees are pollinators of many wildflowers, fruits and vegetables, allotment holders and gardeners appreciate the benefit of accommodating a hive on their land," he says.

The Co-operative Group is the UK's fifth biggest food retailer and employs more than 106,000. It has an annual turnover of more than $20.57 billion (£13 billion).

Alan Harman

VARROA IN OZ

The recent discovery of Asian honey bees infected with *Varroa* at a Sydney port has Australian authorities strengthening their plans to fight off an incursion of the devastating pest.

The latest threat was removed and Australia remains one of the last countries free of *Varroa*.

The bee management committee is also developing a communications plan to help potentially affected industries prepare for the possible incursion of *Varroa*. It is organizing the provisional registration of key chemicals for the treatment of *Varroa*; coordinating research, development and extension activities between industry and government; and helping to strengthen the capacity of the honey bee industry, pollination reliant industries and government agencies through workshops, educational resources and other communication channels. – *Alan Harman*

MANUKA, OR NOT?

New Zealand manuka honey producers are fighting on two fronts to block German attempts to hijack the lucrative brand name.

The Unique Manuka Factor Honey Association says one German is trying to trademark the word 'manuka' in Europe – even though he has no connection to honey production and another is seeking market an additive claimed to allow normal honey to mimic some of the anti-bacterial properties of manuka honey.

Manuka is a shrub or small tree native to New Zealand and southeast Australia and the honey from it has medicinal qualities, making the variety worth more than $100 million.

Association president John Rawcliffe tells Radio New Zealand if the man seeking the trademark succeeds he apparently wants to sell it back to New Zealand producers.

Intellectual property lawyer Earl Gray tells the broadcaster the additive's maker would have to prove they are not misleading consumers into believing their product is the same as New Zealand honey.

Gray says the trademark ploy is unlikely to succeed, because manuka is internationally recognized as a word for New Zealand honey.

The association has hired a law firm Buddle Finlay to fight the trademark application with Rawcliffe saying the German could not be allowed to own a trademark to make money out of manuka honey producers of New Zealand.

If the trademark was allowed, the person who registered it would have the right to prevent others from using the word manuka as a trademark for honey.

The patent for the bee food wasc submitted to the New Zealand Intellectual Property Office, but the association is opposing it, saying it is not inventive. The association rejected an offer to buy the technology.

The association has spent about $250,000 to have a test created, expected to be ready in a few months, that will distinguish real manuka honey from product produced using the bee feed.

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My gal Marilyn and I are both not so great with life's pesky little details. I almost missed a Colony Collapse Disorder lecture last January. I was the featured speaker. I had the date wrong. I only realized my error when a friend read an announcement in the paper.

A month later, we planned a trip to Sayulita, Mexico for my little niece's destination wedding. A week before we left, I realized I'd let my passport expire last summer. I paid extra and got this fixed with a two-day trip to Denver. When Marilyn and I rendezvoused with my sister and her husband at their hotel in Sayulita, we were on time for a change. The first thing Patty said was, "You're late!"

"Five minutes!" I shot back.

"No, an hour and five minutes," she harrumphed. "You're in the wrong time zone!"

I said, "Sister, there's a time change between here and the airport. We're back on Mountain Time." Patty is the quintessential planner. How could she not know?

"Used to be a time change," Patty corrected. "They fixed that. Too many tourists were missing their flights."

Marilyn and I had only been in Sayulita for three days. We'd picked up some outdated information from an old guidebook and never confirmed it. Gentle reader, do you detect a pattern here?

The wrong time zone explained a lot. Like why shops closed early. When we went to the local farmers' market, we talked to a couple of honey vendors. I was wary of taking too much of their time, because I didn't want these guys to lose any sales. That's the way it is at farmers' markets – you can make a killing, if you don't let some blabbermouth distract you from your cash-in-hand customers. So we asked them when they might have time to talk, and they both said after 1 p.m. The market closed at 2.

When we came back at one, Mountain Time, they were both packing. You'd think we'd have been able to put one and two together, but no. Neither of the vendors was a beekeeper, although one was selling his uncle's product. The uncle has a 600-hive operation based in the mountain town of Tepic.

The other seller, Joaquin, procured his product from a beekeeper in Ixtlan del Rio, also inland. He sold a light amber wildflower honey, as well as a pale honey that comes from the white "savila" flower. Both honeys had a distinctive but pleasant bite that I couldn't possibly describe to you. Prices ran a little lower than what you might find at farmers' markets here in the States. Joaquin specializes in gathering and selling medicinal herbs that he harvests himself. He learned from his grandfather. He displayed about 50 varieties. The market itself was bizarre in that a third of the vendors were foreigners, that is to say, mainly Americans. The market was run by an American Sayulita coffee shop owner. The gringo market entertainers were shimmy-shake dancers backed up by saxophone and electric guitar. In a town dominated by American tourism and American second homeowners, what did I expect?

There is no commercial beekeeping in the coastal area around Sayulita. Late February temperatures ranged from maybe high 60s at night to the 80s during the day. We saw apparently feral bees, not just on flowers, but on open-air sweet rolls in the bakeries. I've seen this before, also in Mexico. This tells me no honey flow. The little darlings were desperate.

Our last morning, at an outdoor breakfast cafe, the bride swatted at a honey bee giving us the fly-by. I explained that swatting was a no-no. My sister said, "Well, could you get your little friend to leave?" Patty, I'm a beekeeper, not a bee trainer.

The hotels feature drop-down mosquito nets, but we never saw a mosquito. We heard rumors of spraying to keep the tourists (but not any beekeepers!) happy.

The bride and groom are old enough to know what they're doing. Pam's the former high school class president, straight-A type, and works as a sommelier. Jeron's a California big-wave surfer employed as a "mixologist" in the high-end booze business.

He has crossed assault rifles tattooed on his arm, with "Ready to Die" inscribed below. Kids!

I asked Marilyn what time our return flight departed, and she said, "It's not until 3:39. We can have an early breakfast with your family, go stand-up paddleboarding for an hour, catch a noon bus and be there with time to spare." Perfect!

My sister came down on the same Frontier flight, just on a different day. She said, "Our return is at 1:30. Are you sure that 3:39 isn't your arrival time?" Of course Patty was right. My always reliable sister got us into the right time zone, then to the airport on time. I don't get it. We're flesh and blood. How does she do it?

Ed **Colby**

Life's Little Details

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