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ROOT PUBLICATIONS

Sep 2014

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The Magazine Of American Beekeeping

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Better Beekeeping Using Nucs

Chili Mead

Handling Honey

The Russians Are Coming!

Features . . . Bee Culture . . . The Rest

JIM FRAZIER RETIRES 8
Frazier steps down from Penn State and The National Honey Bee Advisory Board.
Steve Ellis

37TH WESTERN APICULTURE SOCIETY MEETING 15
It's in Missoula, MT. Check out the details.

THE SCIENCE OF PATHOGENS 27
It has to do with density, virulence and transmission.
Jennifer Berry

QUALITY QUEENS 37
Four states collaborate to produce better queens.
Ginger Davidson

FOLLOW THE HONEY: 40
Tobacco style tactics deflect blame.
Ross Conrad

THE RUSSIANS ARE COMING 42
They are coming to Medina, Bee Culture *land in October. Daily program, topics, local info.*
Bee Culture Staff

BEES, PESTICIDES AND A GAME-CHANGING PRESIDENTIAL INITIATIVE 48
Will this make a difference?
M.E.A. McNeil

A BETTER WAY 59
Start planning now for a better way to keep bees. Using nucs.
Mike Palmer

ISLAND OF OPPORTUNITY 71
A bee population that's uncommonly healthy.
Cory Collins

BIGGER PICTURE 74
The ~~Parent~~ Pollen Trap.
Jessica Louque

WAKE UP YOUR INNER CHILIHEAD 82
Make a Capsicumel Mead.
Jack Blackford

DOWNTOWN 87
Vandalism and the urban bee.
Toni Burnham

THE 12 DAYS OF CHRISTMAS 92
We're thinking ahead. Check out the contest you don't want to miss. Win a life time subscription!
Bee Culture Staff

MAILBOX 7

NEW PRODUCTS 11
Hive lifting tool; Honey and tissue screening Oxytetracycline; Pull over bee jacket. Books – The New Honey Revolution; Beekeeping on Two Fronts.

THE INNER COVER 16
Be careful what you wish for.
Kim Flottum

HONEY MARKET REPORT 14
Winter, Spring and so far this Summer.

IT'S SUMMERS TIME! 19
Party on the deck and the County Fair.
Kathy Summers

A CLOSER LOOK – REQUEENING AND QUEEN ACCEPTANCE 21
One of a beekeeper's most difficult tasks.
Clarence Collison

PREPARING FOR A BEEKEEPING COURSE, PART I 33
Planning, preparation and performance.
Larry Connor

ASK PHIL 45
Epi pens; Making honey; Queenless hives.
Phil Craft

ARE THE BIGGEST COLONIES ALWAYS THE BEST COLONIES? 64
Can beekeepers have too much of a good thing?
James E. Tew

SEVEN OR MORE TIMES 68
What price honey?
Ann Harman

BONESETS AND RELATED WILDFLOWERS FOR BEES 77
At least 20 species are known to be reliable honey plants.
Connie Krochmal

GLEANINGS 93
All the news that fits.

CALENDAR 94
Upcoming events.

BOTTOM BOARD 96
A pool shark.
Ed Colby

TV Reporters

I must take issue with Toni Burnham's blanket condemnation of local TV as "a problem waiting to happen" (*BC* July 2014.) At least here in south central Pennsylvania, I and other local beekeepers have had numerous successful interactions with local television reporters, the results of which have been positive and productive.

We know that some aspects of Washington DC are dysfunctional and local TV may well be one of them, but to denounce all local TV stations and their reporters based on this experience is reckless and counter-productive.

Jeremy Barnes
Seven Valleys, PA

Keep Chicken Articles

I'm a backyard beekeeper and also have chickens. Please keep the chicken articles in your magazine coming. I enjoy them very much. The few articles about chickens is hardly 'a disturbing shift away from beekeeping' as Mr. Adkins puts it (in your June issue). As for the horticulture information, it does relate to bees. I garden and am always wanting to learn more about planting things that are beneficial for my bees. I'm sure a lot of your readers are diversified such as myself with other outside activities. Thank you for offering EXTRA pages of new topics. It keeps things interesting.

Pamela Smith
North Carolina

So Much For Local Queens

There's a migratory beekeeper that comes to Ohio every Summer from Florida. He brings hundreds of colonies and deals directly with a few farmers and sets his colonies on their land. He hires a couple of retired beekeepers here to work them during the season. He's here, takes his honey and he's gone. Not an uncommon situation. But here's the rub.

Ohio law says that if he's inspected in Florida, he doesn't have to be inspected here because we respect Florida's program. Ohio's law also says that because he's inspected, he doesn't even have to register his bees in the state, so nobody at all knows where his bees are. That stinks, in my opinion. Of course my bees have to be registered so everyone knows where they are. The assumption is, I guess, that Florida's inspectors are perfect and diseases do not visit those hives while they are here, so no inspection required.

But there's a bigger problem. First, the local-hired beekeepers aren't all that timely it seems, and swarming is a big issue on at least some of the locations. That we know from first hand reports (actually, we do know where some of his bees are, but not because he told anybody). All those Florida swarms with just a little bit of African genes in them (we know that, too, from an incident here) are setting up housekeeping in Ohio. And second, there are a lot of folks in this and other states trying to produce a local queen... and because of these laws and a Florida beekeeper who could care less, that's going to be pretty much impossible...so much for local queens. That's the real issue. He won't tell anybody where his bees are legally located so his Florida-African drones are screwing our Ohio queen programs big time. And West Virginia, Indiana and every place Florida bees go. But what about packages he brings every Spring, you ask? Well, because WE have to register our bees, we know where those packages are and can avoid those beekeepers when we're setting up mating yards. You can't stop what you can't see. But trust me, drones, and you know which kind, are going to be seen shortly.

Believe me, it ain't Ohio's wonderful honey he takes home that we care about, it's those dirty Florida genes he leaves behind that really, really stink. Florida, go home and stay there. Ohio, fix your regulations!

A Ticked-Off Beekeeper In Ohio

Leguminous Bee Trees

It was good to see "A Trio Of Leguminous Bee Trees" in the July magazine that recommends planting leguminous trees in bee gardens. One fact that was missing is that like all legumes, these trees have an added benefit in that they fix nitrogen and improve the soil. I do have one big problem with a species on the recommended list. Mimosa is considered an invasive species in many states. A much better candidate would be eastern redbud (*Cercis Canadensis*), also a legume and a native species. It blooms early in the Spring with flowers lasting two to three weeks.

The Arbor Day Foundation lists it as one of America's most beautiful native trees see www.arborday.org/programs/nationaltree/redbud.cfm. It is much longer lived than mimosa and grows in hardiness zones 4 to 9.

Ken Wantuch
Sophia, NC

Honey Bees - Native??

Recently, while visiting the new Cripple Creek Heritage Center at Cripple Creek, Colorado I was viewing a display of various fossils taken from the Fossil Beds National Monument at nearby Florissant, CO. As a beekeeper, I

The Pollinator Stewardship Council

JIM FRASER RETIRES

Steps Down From Penn State And National Honey Bee Advisory Board

Steve **Ellis**

In July, Jim Frazier stepped down from his current positions as professor at Penn State, and science advisor to the National Honey Bee Advisory Board to spend more time with family, and enjoy a well-earned retirement. The beekeeping industry owes a vast collective debt of gratitude to this selfless, hard-working, gentle legend. When beekeepers first experienced the devastation of CCD and asked for answers, it was Jim Frazier and his research team at Penn State that stepped forward to offer help through the application of good and ethical science in pesticide research. He has been our unwavering teacher, advocate and friend.

Here is a bit of background on Jim Frazier. Born and raised in the small town of Seville, Ohio, he was a member of 4-H, the Grange and star of his high school basketball team. Jim was required to spend much of his time outside of school assisting his father in the family plumbing and heating business, and working in the family garden. But in his free time (and lucky for beekeepers), Jim roamed the fields and woods around Seville in search of one thing . . . insects! Every Summer these insects were preciously preserved in collections that his mother would discover during her Spring-cleaning and throw out, requiring Jim to start from scratch. But he was not discouraged because in his young mind a decision had already been made: he was going to be an entomologist. Although he didn't know exactly what would be required to make his dream come true, he did know college was in his future and although no one in his family had ever been to college, he was determined to get there. A high school science project, assessing the effects of radiation on multiple generations of fruit flies, won him the ire of his mother who battled mutant fruit files for months afterward, and a scholarship to OH State University! In the 1960s OH State University had one of the best entomology departments in the country and it was here that he earned his undergraduate and Ph.D. degrees. Upon receiving his Ph.D., his father, disappointed that he would not be taking over the family plumbing business, but proud of his achievement, remarked, "Well if you think someone is going to pay you to play with bugs, I guess it will be alright."

Jim's first teaching position at MS State University resulted in tenure, a beautiful baby daughter, and a love of duck hunting. After eight years he left Mississippi for a position at DuPont in Wilmington, DE where he worked with a team of biologists, and chemists to design anti-feedents; a strategy with the ultimate goal of developing chemicals that would make plants taste bad to insects rather than poisoning them outright.

After eight years at DuPont, missing the joys of the academic environment (despite the perk of lost Friday afternoons spent on the DuPont country club golf course), Jim landed the position of head at Penn State's department of entomology. His reputation as a successful scientist, previous experience as a faculty member, and knowledge of the industry gave him a unique perspective, and skill set as a department head. For 10 years Jim would lead the faculty, staff, and students through a series of strategic planning retreats, team building exercises, and professional development courses that would lay the foundation for building one of the best entomology departments in the country.

After 10 years as department head, Jim stepped down and joined the ranks of the entomology faculty. By this time he was married to honey bee extension specialist, Maryann Tomasko (now Frazier), and in 2007 joined Maryann, and chemist Chris Mullin to work on the impact of pesticides on pollinators. This team has made a significant contribution to our understanding of pollinator exposure to pesticides.

Upon learning of the National Honey Bee Advisory Board from his friend David Hackenberg, Jim earnestly approached the newly formed volunteer group and offered his help. He was, he explained, uniquely qualified to understand the subject of pesticides from a number of perspectives. His work in academia and private industry gave him insights into the inner workings and thinking which drove both. His scientific background, and current work with colleagues at Penn State, Jim rightly pointed out, positioned him to decipher not only scientific pieces of work for the beekeepers on the group, but also corporate actions and motivations.

Among Jim's many talents are his training as a facilitator in strategic planning retreats. Shortly after joining the NHBAB as "science advisor," he organized and conducted a two-day strategic planning retreat for the NHBAB board October 26 and 27, 2009 at Penn State. At the conclusion of this historic meeting the three appointed representatives from the American Beekeeping Federation and the American Honey Producers Association not only developed a commonly agreed "mission statement" on pesticides, but proved conclusively that members of these two different organizations could work together to address this common threat.

For the next five years, Jim worked tirelessly, and without remuneration, assisting and guiding the work of appointed members of the NHBAB board, as they met with EPA, USDA, Bayer Crop Science, and an extensive list of environmental NGO's. Beekeepers engaged the forces in Washington. With Jim's assistance we met with key leaders, and learned the whos and hows of political policy. Jim Frazier, with Jeff Pettis were instrumental in ensuring larval toxicity studies were recommended for the risk assessment process for all pesticides. Their united support and expertise for requiring lower-Tier larval studies during the Pellston SETAC meetings to develop risk assessments will provide critical data for protecting pollinators.

Because of Jim's tireless and selfless work the beekeeping industry has been heard as never before. BC

was immediately drawn to the fossil of a 35 million year old honey bee. The detail of the fossilized bee was so perfect that it was like seeing a photograph in stone. About the same size as the bees of today, the legs, wings, stripes on the abdomen and even some color of the bee could clearly be seen.

I have always been told that the honey bee was not native to North America and had been imported to the Americas from Europe in the early 1600s, but this fossil is pretty clear evidence that these little darlings were right in the middle of the Colorado Rockies some 35 million years ago. Since that time, so many eons ago, there must have been many ice ages and periods of global warming which probably exterminated them as many times, but thankfully they are resilient little creatures that will prevail despite the ravages of *Varroa*, AFB, Nosema, and the best efforts of man to destroy them.

If anyone plans to visit Colorado, be sure to see one of North America's natives – the honey bee.

Hugh Long
Newton, KS

SC CI Bee Program

The Perry CI (Correctional Institute) Bee Program is always in trouble. This Spring we were down to four hives, the bellows on the smoker were shot, we lost all of our extra drawn comb to wax moths, and they appointed a new coordinator in December who had only opened a hive 12 times – me!

Thanks to family and friends I have books and magazines. *Bee Culture* has been extremely helpful. We are currently at 11 hives. Nine queenright, two splits with queen cells. I am learning and may try one more increase. If so it would be four more hives, OK if the bees are there I would try five.

My books include *The Beekeepers Bible, The Beekeepers Handbook, Increase Essentials, Better Beekeeping* and newest book from my youngest daughter *The Complete Idiot's Guide To Beekeeping*. Which brings the question – was she sending me a really nice birthday present or trying to tell me something?

Thanks against for the work you do.

Robert McCall
Pelzea, SC

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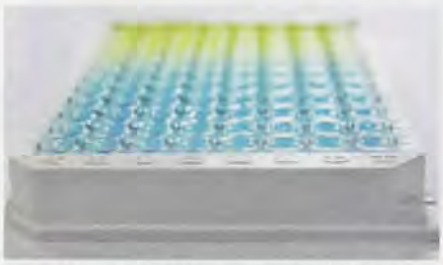
Honey Bee on Applemint. photo by Kim Flottum

Look What's New This Month –

In recent years, Tetracyclines have been used in apiculture for the treatment of bacterial brood infections and although not intended for use during the production of marketable honey, their use could result in presence in honey.

Randox Food Diagnostics have developed the Oxytetracycline ELISA (OX10037A) to detect traces of Oxytetracyclines in honey and tissue. Oxytetracycline is one of the most commonly used antibiotic used in fish farms. The Randox Food Diagnostics Oxytetracycline ELISA has an excellent sensitivity of 3.92ppb for honey and 20ppb for fish and shrimp tissue. **www.Randoxfooddiagnostics.com.**



One-Person Hive Lifting Tool

This tool may be used on all sizes of hive bodies. The brood box has plenty of depth so the tool does not stick below the box. That makes it easy to set down most anywhere. With the medium and shallow boxes just set the first box crossways on an inverted hive cover or another box to make sure the bottom of the hive tool is clear. This tool was designed to make it easier to lift single boxes with weights up to 70 pounds or more. This tool was not designed to be used over an outer cover.

Cost: $50 plus postage. For more information contact Lannie Ballard, **lballard@ntelos.net** with subject – Hive lifting tool.

It's Finally Here!
It's New!
It's Grand!
Go There Now!
Visit Our Brand New Bee Culture Web Page
www.BeeCulture.com

Freeman Pull Over Bee Jacket

1. The veil netting goes all the way around your head for full ventilation.
2. There is a half zipper so the hat and veil can be pushed back off your head to get a drink of water or drive to the next bee yard. (Or because I forgot to put on my glasses.)
3. Breast pockets are always useful.
4. There is a large and a small pocket on the front.
5. Elastic sleeves keep the bees out.
6. The jacket has a long tail with an elastic waist for better protection.
7. For tall, slender people, there is a pull cord on the waist, if needed.

The jackets are loose fitting so they easily slip on and off. You are instantly bee proof! No zipper holes!

These are heavy duty jackets made in the USA. Comes complete - hat, veil and jacket in one unit. Available in Medium, Large and 2X-Large.

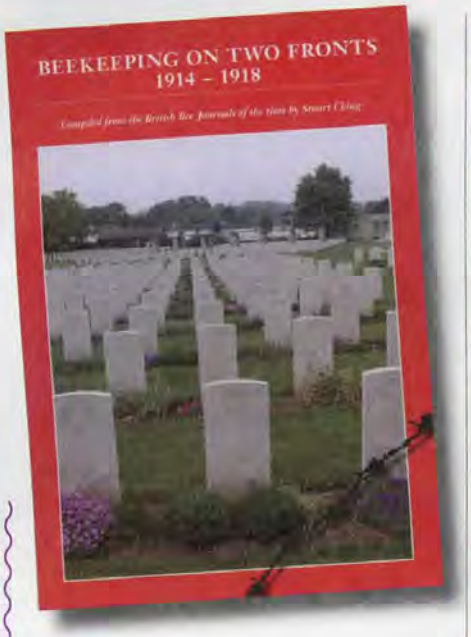
Being old and retired, I decided it was too late to get rich and I wanted the jackets to be affordable. The jackets retail for $44.95 - noticeably less than the zippered jackets.

Jackets can be ordered on my website: **http://freemanbeetletrap.com/** or call 870-853-2412.

The NEW Honey Revolution. Restoring the health of future generations. Revised and Updated, by Ron Fessenden, MD, MPH. Published by and available from TGBTGBOOKS.COM. 5-1/2 x 8-1/2, 232 pages, Soft cover. $12.99.

Perhaps you have already read the other Honey books Dr. Fessenden has produced, including the first edition of this book, and Feed Your Brain First, with honey, of course. If you haven't, get this one, it's even better. This edition has updated the information from the first edition, and covers the benefits of eating honey for a host of problems and health issues. A brief list includes: benefits for sleep, for memory and learning, for Alzheimer's and hypertension. Honey and allergies; for cancer and wound care. Honey for oral care, gingivitis and periodontal disease; and miscellaneous benefits including fuel ofr exercise, alchol detox and liver health, aging and infants.

There's also a discussion on developing a honey standard, unsuccessfully tried in several states already. The argument about is honey, honey if it doesn't have pollen in it comes up, as do the many attempts at standards that already exist, and don't work. The authors final decision is a wise one...no matter what it is, put it on the label. Process, micro-strained, heated, whatever. As long as the consumer knows, it should be OK, right? Well, as long as you can believe the folks who produced the label...so nothing has changed much. His other piece of advice is even better. Know the beekeeper you get your honey from.



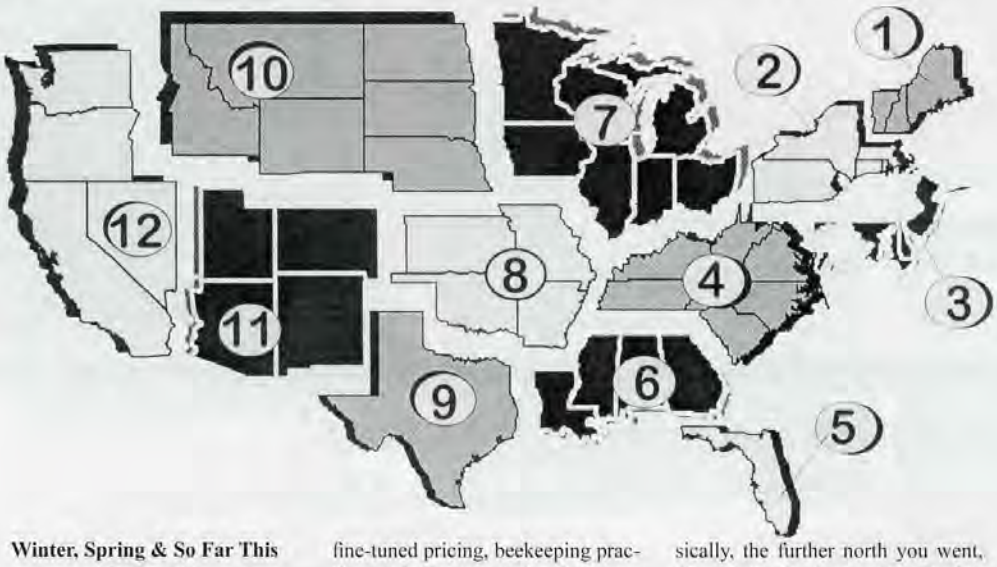
Beekeeping On Two Fronts 1914 – 1918. By Stewart Ching. Published by Northern Bee Books, UK. 9-1/2 x 6-1/2, 52 pages. Black and White. Soft cover. $14.00.

Stewart Ching didn't really write this book. But he did do the digging in the files of the British Bee Journal during those years to find the contributions of three people who did write the book. Of course "The Great War" was ongoing and one of the contributors was involved in heavy action in France. However, between battles and marches, he'd spy beehives or skeps in the backyards of abandoned or destroyed homes and tell his readers in England how the bees were kept and managed. He even came upon a hive with queens emerging, harvested one and sent it home.

The other two writers were holding down the fort back home, taking care of the bees, making honey, enjoying the newest inventions...particularly the extractor. And expanding on the joy of moving to, making and then harvesting heather honey. But the plague of Isle of Wight was upon the land, and bees were scarce or not at all. Crawling bees in front of colonies was common, and a treatment of Dioxogen would save them, but usually by the time they were discovered, a treatment helped very little.

A short glimpse into a time and place we seldom have opportunity to visit. It will increase your appreciation of what we have today.

SEPTEMBER – REGIONAL HONEY PRICE REPORT



Winter, Spring & So Far This Summer

To start with, we are slowly rearranging our Regions, and will have them finalized by the January 2015 issue, so bear with us as we work this out. The pricing columns will remain unchanged for now, but the data from our surveys will begin to be affected with this report. Florida and Texas will no longer be individual regions, and Region 8 will no longer exist as those states will become part of the three states on their north and SW sides. New England, too will be rearranged, resulting in a final seven regions instead of the current 12. Our analysis has more fine-tuned pricing, beekeeping practices and climate to make these new regions better represent beekeepers.

We asked our reporters about Winter losses, now that they've had a good chance to count them, their Spring and Summer crops and any losses this Summer, plus how has the weather been.

The Winter loss data was interesting, and reveling because many beekeepers simply didn't have time to measure losses for the Winter until after the survey was closed. Overall, our reporters had a 39.5% Winter loss this year – far greater than the 23% loss reported by BIP and higher than the 35% reported last year. Basically, the further north you went, the greater the losses. For Region 1 – 45%, 2 – 43%, 3 – 44%, 4 – 40%, 5, 6 and 9 combined – 14%, 7 – 51%, 8 and 10 combined – 60%, 11 – 33% and 12 only 25%.

Fully 83% replaced those lost colonies with either purchased packages or nucs. A good year for selling bees it seems.

Across the board the spring crop was down, with 49% reporting less than average, and only 26% above average crops. Summer losses however are a bright spot, with 74% reporting minimal or no Summer losses, and only 10% having significant losses. Summer weather played a role in that with 40% saying the weather played no role in the Summer crop, but an equal 40% said it played a negative role and of course the remaining 20% said it was better than average.

Prices are up a hair this month compared to last, but that will change as the season winds down and packers find they can't find enough honey from home. Even a great crop here isn't close to what they need to sell, and the rest of the world is hurting worse than we are. Don't sell cheap this Fall.

	REPORTING REGIONS												SUMMARY			History	
	1	2	3	4	5	6	7	8	9	10	11	12				Last	Last
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS													Range	Avg.	$/lb	Month	Year
55 Gal. Drum, Light	2.05	2.25	2.05	2.00	2.45	2.17	2.38	2.05	1.80	2.25	2.31	1.80	1.25-2.60	2.17	2.17	2.21	2.12
55 Gal. Drum, Ambr	2.12	2.00	2.12	1.97	2.22	2.08	2.39	2.12	1.60	2.12	2.14	2.25	1.60-2.60	2.14	2.14	2.11	1.96
60# Light (retail)	218.00	225.00	175.00	177.50	180.00	180.00	188.80	185.00	200.37	171.00	179.00	222.50	144.00-270.00	193.73	3.22	191.61	177.50
60# Amber (retail)	223.50	230.00	175.00	187.40	180.00	176.67	187.60	185.00	195.57	195.57	171.00	215.00	144.00-250.00	194.15	3.23	191.31	176.77
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																	
1/2# 24/case	88.03	88.49	74.40	102.28	109.47	60.00	56.38	109.47	109.47	51.84	85.20	104.00	45.60-225.00	83.63	6.96	75.21	74.73
1# 24/case	127.94	124.18	123.60	96.93	108.00	112.32	93.43	114.00	119.73	106.32	112.50	112.00	79.20-172.80	113.45	4.72	111.72	104.32
2# 12/case	114.92	108.69	115.00	89.33	99.00	93.24	90.58	108.00	105.00	97.44	102.00	97.33	72.00-144.00	102.00	4.25	99.13	94.19
12.oz. Plas. 24/cs	108.61	99.98	76.80	80.53	79.20	83.00	73.40	108.00	97.16	74.40	110.60	92.00	62.40-144.00	91.11	5.06	88.83	83.88
5# 6/case	139.17	123.59	108.00	94.13	126.00	120.73	97.00	135.00	120.73	102.30	115.20	122.50	75.00-175.00	116.47	3.88	112.20	103.54
Quarts 12/case	160.00	189.48	169.00	119.83	144.00	99.01	135.05	126.00	143.68	125.64	135.00	138.50	48.00-258.00	134.35	3.73	135.57	127.32
Pints 12/case	107.25	123.48	96.90	81.40	96.00	71.20	95.64	96.09	66.00	96.09	87.40	86.00	48.00-160.00	88.17	4.89	82.69	94.98
RETAIL SHELF PRICES																	
1/2#	5.03	4.99	3.89	4.11	4.44	3.33	3.34	4.44	4.44	2.96	4.48	6.00	2.12-7.25	4.19	8.38	4.09	3.72
12 oz. Plastic	6.72	5.74	4.63	4.69	5.00	4.30	4.25	5.00	5.36	4.46	5.39	5.73	3.00-8.25	5.10	6.80	5.07	4.73
1# Glass/Plastic	6.97	7.06	6.92	6.26	7.00	6.20	5.14	7.25	6.46	6.15	5.98	7.50	3.00-10.00	6.42	6.42	6.47	6.04
2# Glass/Plastic	12.54	11.08	12.40	10.48	12.00	9.90	9.52	14.00	10.38	9.08	9.43	10.00	2.00-18.00	10.77	5.38	10.80	10.03
Pint	10.00	11.98	10.33	8.66	9.00	7.24	11.08	9.14	6.00	8.00	9.26	11.20	4.00-14.50	9.03	6.02	9.12	8.05
Quart	16.50	17.74	17.33	14.56	13.00	13.14	14.60	21.00	16.06	14.78	14.59	15.73	7.00-27.00	15.11	5.04	15.47	13.69
5# Glass/Plastic	27.83	24.08	30.25	23.60	28.00	25.36	22.90	35.00	25.36	18.65	20.02	25.00	15.00-38.00	24.23	4.84	23.83	21.39
1# Cream	9.90	7.18	11.00	7.42	8.25	8.25	6.64	8.25	8.25	7.52	7.74	9.00	4.90-12.00	8.06	8.06	8.03	7.07
1# Cut Comb	10.38	7.98	11.00	8.40	9.57	6.50	8.90	9.57	9.57	10.00	9.50	13.50	4.50-15.00	9.39	9.39	9.41	8.54
Ross Round	10.00	7.48	8.64	6.10	8.64	8.64	10.00	12.00	8.64	8.64	9.50	8.64	5.00-12.00	8.79	11.72	7.91	8.17
Wholesale Wax (Lt)	7.42	7.31	7.00	5.25	3.40	5.58	6.50	6.00	6.21	6.00	3.93	4.63	3.00-10.00	5.92	-	5.73	4.85
Wholesale Wax (Dk)	5.70	6.30	8.00	4.23	3.15	4.17	5.92	6.00	5.14	5.14	3.53	4.00	2.50-8.00	5.02	-	4.90	4.38
Pollination Fee/Col.	92.40	76.67	120.00	66.60	70.00	55.00	62.50	100.00	98.61	80.00	129.00	132.33	35.00-185.00	87.22	-	89.00	83.07

INNER COVER

After I graduated from high school lo those 49 years ago, I bounced around for a while doing this and that. I went to college for a bit, almost graduated in, would you believe Police Administration Science, but had a healthy dose of reality when I tried on the uniform (all police uniforms, at least in Wisconsin at the time come in XXL, and I was only a M) that made me see the light and move on to other things. Eventually I went back to college in plant science and found where I belonged. But I had a family to feed and tuition to pay and needed to work part time to make ends meet. I was in the horticulture department, but there was a part time job working in the entomology department greenhouse listed on the bulletin board the day I walked in.

Greenhouse, I thought, plants and dirt and sunshine. How much better can it get? So I applied and got the job. Mostly, I imagine, because I was persistent at trying to catch the Professor who had listed the job. He was the State Extension Entomology Specialist for small fruit, large fruit, ornamentals, turf and greenhouse pest management. He was responsible for controlling all the bugs that ate all those crops, and he was on the road a lot.

The job consisted of several tasks including finding the best insect pest management strategy for each of those crops. But mostly it was testing pesticides. So we used apple orchards, cranberry bogs, lots of greenhouse crops, home lawns and flower beds and golf courses, city trees, raspberries and blackberries and blueberries, and more. And every insect or mite that ate any of these was fair game.

We used everything from soapy solutions to methyl parathion, plus I applied hundreds of experimental chemicals that only had numbers for names. We tested existing control chemicals so my boss could tell growers what worked best, what didn't, when to spray and how much in the always ongoing IPM programs we developed. And we were paid by the chemical companies to test those new products to see if they worked, did they damage the plants and at what rate did they work best. It was chemical company money that paid my wages all through college. I was, in the vernacular of the times, a nozzle head. There were several of us in the department, the veggie guys, the row crop guys, the forestry guys, and the fungicide guys and gals and us. Nozzle heads by trade and profession.

The greenhouse part of the job was the most challenging. To teach growers how to control white fly on poinsettias you had to have them in bloom on Labor Day. For Easter lilies, Christmas, for mums, all the time. And to see if a particular chemical controlled a particular pest, you had to have the pest. So I spent time raising aphids, fungus gnats, mealy bugs, white flies, leaf miners, scale, cranberry moth, apple mites, and more. And then I'd kill them. Or not. It was an interesting, and educational job. Because of this experience, after graduation I got a job working at the bee lab in Madison because they knew I could raise all these plants they needed, a lot about the pesticides they might encounter in the field, and they needed someone with those skills so they could study crop pollination with their bees.

OK, why all the history?

With bees, pesticide problems are never far from the surface. If you read our reprint of the AHPA book The Indispensable Honey Bee that first came out in 1973 you'll see that pesticides and honey bees were in the same war and the beekeepers were pretty sure honey bees were losing then, too.

Due to my past association with these chemicals, I've treated a host of crops directly and because I spent time hanging around with the rest of the nozzle heads I got to know what happens when insect pests win the war that all farmers are always fighting.

However, for the last couple of decades the honey bee/pesticide war has been more quiet than not. There have been flare-ups recently, like in the 70s, but *Varroa* has blurred our focus. But now it's come roaring up again. Right off, EPA's testing protocols have been eased or eliminated or changed or something so there's a lot that's not known about what's out there. Add to that the citrus issues in Florida that are heading west to Texas and California and the mushroom clouds of death from the corn planting dust that have exploded, and the infinite number of tank mixes that are untested and unmeasured disasters already happening. And 99 percent of these proven incidents and even the suspect incidents all point a finger at the class of insecticides known as neonicotinoids. They are guilty by design, by suspicion and by default. So much so it seems that European regulators have already put years-long bans on these chemicals in place.

Unfortunately, the science on all of this is whatever you want it to be. If you hate 'em because they are killing your bees, there's science to prove they are the devil's own and you are exactly right. If you want to continue using them, there's science to prove they aren't killing anything except what they are supposed to kill. If you worry about the ecosphere, there's science to prove that once applied they'll immediately spread to all corners of the universe killing everything in their path, and if you look close enough, you can find them in every food, in

Be Careful What You Wish For.

every plant and in every beehive. But if you just don't know if this is a problem or not there's science to show that science just doesn't know either. What's more unfortunate is that not all of this science is good science. Some is slanted by researchers unintentionally because they don't know good science, and some is incomplete and deductions are made on little or no data. As a result of all this you may think the EPA has absolutely abandoned the human race by letting this stuff get out, or perhaps you agree with their measures of the cost/benefit ratio.

There is, by the way, no debate here. There is no back and forth. There is no discussion. There is pro, and there is con, and there is nothing in between. You hate neonics (and by default the EPA policies that endorses them), or you don't. It's not unlike hating GM or Chase, the Yankees or Amazon, AT&T or Wal-Mart.

Well, I pretty much don't like to hear about bees getting killed, and I sure don't want mine to die. So, let's just make these chemicals go away, like they did in the EU, OK? But what then? What happens to all the bugs and the crops they eat if this stuff goes away? Is the war over? Did we win, or do they win?

If you'll take a step back for just a minute maybe you can see what I saw right off. First, there's my dad's voice in the back of my head . . . "Be careful what you wish for son, because you just might get it". And if that's the case, what do we get? Well, I don't know, and I haven't heard anybody ask that question, so I found a couple of folks who today could be compared to my friends in a previous life. If you called them nozzle heads I don't think they'd be offended, but they are more like the Professor in the Entomology Department that hired me years ago. One is a crop protection regulatory chemist researcher, and one is a crop protection product development manager. One knows what these weapons in the war are, and one knows which ones to use when.

So what happens if these nicotine-like compounds are taken off the shelf and out of the sprayer? Does the world end? Do Farmers quit in droves because pest control becomes impossible? Will we have enough food? The noise made by crop protection people is pretty much, yes, all of that happens. The citrus industry will collapse, cotton, corn, soybeans, alfalfa, canola...all these absolutely depend on these chemicals and without them we're mostly already dead.

Well, not quite, according to the experts I talked to.

First, there are a lot of older chemicals still being routinely used in crop protection and will continue to be used because no product is perfect, and there's no predicting a season when outbreaks of some pest occur that were unexpected. So if for some reason neonics weren't available these older products will get used more – carbamates, organophosphates and lots and lots of pyrethroids will be used. The old reliables have not gone away. The difference is that these older chemicals are not as safe to use from a farmer's perspective, and though they cost less (neonics are comparatively expensive because their patents haven't expired) there will be more applications because they don't protect the plants as long.

However, the neonics are pretty broad spectrum products, safe from an applicator's perspective, and have minimum toxicity toward non-target pests and people says the EPA, and from experience these guys pretty much agree with that assessment.

But all things considered, this sounds like, yes, we should get rid of all the neonics being used and let's see what happens. It seems we just don't know enough about them. Make the EPA follow the rules on testing these compounds in all their settings and for all life stages on bees and all non-target organisms, plus soil and water transport issues. Or at least reduce their most sensitive applications to non-bee-visited crops and non-soil-and-water-movement applications. To me, there does seem to be a Plan B available, though it requires using older, more-toxic-to-humans chemicals, and perhaps more of them, and, say my experts, there's nothing in the pipeline from any chemical company out there to replace the neonics so there's no fall back when the old chemicals don't work. It'd be farming like it was 20 – 40 years ago. Wait a minute, is this what I wished for?

So go and read again what it was like in the 70s. Is PennCap-M better than imidicloprid? What about Aldicarb, or Sevin XLR? Are they better than clothianidin? Google all of those and see what you think. And there's a lot more corn, soybeans and canola now to put this stuff on than back then, which means even more of those older chemicals will get used – because they don't last as long, and there's more crops to protect. Was it better then? Like my dad said, be careful what you wish for – you just might get it.

So I'm not so sure. But I know that most of you aren't going to change your mind.

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By the way, September is National Honey Month. The Honey Board has a Honey Month kit you can use to spread the word and get good information out to the folks who what it. Great for farm markets, give aways at stores, county and state fairs, and just a giveaway to customers. Celebrate National Honey Month this year.

It's Summers Time –

Party On The Deck and The County Fair

There was a party on the deck and I was not invited – even though it was my deck. Last month I told you about our garden in pots and specifically about our 'corn on the deck.' Well, we've been watching it closely – nearly ready – just a few more days. You guessed it! A friendly little raccoon invited some of his friends and late one night ate about half the ears of corn that we had in two big pots. He left the ones that were really high on the stalks – I guess he couldn't reach them easily, or maybe he was saving some for another night. But we took care of that. Now some of you are going to chuckle, but here's how we salvaged the remaining corn. We drag the pots with the corn into the garage at night for safe keeping and slide them out the next morning. Fortunately, right in the front of the garage is one of the sunniest spots on our property, so it works. What a way to grow a garden, huh? You have to be clever when competing with varmints out in the country, that is if you want to enjoy some of your own produce.

We thought the deck was a safe haven. There had been no sign of any disturbances and we have our laser lights going. He just must have politely come up on the deck and checked every night to see when the corn would be ready. Or maybe he's been watching from a distance while Kim checks the corn every day.

I'm not a hunter like Jessica, but we do have a neighbor who traps things with live traps and then "relocates" them – we don't ask. So I may pay him a visit and see if he can help me out. Nothing else was disturbed on the deck, just the corn. So I guess raccoons don't particularly like tomatoes or peppers or cucumbers or beans.

We've been hearing coyote for the last few weeks. It's strange to be awakened in the middle of the night to this mournful howling sound that seems pretty close. No sign of any disturbance around the chicken pen. And really no other signs of the coyote, just the howling during the night which stops as abruptly as it starts – almost as if they are singing a song.

We had our Medina County Fair last week and it's always a very big deal around here. Growing up in California I was never really aware of a county fair – I suppose they had one, but there was not attention. I moved to Medina in 1979, right around Fair time and I got to see what a big deal it was. And amazingly over the years that hasn't changed, it's still the highlight of the Summer.

Medina County Beekeepers have a large booth where we sell local honey, some wax items and thousands of honey stix. The honey stix are the hottest item there. It's pretty amazing to watch. We have an observation hive where one of our members is always located to answer all of the questions about the queen and how everything works in the hive. There is a Honey Show, where last year we actually won a Blue Ribbon for a frame of honey.

I'm not sure what draws so many people in. Is it the animals, the games, the farm equipment, the produce, the vendors in the community building – and oh yeah, the food! That's what gets me there – corn dogs and funnel cakes! Those are my two favorites. Then there are the evening events – the tractor pull, the rodeo, the demolition derby and finishing up on Sunday evening with fireworks.

My kids grew up going every year to the county fair. It was a big deal when they could finally go by themselves without Mom. And you still see these packs of teenagers and the pre-teens trying to be really cool. And they do travel in packs, have you noticed that? And you see so many people and you wonder where are all these people the rest of the year. Where do they work, what do they do? So many from such different parts of the community – farmers, business people, old people, youngsters, babies in strollers. It's fun to just sit and watch. Everybody loves the Medina County Fair.

And people love to come to the bee booth and buy their local honey once a year. And talk to the beekeepers, and dream about maybe being a beekeeper some day. "I could do this, I have several acres." That's right, you could do this. We actually end up getting lots of names for our beginners' class from talking to folks at the fair.

The other Summer activity that I've come to enjoy so much is our Medina Farmer's Market. It has grown over the last 10 years into a fairly impressive event. Every Saturday 9:00 a.m. to 1:00 p.m. if we're in town you'll find us there. I like buying local. We know several of the people that have booths there and we try and support what they are doing. We have a town square like a lot of towns in Ohio and that's where it is held. Right in the middle of town and there are small shops that open up around the square to be part of the activity. Nothing better than fresh vegetables just picked maybe the day before or even early that morning.

It's hard to believe Summer is winding down. I hope your Summer has been pleasant and that your garden has done well.

Hardy Summers

A Closer LOOK

REQUEENING & QUEEN ACCEPTANCE

Clarence **Collison**

One of a beekeeper's most difficult tasks.

Young vigorous queens are essential to successful beekeeping. The oviposition potential of honey bee queens decreases with age, therefore it is important to replace old queens with younger ones on a periodic basis. However, queen replacement can be problematic since many introduced queens are not accepted, and virgin queens are less easily accepted than are mated queens (Moretto et al. 2004). Honey bee colonies do not readily accept a queen that is not their own (DeGrandi-Hoffman et al. 2007).

Worker honey bees can distinguish between their own and foreign queens on the basis of individual characteristics (Boch and Morse 1979; Breed 1981). This has been demonstrated by giving a swarm of bees the choice between its own queen and a foreign queen, each placed a few meters away from the swarm cluster (Velthuis and Van Es 1964, Morse 1972). The bees regularly moved to and joined with their own queen while a small number of workers immobilized (balled) the foreign queen. Workers required close antennal and/or proboscal contact with queens before they could distinguish between them. Boch and Morse (1974, 1981) suggested that discrimination was based on differences in the odors that adhere to the bodies of the queen. The olfactory cues which workers use when discriminating between queens may be odors that the queens have acquired from the hive environment, or may be pheromones that the queens produced themselves (Breed 1981). Queen pheromones vary among individuals in both quantity and composition and may convey information on the physiological state of a queen, reflecting differences in diet, rearing history, age, mating etc. (Ambrose et al. 1979). The colony odor is acquired from the food the bees share extensively within the hive. Every colony develops its own distinctive odor as each collects nectar and pollen from a different range of flowers (Ribbands 1953). Renner (1960) showed that, in addition to colony odor acquired by feeding or direct contact, the odors in the hive atmosphere may be adsorbed to the body cuticle of bees.

However, even after queens have been exposed for several days to the same hive atmosphere, worker bees are able to differentiate between them and recognize their own queen (Boch and Morse 1979). This indicates that adsorption of different odors onto the body surfaces of queens is not entirely sufficient to explain their individual odor characteristics. Free et al. (1990) separately caged two queens with groups of young sibling workers which were the daughters of another queen. The cages were exposed to the same environmental odors for 10 days. When placed in a test apparatus and given a choice of both queens, workers segregated towards the queen with which they had been caged. This provided further evidence that the distinctive odor of an individual queen is probably partly inherited and is learned by workers.

Recent behavioral evidence suggests that the distinctive odors of queens are in part genetically determined. Breed (1981) exchanged honey bee queens among small groups of workers kept in the laboratory. His inbred sister queens were more readily accepted (35% of the exchanges) than outbred sisters (12%), whereas non-sister queens were all rejected. In the field, Boch and Morse (1982) demonstrated that recently dequeened swarms clustered around queens that were sisters to their own queen in preference to unrelated queens. These studies relied upon agonistic responses as indicators of discrimination, and queens were sometimes stung.

A foreign queen introduced to a colony (in the presence or absence of the colony's queen) is typically surrounded by a tight cluster or "ball" of workers. Robinson (1984) introduced foreign queens into observation colonies containing individually marked workers and observed three distinct, simultaneous responses: 1) complete passivity; 2) nonaggressive balling behavior; and 3) aggressive balling behavior.

"The survival of queens to 14 days and 15 weeks after introduction into an established bee colony increases with increasing age of the queen at introduction."

Balling persisted for 9.2 hours and involved approximately 15-20% of the colonies' populations. Participation in a ball was age-dependent, with 91.2% of the balling workers 12 days old or older. Only a small fraction (0.5-2%) of the colonies' workers behaved aggressively, while the remainder displayed nonaggressive balling behavior. Aggressive workers spent significantly more time in a ball than did non aggressive workers, but there was no difference in age between the two subgroups. Foreign queens were not killed immediately upon introduction and were not continuously attacked throughout the balling period. Balling workers gradually became conditioned to some foreign queens beginning three to five hours after introduction; the incidence of worker aggression steadily decreased while queen activity increased.

Queen replacement is especially difficult in Africanized honey bee colonies. Moretto et al. (2004) assessed the influence of genetic origin (queen mother) on the acceptance of queens, when they were introduced as virgins into Africanized honey bee colonies in Brazil. For this purpose, 12 daughter queens from each of 11 mother queens with no degree of kinship among themselves were introduced. Introductions were made monthly, for 12 months, though the Winter months of June and July were not included, as there is little brood and drones are rare in Winter. There was some seasonal variation in the acceptance rates; generally there was greater acceptance in months with good honey flows. However, the acceptance of introduced queens was influenced by their origin. The rate of acceptance of daughter queens from the 11different mother queens varied significantly, ranging from 33 to 75%. There appears to be a genetic influence of the mother queen on the introduced queen acceptance rate.

Mated European honey bee queens were introduced into Africanized and European colonies in Arizona to determine if acceptance rates differed (DeGrandi-Hoffman et al. 2007). Prior to introduction, volatile compounds emitted by queens were collected. More queens were accepted by European colonies compared with Africanized. The highest supersedure rate occurred in Africanized colonies during summer introductions. Queen acceptance did not differ between European and Africanized colonies during Spring or Fall introductions. E-β-ocimene was the only compound consistently detected in queens prior to their introduction, and was present in lower amounts in queens that were rejected within the first week of their introduction. The best time to introduce European queens appears to be in the Fall when overall rejection rates are the lowest.

A study was conducted to evaluate the role of weight at emergence of Africanized honey-bee virgin queens on their acceptance and beginning of oviposition when introduced in Africanized mating nuclei in Brazil (Medina and Goncalves 2001). Africanized honey-bee virgin queens weighing at emergence: 1) less than 180 mg, 2) between 180 and 200 mg, and 3) more than 200 mg, were introduced into mating nuclei. The results showed that the weight at emergence of

Africanized virgin queens did not significantly influence their acceptance by the colony's workers or the beginning of oviposition. However, virgin queens weighing at emergence between 180 and 200 mg had slightly higher acceptance rates and reached the egg laying stage (with higher mating success = 79.3%) than virgin queens weighing both less than 180 mg and more than 200 mg at emergence (mating success = 62.9 and 70.9%, respectively). In this study queen honey-bee oviposition started at 12.6 days old, with a range of nine to 17 days. In Africanized mating nuclei it has been observed that virgin queens were more readily accepted when they were less than five days old, when queens were confined into the colony for at least 48 hours before liberation and when the recipient colony was queenless for at least 24 hours before virgin queen introduction. In addition, mating nuclei need to have capped brood (Silva et al. 1995).

The acceptance and survival of queens in honey bee colonies located in a tropical region of Mexico were recorded. Four methods of queen introduction were compared: the traditional (Benton mailing-cage), the traditional plus smearing hexadecane on the cage, the traditional plus rubbing the old queen on the cage screen and the traditional plus smearing vanilla essence on the cage. The highest rate of queen

acceptance was obtained with the traditional method, which yielded 80.4% successful introductions. This method differed from the traditional plus hexadecane and from the traditional plus old queen rubbing methods, but was not different from the traditional plus vanilla essence method. Of the original experimental queens, 60.8, 39.6 and 28.1% were still in their hives, six, nine, and 12 months after being introduced and accepted in colonies. Queen replacement and queen loss increased over time. Six, nine, and 12 months after queen introduction, 28.8, 46.2 and 56.5 % of the experimental colonies had new queens; whereas in 10.4, 14.2 and 15.4% of them, no queens were found for the same periods, respectively. These results do not support the use of chemicals and queen substances to increase queen acceptance by workers in honey bee colonies. Therefore, it is suggested that beekeepers continue using the traditional methods of queen introduction, until more reliable methods are developed and tested (Guzmán-Novoa et al. 1998).

The survival of queens to 14 days and 15 weeks after introduction into an established bee colony increases with increasing age of the queen at introduction. Survival rates increased strongly to high levels for queen bees introduced between seven and 24 days of age and at a slower rate for queens introduced at ages up to 35 days. The survival rates were similar for sister queens introduced into two unrelated apiaries suggesting that

"While requeening in the Spring is easier because the colonies are smaller and the queen easier to find, there are several advantages to "Fall" (late Summer to early Fall) requeening."

apiary site and beekeeper management differences had minimal effect on survival rates. A year effect was found but the response to increasing age was similar for the three years (Rhodes et al. 2004).

The effects of requeening colonies in the last week of July with newly mated queens, mature queen cells or supersedure cells, on sealed brood, adult worker bee populations and colony population demographics were assessed at twelve day intervals until early December (Harris 2008). Requeening altered brood rearing patterns, adult worker bee populations and colony demographics. Requeened colonies contained populations with higher proportions of young bees which should increase overwintering success. By early December, colony population sizes converged amongst treatments and were not statistically different.

The effect of late Summer requeening on the subsequent development of honey bee colonies during Autumn and when confined in an indoor wintering facility was extended with observations on sealed brood production, colony size and colony demographics every 12 days from March 11 until August 14 after they were removed from their Winter quarters (Harris 2010). Average adult populations declined for the first 48 days, and then recovered over the next 24 to 36 days once adult emergence consistently exceeded worker mortality. Rates of mortality for wintered workers were similar to those recorded for bees emerging in April, May, June, July and most of August. The last surviving bees from worker cohorts marked in September and October 1976 died between June 3-15, 1977. Requeening treatment effects were quite variable and not statistically different. Requeened colonies were, however, generally larger than those headed by older queens when the experiment was terminated on August 14 and these colonies were killed and counted. The nine largest colonies belonged to the requeened treatments and contained on average 8,637 more bees (range 85 to 17,735) than the largest colony that had not been requeened. One of the requeened colonies was estimated to have contained slightly more than 80,000 adult bees at its peak population on July 9th.

Several techniques commonly are used for queen introduction. Unfortunately, there is not one sure way of doing it. The first step in requeening is to find the old queen and kill her. Also check for queen cells and remove them before attempting to introduce the new queen. Requeening is most

successful during a nectar flow. Bees will more readily accept a new queen in a honey flow because the old worker bees are occupied with other duties. Young worker bees do not pose a threat. In the absence of a nectar flow, feed the colony sugar syrup during requeening. Do not start dequeening the colonies until the new replacement queens are available. Requeening will be more successful if only a short time elapses between the time the old queen is killed and the new one introduced. Introduce queens during the warmest part of the day, except when there is danger of robbing. New queens are normally protected from "balling" by confining them in a cage for at least 48 hours before they are released into the population.

While requeening in the Spring is easier because the colonies are smaller and the queen easier to find, there are several advantages to "Fall" (late Summer to early Fall) requeening. Better climatic conditions and larger drone populations favor queen rearing and mating during the Summer in comparison to early Spring. Young vigorous queens will lay eggs later into the Fall, so a colony has a higher percentage of young bees to survive the Winter. Fall requeening stimulates rapid Spring buildup and aids in swarm control. Finally, young queens start laying earlier in the Spring and are less likely to be superseded the following year. BC

References

Ambrose, J.T., R.A. Morse and R. Boch 1979. *Queen discrimination by honey bee swarms.* Ann. Entomol. Soc. Am. 72: 673-675.

Boch, R. and R.A. Morse 1974. *Discrimination of familiar and foreign queens by honey bee swarms.* Ann. Entomol. Soc. Am. 67: 709-711.

Boch, R. and R.A. Morse 1979. *Individual recognition of queens by honeybee swarms.* Ann. Entomol. Soc. Am. 72: 51-53.

Boch, R. and R.A. Morse 1981. *Effects of artificial odors and pheromones on queen discrimination by honey bees.* Ann. Entomol. Soc. Am. 74: 66-67.

Boch, R. and R.A. Morse 1982. *Genetic factor in queen recognition odours of honey bees.* Ann. Entomol. Soc. Am. 75: 654-656.

Breed, M.D. 1981. *Individual recognition and learning of queen odours by worker honeybees.* Proc. Natl. Acad. Sci. USA 18: 2635-2637.

DeGrandi-Hoffman, G., D. Gilley and J. Hooper 2007. *The influence of season and volatile compounds on the acceptance of introduced European honey bee* (Apis mellifera) *queens into European and Africanized colonies.* Apidologie 38: 230-237.

Free, J.B., A.W. Ferguson and J.R. Simpkins 1990. *Queen discrimination by honeybee* (Apis mellifera *L.) workers.* Apidologie 21: 493-500.

Guzmán-Novoa, E., R.E. Page Jr., and D. Prieto-Merlos 1998. *Queen introduction, acceptance and survival in honey bee (Hymenoptera: Apidae) colonies of a tropical, Africanized region.* J. Econ. Entomol. 91: 1290-1294.

Harris, J.L. 2008. *Effect of requeening on fall populations of honey bees on the northern Great Plains of North America.* J. Apic. Res. 47: 271-280.

Harris, J.L. 2010. *The effect of requeening in late July on honey bee colony development on the Northern Great Plains of North America after removal from an indoor winter storage facility.* J. Apic. Res. 49: 159-169.

Medina, L.M. and L.S. Goncalves 2001. *Effect of weight at emergence of Africanized* (Apis mellifera *L.) virgin queens on their acceptance and beginning of oviposition.* Am. Bee J. 141: 213-215.

Moretto, G., J.C.V. Guerra, H. Kalvelage and E. Espindola 2004. *Maternal influence on the acceptance of virgin queens introduced into Africanized honey bee* (Apis mellifera) *colonies.* Genet. Mol. Res. 3: 441-445.

Morse, R.A. 1972. *Honey bee alarm pheromone: another function.* Ann. Entomol. Soc. Am. 65: 1430.

Renner, M. 1960. *Das Duftorgan der Honigbiene und die physiologische Bedeutung ihres Lockstoffes.* Z. vergl. Physiol. 43: 411-468.

Rhodes, J.W., D.C. Somerville and S. Harden 2004. *Queen honey bee introduction and early survival – effects of queen age at introduction.* Apidologie 35: 383-388.

Ribbands, C.R. 1953. The Behaviour and Social Life of Honeybees. Bee Res. Assoc., Ltd., London, 352 pp.

Robinson, G.E. 1984. *Worker and queen honey bee behavior during foreign queen introduction.* Insectes Soc. 31: 254-263.

Silva, E.C.A., R.M.B. Silva, J. Chaud-Netto, A.C. Moreti and I.P. Otzuk 1995. *Influence of management and environmental factors on mating success of Africanized queen honey bees.* J. Apic. Res. 34: 169-175.

Velthuis, H.H.W. and J. Van Es 1964. Some functional aspects of the mandibular glands of the queen honeybee. J. Apic. Res. 3: 11-16.

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The Science Of Pathogens

It Has To Do With Density, Virulence and Transmission

Jennifer **Berry**

Honey bee research at times can be a challenge. What am I saying? It's more than a challenge; it's actually very difficult. Take our latest project as an example. It has been by far the most trying project that I have yet to be involved with. But, at the same time, it has been extremely rewarding because of the folks we've had the opportunity to work with.

Several years ago, Dr. Berry Brosi and Dr. Jaap de Roode, both of Emory University, approached our lab about collaborating on a United States Department of Agriculture (USDA) grant. We agreed without hesitation. And, our joint venture has since moved on to an additional National Institutes of Health (NIH) grant, which will fund the lab for the next five years. In a future article, I'll go into more detail about the study and the Emory team, but, for now, I'd like to give some essential background information about the study.

In a nutshell, the question posed by this study is, "Have we, the beekeepers, created a more virulent mite?" Now, this question stems from research conducted by Dr. Thomas Seeley. Back in 2002-2005, he discovered feral colonies in the Arnot Forest of New York thriving with *Varroa destructor* (Seeley, 2007). This situation raised the question; had bees developed resistance to the mites and/or had the virulence of the mites changed. So, he designed a study to investigate just that. The results of his study did not support the theory that the bees had evolved mechanisms of resistance to mites. However, it did call to question the virulence of the mites living with those bees. Something was going on. Otherwise, why were the bees still alive? Before we go any further, let's back up a bit.

As you are reading this, there could potentially be pathogens all around you. They may be on the chair you are resting in, the desk you have your legs propped on, or the couch you are sunk into. You may find pathogens hanging around on your kitchen table or countertops, on the oven, in the fridge, and in the microwave. When you step outside, pathogens can be hiding anywhere: lurking under stones, slithering in the grass, and lying in wait just to get a taste of you . . .

So, what is a pathogen? The true definition is something that causes a disease such as a virus, bacterium, or other microorganisms. Some parasites are also considered pathogens. All pathogens are parasites, but not all parasites are pathogens; if a parasite doesn't cause a disease, it's not a pathogen. Now, when discussing pathogens, there are two terms that go along with it: pathogenicity and virulence. Pathogenicity by definition is the ability to cause a disease, which is absolute and qualitative. It either does or doesn't cause a disease. To be a pathogen, it must cause a disease. Otherwise, it's just benign – like the bacterium floating around in that soda you're drinking. Yummy!

On the other hand, virulence is a bit more complicated. Virulence is variable and quantitative. By definition again, it is the measurable capability or ability of a pathogen (micro or macro) to cause disease. It is positively correlated to the pathogen's reproduction rate within the host and negatively correlated with the host's fitness. Let's explore this further.

Say you're heading out of town and about to board an airplane. As you are standing there waiting for your zone to be announced over the intercom, the superficially charming lady behind the podium states that this flight is full and calls for volunteers to check their baggage or take a later flight. You have a meeting in Chicago this evening; so, volunteering is out. You look down at your boarding pass and realize you are in zone 4, which, of course, is the last section to board. Your group finally gets called, and you join the automaton, conga line shuffling toward the plane.

Once inside, you wait patiently for the people arranging carry-ons in the overhead compartments, adjusting wardrobes, and moving into their seats from the aisle ahead of you. You try not to bang your own bag into anyone's knee or elbow as you weave your way down the alleyway. And, finally, you arrive at row 32 – deep in the bowels of the great, aluminum beast. You stow the overstuffed bag and offer apologies several times to the person in seat C as you climb over their legs and squeeze yourself into the center seat (your favorite!). Very

"Moving 1.6 million colonies to California, we have facilitated the transmission of mites (pathogens) and created conditions (high host densities) conducive to increased virulence."

quickly, you notice the person in the widow seat to your right who looks like he hasn't slept in days; he has dark circles under his eyes, pale and clammy skin, and then, here it comes, the tell-tale gurgling cough. Oh great! I'm sitting next to the sick guy. Well, technically, everyone on the plane is sitting next to the sick guy. You feel bad for him, but, at the same time, you wish that you had gotten that flu shot!

In the case of the flu, each time your travel partner coughs, small water droplets encasing viral particles are released into the air of the passenger cabin. And, as you're sitting there, trapped in your seat, you breathe in these small viral pill bombs. As they make their way through your sinuses and into respiratory system, voila, you become infected. You might not begin to feel the symptoms for days, but the war in your body has begun.

Viruses are nothing more than genes (RNA or DNA) wrapped in a protein coat. This outer coat is covered with spikes, which are like keys. The outer membrane of your cell contains receptors or locks. If the key fits the lock the virus basically fools the cell into allowing access through the membrane. Once inside the cell it races through the cytoplasm until it reaches the nucleus. Just outside the nucleus, the virus breaks up releasing the genes along with chemicals called polymerases, which help to copy these viral genes inside the nucleus. After thousands of these genes have been replicated, they move out of the nucleus and into the cytoplasm where they form new viral particles. Thousands of these new particles force their way out of the cell with only one mission: to find other healthy cells to infect so replication can start all over again. Within days of your exposure, millions of flu viruses have infected millions of your cells. Then, your immune system kicks in, your temperature rises, and you begin to feel like crap.

So, where does virulence come into play? As you know, all living organisms (or, at least most of them) want to reproduce and pass on their genes; thus, life continues on this planet. In the case of a pathogen, however, reproduction is in the immediate sense, as with the flu virus replicating inside your cell, but transmission is equally important in the greater scope of survival. In other words, pathogens need to migrate to other hosts where reproduction can continue. Reproduction and transmission are both very important to any pathogen.

Virulence describes the rate or intensity of reproduction within a host. And, usually, reproduction within the host causes harm. So, if the reproduction (and, therefore, harm to the host) is at a high rate, this could effectively decrease the likelihood of successful transmission to the next host.

"If there are plenty of hosts available then the pathogen doesn't necessarily have to keep the host alive. So, reproduction can increase, which decreases the host fitness, but, who cares, there's one right next door?"

Think about it. If the host becomes immobile or dies too soon, then transmission may not occur to the next host (the means of transmission and proximity of host candidates are factors that we will discuss in a minute). On the flip side, if too little reproduction occurs within a host, and the pathogen is too easily overcome by the host's immune system, this, of course, may also defeat transmission. So, one would think that natural selection would favor pathogens that find a workable balance between the costs and benefits of harming the host. In other words, there needs to be a correspondence between reproduction and transmission, which translates into a functional relationship between the pathogen and the host. As examples, let's compare two viruses that infect humans: the Ebola and the common flu.

Since December of 2013, several West African countries (Liberia, Sierra Leone, and Guinea) have seen the deadliest outbreak of Ebola ever recorded. Over 500 people have died so far and there are still new cases being reported. While this is scary news, these are not huge numbers however, Ebola is considered an extremely virulent virus because most people infected with Ebola usually die. To become infected, you must come into direct contact with the infected blood or other bodily fluids from an existing host, including certain tropical monkeys and fruit bats, or contaminated medical equipment. This direct fluid contact is the means of transmission, and it is not one of casual encounters - thank goodness! Yes, the Ebola virus replicates so quickly and effectively within the host, it usually knocks down its host too quickly for transmission to another host to take place. And, if

transmission fails, that particular stem of infection ends upon the host's death.

Luckily for us, so far, the disease has remained in the isolated regions experiencing the outbreaks. Plus, according to the World Heath Organization, Ebola is *not* one of the hemorrhagic fevers transferred by a vector (ticks/mosquitoes). This is a good thing since vectors can easily increase the transmission of disease.

When we loosely compare Ebola to the common flu virus, there's a difference. Reproduction occurs in both, yes, but not to the same degree of injury to the host. Sure, the sick guy on the plane was suffering, but not so much that he had to cancel his travel plans (and ruin the transmission opportunities for the virus!).

In theory, host density will also affect virulence. If there are plenty of hosts available then the pathogen doesn't necessarily have to keep the host alive. So, reproduction can increase, which decreases the host fitness, but, who cares, there's one right next door? On the other hand, low host density will favor lower virulence since there's little to no opportunity to transmit.

Now, let's get back to the world of the honey bee and how host density comes into play. Century old records from Russia reported there were 0.4 honey bee colonies/ km^2 in the Northwestern forests. Research conducted in Ithaca, New York by Dr. Thomas Seeley discovered feral colonies occurred at a density of approximately 1 col/ km^2 (Seeley, 2006). A km^2 equates to 247 acres. Do we beekeepers keep one colony per 247 acres in our apiaries?

Each year, roughly 1.6 million honey bee colonies head to the almond orchards of California in order to pollinate hundreds of thousands of acres of blooms. So, bees and mites from all over the U.S. are unnaturally convened into one area. Plus, prior to moving into the almond orchards, thousands of colonies can be packed into temporary staging yards for weeks. Hence, the mixing of bees and mites begins. Does this sound familiar – i.e., the airplane ride story? With this one move, we have facilitated the transmission of mites (pathogens) and created conditions (high host densities) conducive to increased virulence.

Even when those girls return home from California, they are typically kept in apiaries with 10, 20, 30 or many more colonies. Because of this one management strategy (high colony density), are we, the beekeepers, creating conditions that foster *Varroa* mites, and the viruses they vector, to become more virulent? And, what about other management techniques that may aid in pathogen transmission, such as: mite treatment applications, resource equalizing efforts, performing splits, and swarm control measures? Are they amplifying virulence not only in *Varroa* but in honey bee diseases as well? Lots to consider here.

Ok, long story long, but I wanted to give some background information before I went any further. When we first started working on the concept of this study, it took me awhile to get my head wrapped around the idea of virulence and all that comes into play. Next's month I'll go into more detail about what we've had to do in order to achieve the goals of this study and why it has been so difficult. See Ya! BC

Jennifer Berry is the Research Coordinator at the University of Georgia Honey Bee Lab.

Preparing For A Beekeeping Course, Part I

Planning, Preparation and Performance

Larry **Connor**

Preparing for a Beekeeping Course

Planning a course on beekeeping – of any length – requires considerable thought and planning. From a one-day bee school to a full semester, college-length course of instruction, there are many concerns that planners and teachers should address well in advance and not expect to have it fall into place without some effort. In these articles, we will look as several key elements of planning a successful beekeeping educational experience.

Design the class for the students who are likely to attend. The content of your course, not to mention the length of the program, will be directly influenced by the nature of your expected student population. If you are doing a survey bee school that 'just' shows how to get started with beekeeping, you will have a far different focus than if you want to offer a college course in bees and beekeeping, including some in-depth work on bee biology and more advanced concepts.

One-day Bee Schools

Many clubs offer **one-day bee schools** to provide a survey event for a large number of beekeepers. Several of these have grown quite large over the years, such as the Tri-County Beekeepers Association Annual Spring Workshop. Started over 30 years ago by Dr. Jim Tew and Sherry Ferrell working with the three local bee clubs around Wooster, Ohio, Enrollment is now cut off at a thousand participants and, with that level of success, the program is worthy of study. (They already have information on their website for the 36th Annual Spring Beekeepers Workshop for March 6-7, 2015, with registration opening in January 2015. Contact: **educationcommittee@tricountybeekeepers.org**.)

Format: There is a keynote speaker as the first speaker in the morning. The rest of the day offers a wide range of programs in breakout sessions for non-beekeepers, new beekeepers, and beekeepers who want to learn more about specialty items, like mead production, queen rearing, cooking with honey, value added products and much, much more. It is a full and crazy day, and the Tri-county group should take some bows for keeping it going after Tew and Ferrell's retirement.

Textbook: There is no textbook for the day because no one book would meet the needs or interests of all participants. Plus, nobody would have time to read it until they returned home. Some speakers have handouts of materials that they provide to cover their topics.

Food: The food at this event is very good and has to be one reason people enjoy the day. The coffee pot is full all day, along with other beverages. There is a large table filled with calorie-dense sweet rolls and other treats. This is not a dieter's bee school.

Fee: The fee has been increased recently because The Ohio State University charges more for the use of the facilities which are completely taken over by the beekeepers.

Organization: The event is run by a group of volunteers who meet all year to plan the next event. They use survey forms to help plan future programs, using this as a method of solving any glitches in registration, events during the day, as well as provide feedback for speakers and topics. This gives each participant a chance to suggest a topic or speaker they would like to have on the next year's program. It is clearly one way to keep up with trends and what is on beekeepers' minds.

Strongest point: This event has introduced a large number of beekeepers to beekeeping, and given these people a chance to talk to the many speakers and vendors and obtain bees, beekeeping equipment, books, and plenty of advice on how to keep bees. After beekeepers get started, the program features a well-known speaker as well as many experts and specialists in the topic areas.

The content of your course, not to mention the length of the program, will be directly influenced by the nature of your expected student population.

Most one-day schools are smaller, and more intimate than the Tri-county event. Search out your local bee associations for examples of what they do and how they approach educational events.

Nightly or Multi-Weekend Bee Classes

Many bee clubs offer **nightly or multi weekend bee classes** during the Fall and Winter months which are limited to a manageable number of new beekeepers, somewhere between 30 and 100 participants. Not everyone finishes the classes, but even the many participants who do not start with bees will learn a great deal about them during the training. These events enable their participants to make informed decisions based on additional information learned from the program.

Instructors: The people who instruct the classes (they run from two to ten weeks in length) include supply dealers, bee inspectors, extension specialists and master beekeepers. Longer courses are often set up with multiple instructors, distributing the teaching load over a larger base. Some classes are set up with donated lecturers who often are selling bee equipment or bees to the participants. Others pay their instructors between $100 and $300 per evening of instruction, which usually figures out to minimum wage if you consider the preparation time some of these classes require.

Fees and textbook: Course fees run as low as $35, which might include a copy of an inexpensive book with each registration like Dadant's, *First Lessons in Beekeeping*, or Connor and Muir's, *Bee-sentials: A Field Guide*, to registration fees over $200 which may include Root's, *ABC and XYZ of Bee Culture*, or Caron and Connor's, *Honey Bee Biology and Beekeeping*. The planners need to put together a budget that includes facility rentals, break expenses (coffee, cider and fresh fruit, for example), speaker expenses, textbook and handout costs (many of these are purchased in bulk), advertising and promotional expenses and a bit of a cushion, just in case. Some bee clubs use their bee classes as a way of both attracting new members (and may include a one-year membership in the registration fee) as well as earn money for the club's speaker expenses for the rest of the year.

Organization: Many of these programs are put together by a local bee club's board of directors or may be the work of a single person who knows, through experience, how it all needs to go together. These people are generally all volunteers. Planning starts about six months in advance to reserve the meeting room and to plan for speakers and advertising. Registration generally starts two to three months before the event starts. Pre-registration is generally required, if not essential. A 'wait' list is started in case someone needs to drop out at the last minute due to illness or employment conflicts.

Smart groups have the experienced meeting planners work with new volunteers who learn how the course is set up and organized. This provides for a smooth transition to new leadership to share the 'opportunity' planning such a program offers.

Strongest points: These programs are best run using a textbook and a series of handouts featuring local contact information and key Internet links. By scheduling an event over a series of days, participants can be asked to read and study the next topic. Each meeting often starts with a question and answer period that is very helpful to new beekeepers who have had time to think about the content of the previous class.

Specialty Classes

A few bee clubs and state associations offer **specialty classes** on topics such as queen rearing, mead making, and value-added products. I learned about some of these programs when organizers contacted me for a quantity purchase of a book on queen rearing or making nuclei colonies – this how I found out that they were bringing in a well-known speaker to conduct a weekend course and that person had requested a certain textbook. It is not uncommon for these specialty classes to attract two or three hundred participants when advertised well and the venue is large enough for such a group. The disadvantage, of course, in such a lecture course is that they tend to be at the expense of field work (usually not included) to apply the information being learned and one-on-one time with the instructors.

Fees are often set to cover the speaker's expenses and honorarium, which may run $1,500 to $2,500 per day, depending on the topic and the experience of the speaker. While a few bee clubs react poorly to such fees, when divided by 100 or 200 student registrations, the cost per person is quite minimal for a top-quality speaker.

I have had excellent success by offering more advanced topics in bees and beekeeping in a one-day format for state and provincial beekeeping associations who have me arrive one day before their annual meeting. I offer four lectures and discussion periods of 1.5 to two hours each, followed by a break. In the case of an upcoming class with the Texas Beekeepers Association in November, the registration fee is collected by the association treasurer as part of the total meeting registration process. With other groups, individuals register directly with my firm using our website and PayPal payment options. About 80% of the participants register using on-line registration, which saves time and provides excellent contact information. With these classes, I am the one at risk as I have to front the cost of travel and motel expense, rather than the state association. The benefit is when the class fills and there is enough money to get home!

Developing an outline and timeline.

Whether you are doing a small class or a large one, some forethought about organization and planning is essential. One successful approach to this planning is to use a successful format from a prior program (or to emulate a similar, successful

Volunteer jobs include the mundane, like buying snacks for breaks at a box store or the sublime, like waiting for a guest speaker to arrive from across the country.

program).

A simple way to organize yourself or a group of people is to have a dedicated calendar (physical or digital) that tracks the key dates certain items must be completed by. For example, advertising and registration should start three months prior to the event. Speakers need to be engaged 12 to 18 months in advance, especially if they are 'on the bee circuit'. Record dates when deposits are due and when bills need to be paid. If you are sharing the planning duties with other people, having this information available on an on-line calendar is essential to coordinating important tasks.

Key organizer and helpers. Just how many people do you need to run a bee school? Groups like the Eastern Apicultural Society and the Heartland Apicultural Society have relied on a few officers and a support staff of volunteers that do an excellent job. Volunteer jobs include the mundane, like buying snacks for breaks at a box store or the sublime, like waiting for a guest speaker to arrive from across country. Registration is a huge volunteer job, usually coordinated between the treasurer and the registration committee chairperson.

Personally, I find the most inefficient method of running a beekeeping course is when an entire board of directors feels empowered to muscle in, change directions and generally make a mess of someone's efforts. The ideal model is to have one to three people who are 'in charge' and have total control of the event, working under the supervision but not the interruption of the board of directors. Without this authority, it is like hiring an employee to do a job and micromanaging the person until he or she walks out in frustration. Find the best person you can to do the job and let them do it. For better or for worse, many clubs make the vice president organize all educational events. While this often works well, it fails when the person elected into the position is not experienced with program organization or lacks the skills to work with school administrators, motel managers and beekeepers to get the job done. BC

Next month I will continue with these topics yet to be covered: Assembling qualified instructors and compensation; Choosing a textbook and getting the best price; Setting course fees; Finding a venue and food handling; Publicity and getting the word out; Handling registration; Certificates and recognition; Having a budget and paying bills; Home school planning; Thanking the troops. Also, The Bee Club Scenario; The Self-Sponsored Class; College and University Course; Specialty Classes

Check out future programs at ***www.wicwas.com.***

Quality Queens

Four States Collaborate To Produce Better Queens

Ginger **Davidson**

Ask any beekeeper in the North what traits they desire in a honey bee and they will likely tell you gentleness, disease-resistance, mite tolerance, honey production, and Winter survivability. It does not matter if you are a hobby beekeeper or a large scale commercial operation; these traits are the 'most desirable.' Although seemingly unobtainable at times, this 'must have' list may very well be possible through networking and collaboration.

Queen producers in several states have already formed organizations to address the widespread concern of queen quality. These queen producer programs vary somewhat in organization, but all are forging ahead with the idea they can provide excellent locally adapted queens, and many are succeeding. This means that beekeepers purchasing queens from these programs can find themselves one step closer to having a colony which will thrive and survive in the varied environmental conditions of their respective states. Recently, a few of these producers recognized the regional potential to be gained by sharing information and genetics beyond the state level.

Under the leadership of Dwight Wells, a small representative group of the Northern state queen producer organizations met at the 2013 Heartland Apiculture Society conference. From this meeting the Heartland Honey Bee Breeders Cooperative (HHBBC) was formed. The primary purpose of this new group is to focus on the continued development of quality queens and improve genetics via collaboration between participating states. Much like the hardiness zone maps available to gardeners purchasing plants, the synergy that comes from a common goal will play an important part in helping bees survive within regional areas.

As National Pollinator Week was kicking off around the nation, HHBBC members recently came together at the Purdue University Bee Lab. Braving the hot and humid Indiana weather, queen breeders from Indiana, Ohio, West Virginia, and Pennsylvania arrived to collaborate with Greg Hunt and Krispn Givens from the lab. One of the primary goals of this gathering, later termed the First Annual II Fest, was to inseminate virgin queens from each of these breeders with semen collected from Purdue stock exhibiting mite-grooming traits.

Varroa mites, well known parasites of honey bees, are generally considered one of the biggest contributing factors to colony losses. While mites feed on bees and their larvae, viruses are spread throughout the colony. This eventually leads to its demise. Under the direction of one of the world's leading honey bee geneticists, the Purdue University Bee Lab has been instrumental in researching possible solutions to the mite problem. By selecting for a grooming trait which allows bees to deal with mites on their own, their work is furthering stock improvement. Bees which exhibit the grooming behavior will pull mites off their backs and chew on the legs - often leading to the death of the mite. Known affectionately as either 'The Indiana Leg Chewers' or 'Purdue Ankle Biters', their grooming habits are becoming highly sought after.

Although tedious at times, selectively breeding for the ankle-biter trait has allowed advancements. During the past six years, hives located at the Purdue University Bee Lab have seen an increase in grooming behavior from 3% to 40%. Furthermore, with the expansion of this trait and additional genetic testing, the experts at Purdue hope to speed up the process by identifying the gene that triggers it.

This year's II Fest began with virgin queens from 20 different sources, including New World Carniolans, Ontario Buckfast, Palmer Carniolans, Harbo VSH, Purdue Ankle Biters, local survivors, and others, being transported to the lab in queen banks or small nucs. These were instrumentally inseminated via the desirable Purdue stock. The resulting crosses therefore should

Krispn Givens, left and Greg Hunt.

create the hardiest queens and lead to increased grooming behavior across the region. But, it wasn't as easy as it sounds.

Extensive planning was a commensurate part of the team's processes as timing is critical for such procedures. Drones do not become sexually mature until they are at least 14 days old and have had five good flying days. In order to ensure that is what the group was working with, drones from select Purdue University colonies were raised in an incubator weeks prior to the team's arrival. As they emerged, 1300 drones were marked and returned to donor colonies to mature. Prior to insemination, marked drones were then collected in the morning from outer honey frames or in the afternoon from queen excluders placed in front of the hives. Finally, and in addition to these efforts, participating queen breeders had to graft appropriately aged larvae so that virgin queens would be six to eight days old at the time of insemination. Once everything was properly timed, it was time to do the inseminations.

Although six insemination devices were often in simultaneous operation during the week, Krispn Given was the primary person collecting semen from drones and inseminating the breeder queens for this project. His schedule over the five days was long, often arriving early and staying late. The hard work paid off though. When he finished there were 74 inseminated breeder queens; great job Krispn!

Considering everything that is involved with such an operation, it went very smooth. Yet, there was one bottleneck in the process worth mentioning: the collection of drones. Even though drone semen may be collected and stored for a week at room temperature, the team chose to use freshly collected semen to further ensure success. This time consuming process required finding marked drones – in either the donor hive, or possibly a nearby hive, where they had drifted. In order to minimize the risk of contamination during the collection process, drones were restricted to flight cages where they were allowed to fly and use the bathroom inside. For each inseminated queen it was not uncommon for 20 to 30 drones to be evaluated. Because of this limiting factor, the collected semen was extended to the queens in smaller doses to ensure the germplasm could be shared.

Realizing that it might be possible to end up with more virgin queens than semen, Dwight Wells had purchased a straw of *Varroa* Sensitive Hygienic (VSH) semen. VSH is yet another way the bees are able to deal with the mites on their own accord. When adult bees exhibit the VSH behavioral trait, the pupae which have reproductive mites in the cell are removed but the cells containing pupae with no mites or mites that are sterile are not disturbed. This trait was also incorporated into some of the stock that returned home with the breeders.

Instrumentally inseminated queens are typically not considered production quality because they often do not last as long as naturally mated queens. However, grafting from breeder queen larvae allows the genetics to be replicated and quickly shared with others. Once at home with the 'ankle-biter' inseminated queens, the participants had to ensure they received a second dose of CO_2 which signals them to start laying eggs.

Inseminated breeder queens can be tricky to introduce into a new colony. To ease the transition, push-in introduction cages were used. The push-in cage allows the queens to be tended by a few emerging workers so she can begin laying eggs before being released. Additionally, since the number of fertilized eggs could be limited due to the lower dose inseminations, the Purdue staff encouraged everyone to utilize small nucs or an excluder above a single deep in order to ensure that the queen will last longer.

As the event came to a close, breeders used the few remaining hours to swap the remainder of their virgin queens, graft larvae from Purdue stock to take home in swarm boxes, and discuss ways to make the next event even better. In addition to the advancements made by sharing genetics, the group also learned tips and tricks from each other and the bees. The 'Holy Grail' of honey bee productiveness may not have been found during this event but it just might be one of many keys required to ensure it is found in the future. It is definitely an exciting, optimistic, and energizing development to see humans and bees working together in harmony for the benefit of both. BC

Websites:
Purdue Univ. Bee Lab – **www.extension.entm.purdue.edu/beehive**
HHBBC – **sites.google.com/site/heartlandhoneybeecoop/home**

State groups involved:
Indiana Queen Breeders Association
Buckeye Queen Breeders Initiative
West Virginia Queen Producers Cooperative
Pennsylvania Queen Bee Improvement Program

Follow The Honey:

Tobacco Style Tactics Deflect Blame

A Friends Of The Earth Report

Ross **Conrad**

A recent report issued by Friends of the Earth exposes how some of the largest pesticide manufacturers are using Big Tobacco-style propaganda efforts to stall potential legislation designed to protect pollinators by manipulating public and industry opinion to protect profits.

The report titled: Follow the Honey: Seven ways pesticide companies are spinning the bee crisis to protect profits, outlines efforts chemical companies are utilizing to earn billions of dollars peddling bee-killing pesticide products while masquerading as champions of pollinator health. Highlighted are the manufacturers of the top selling neonicotinoid pesticides (Bayer and Syngenta) along with the world's largest chemical company, Monsanto.

Here is an overview of the seven strategies beings used by these corporations:

1. Public Relations efforts to create the illusion of caring

The Big Tobacco companies became very good at convincing the public that they cared deeply about the problems their products caused and offering supposed solutions.

Since the onset of CCD, the pesticide industry has gone on the offensive to create the appearance of leading the effort to save the bees by supporting research and bringing stakeholders together. Examples include:

Monsanto, which has provided significant support for projects such as last year's Honey Bee Health Summit, the Clinton Global Initiative (CGI) to form a Honey Bee Health Coalition, and a forage project by Project Apis m. (Pam). They have also purchased Beeologics, a company that works with the genetic material of the honey bee in an effort to build a business based on a line of RNAi-based products to help control pests like *Varroa*.

Bayer Crop Science has opened two Bee Care Centers (one in Monheim, Germany and one in Triangle Park, North Carolina) where they just announced a $29.6 million expansion project that includes a "29,500-square-foot greenhouse to enhance agriculture and bioscience industry leadership". They have also rolled out this year's "Bee Care Tour" celebrating "25 years of commitment to honey bee health" with stops at agricultural schools across America. If that were not enough, you can now sign up online to receive the Bayer Bee Health Newsletter.

Stress from Varroa *is one of the factors that many believe is implicated in the world-wide outbreak of Colony Collapse Disorder.*

Syngenta has been working to support bee health through its "Operation Pollinator" initiative, an effort to increase native bee populations through, among other things, helping to establish and manage pollen rich habitats. Syngenta's website encourages the public to establish native plant gardens with an eye to improving pollinator health. This would be good except that the recent report: Gardeners Beware 2014 found that more than half of the "pollinator friendly" plants sold at top garden retailers throughout the United States and Canada (e.g. Home Depot, Lowe's and Wal-Mart) contain the systemic pesticides known as neonicotinoids, which have been shown to weaken the immune system of pollinators who feed on the plant's pollen and nectar making the bees more vulnerable to diseases and other stressors. So while the general public is planting with the intention of providing additional forage for pollinators and helping bees survive, they are actually causing them unnecessary harm in many instances.

Please don't misunderstand, many of these programs are extremely beneficial to pollinators and beekeepers, but that's where the rub is. It is clear that the primary reason that they are spending so much money and time on such programs all of a sudden, is that despite small company divisions that actually do work on honey bee health products, their main business and profit making comes from producing pesticides that kill and harm bees, and other pollinators.

2. Distracting from the primary issue by casting a wide net of blame

The tobacco industry perfected the ability to divert blame by creating diversions and a sense of uncertainty. In 1969 Brown & Williamson documents discuss using cigarette advertising to "counter the anti-cigarette forces" by including defensive editorial text in the ads. The document states, "Doubt is our product, since it is the best means of competing with the 'body of fact' [linking smoking with disease] that exists in the mind of the general public. It is also the means of establishing a controversy."

In the same vein, Monsanto, Bayer, and Syngenta have developed a mix of PR tactics to divert attention away from neonicotinoids and other pesticides as one of the

primary contributors to bee declines. One way they have done this is by promoting the "multiple factors" argument while downplaying and creating doubt about pesticides' role. Bayer has even erected a giant sculpture of the varroa mite on a bee at its German "Bee Care" Center. As the New York Times has pointed out, "Conveniently, Bayer markets products to kill the mites too."

The multiple factors argument certainly has a level of legitimacy and is often repeated by well-respected beekeepers and apicultural researchers. These factors include what I call the five P's: Pathogens (e.g. nosema, viruses, American Foul Brood), Pests (e.g. Varroa, Small Hive Beetles), Poor Nutrition (loss of forage and/or monocultures that limit forage diversity), Progeny or Pedigree (lack of genetic diversity and inbreeding due to the limited gene pool that exists in North American bee stock), and Pesticides (miticides used by beekeepers, as well as agricultural pesticides which include insecticides, herbicides, and fungicides and their non-active ingredients).

What is conveniently overlooked is the fact that pesticides are implicated in four out of the five P's: Bees are known to be more vulnerable to pathogens when exposed to sub-lethal doses of pesticides. Since pesticide residues have been shown to delay the development of honey bee larvae, contaminated hives can become more susceptible to pests like Varroa due to the longer brood development time. Herbicides are designed to kill weeds and other vegetation that often play a key role in providing diverse and abundant forage for pollinators and this can contribute to poor Nutrition. And of course bees are killed directly when exposed to concentrations of pesticides that are high enough, even when pesticides are used properly.

The Five P's
Pathogens
Pests
Poor Nutrition
Pedigree
Pesticides

While some of the other P's can be similarly cross-implicated, pests like varroa have not been linked to poor nutrition or progeny for example. In addition, while the limitations of honey bee genetics in North America may be linked to a lack of resistance to pathogens and pests, they have not as yet been shown to impact poor nutrition or pesticide resistance. So while research into honey bee nutrition and genetics is certainly valuable, pesticides are a proven key driver in the current challenges faced by bees. This would suggest that pesticides should be given a higher priority for action than some of the other factors implicated.

3. Spinning and Manipulating Science

The infamous "Tobacco Institute" was the brainchild of Big Tobacco in their quest to fund industry-friendly science that could create a false "debate" in the scientific community, sowing the seeds of doubt in the general public and creating uncertainty within regulatory agencies and lawmakers.

Monsanto, Bayer and Syngenta have all moved in recent years to increase their reach into the scientific community in an effort to build their case that almost

Nosema and other diseases are killing more bees than ever – but the real question is what is weakening the honey bee's immune system so that they have become so susceptible to diseases?

everything except pesticides is to blame for colony collapse. As mentioned above the companies are funding research, creating alliances and partnerships with beekeepers, farmers, and agricultural organizations in order to bolster the legitimacy of their arguments and allow themselves to be viewed as protectors of the bees. Bayer's Bee Care website lists the five P's along with beekeeping practices, queen issues, and the even the weather as reasons for dramatic honey bee losses.

Syngenta even released company-produced "news interviews" that feature their chief operating officer, John Atkins announcing that neonicotinoids have nothing to do with bee declines.

4. Purchasing influence and credibility by hiring beekeeping insiders and co-opting groups

Besides funding research, another way Big Tobacco distorts science is to co-opt professional organizations. The pesticide companies have picked up this ball too.

Monsanto's "Bee Health Summit", is where the company greatly expanded its reach and influence into the beekeeping and scientific community as reported by Kim Flottum previously in Bee Culture. It was during the summit that Monsanto announced the formation of a Honey Bee Advisory Council comprised of Monsanto executives among others.

Shortly after Monsanto acquired Beeologics, Jerry Hayes, the former bee inspector for the Florida

A limited gene pool combined with queen suppliers that rely on too small a number of breeder hives may be aggravating the decline of colony health.

Department of Agriculture and Consumer Services, beekeeping author, and highly respected columnist for the American Bee Journal, was hired by Monsanto to act as Beeologics Bee Health Lead person.

Across the ocean, the British Bee Keepers Association has come under fire for accepting significant funding from Bayer, Syngenta among other pesticide companies, while at the same time endorsing the use of insecticides as "bee-friendly."

5. Blaming beekeepers and farmers

Big Tobacco is notorious for blaming smokers who "should have known" that smoking is deadly during the trials of numerous lawsuits brought against the industry. This tactic is being increasingly used by pesticide companies to, once again deflect responsibility away from where it should be.

For example, Bayer's Bee Care site lists "responsible stewardship principles" to be followed as part of its Applying Seed Treatment & Sustaining Bee Health, publication and suggests misuse and improper application of pesticides is the problem, not the pesticides themselves.

In the same vein, Syngenta's website states. ". . . it is critical growers and others who work with treated seeds and pesticides practice careful stewardship and best practices," and in its Pollinators and Pesticide Stewardship brochure they stress the proper use of pesticides, following label directions and being aware of bee and pollinator activity in the area to be treated. Now there is nothing wrong with these warnings and suggestions, in fact they are good and desirable, but they suggest that something other than toxic chemicals is responsible for bee damage. For example, Syngenta claims: "The small number of instances of damage to bee health from these pesticides has come from the very rare occasions when farmers have used the product incorrectly (e.g. not followed label instructions)."

6. Targeting youth

Phillip Morris targets kids with the Joe Camel character knowing that by molding the impressions of the current generation they are working to help ensure that the adults of the future are more likely to have favorable feelings toward tobacco products and their use.

In 2012, Bayer published a children's book called "Toby and the Bees" that features "Mr. Bumble" the friendly neighborhood beekeeper who explains that his hives can be protected from mites that make the bees sick by placing "some special medicine in the beehive that the mites don't like." All made by Bayer of course! In yet another attempt to mold young minds a coloring contest "Color Me Bee-autifully" is being promoted by the Bayer Bee Center, all designed to "...encourage students 12 and under to learn about bee health." Not surprisingly, there is no mention of pesticides in any of this material.

7. Thwarting the efforts of regulators

Big Tobacco learned early the importance of gaining the ear and favor of policymakers and the pesticide industry has taken notice. Despite industries best efforts, the European Union has placed a two-year ban on three neonicotinoids (clothianidin, imidacloprid, and thiametoxam).

The watchdog group, Corporate Europe Observatory that focuses on exposing the power of corporate lobbying in the EU, obtained documents that indicate Bayer, Syngenta, and the pesticide manufacturer's lobbying group, the European Crop Protection Association, were involved in lobbying behind closed doors to prevent the EU from banning neonicotinoids. The companies used questionable science and facts in their efforts to convince European Commissioners that neonics were not a problem.

Industry lobbying has been more successful in America. Despite scientific conclusions on the high risk that neonicotinoids pose to bees by the EPA, similar to those of the European Food Security Association, the EPA and U.S. Department of Agriculture have not indicated that a ban in the U.S. is necessary.

Break Through the Propaganda and Act

I can see the emails in response to this article already . . ."But we can't abandon chemicals and maintain current levels of food production." This is true only if you believe there is no other way to produce food other than the methods the largest farms in America are using today that rely heavily on mono-cropping, chemical fertilizers, and fossil-fuel based machinery. By embracing a new farming paradigm focused on organic, biodynamic and permaculture principles, we can not only maintain and increase current levels of food production, we can save our bees.

The island country of Cuba is a prime example of how organic agriculture can work on a fairly large scale and there have been no reports of CCD in Cuba! They shifted to organic agricultural methods years ago following the U.S. embargo that cut all chemical fertilizers, pesticides, and petroleum products to the country. Cuba managed to improve the quality of their food and soils and have avoided the horrors of colony collapse and pollinator decline in the process. Additionally, Australia has no reported instances of CCD to date. Some point to this as evidence since neonicotinoids and other pesticides which are used down under are not causing CCD there. However, beekeeping in Australia is highly migratory and primarily focused on wild groves of eucalyptus out in the bush. As a result, only a tiny percent of the total Australian honey bee population is forced to forage on pesticide laden crops. Could this be what is sparing the majority of the Australian bees from CCD? Pesticide issues are the one CCD related factor that is entirely man-made and as a result, it is the one contributing factor to CCD we can do the most about and quickly. Isn't it about time we acted?

It is important that policymakers, the media and the public are aware of these tobacco-style tactics, which were used to successfully mislead and delay tobacco policy action for many years. We can't afford the same delay in protecting bees and pollinators from further harm. The beekeeping industry is slowly dying thanks to the constant refrain that there is "no singular cause of the problem."

While the European Union is way ahead of the United States in trying to address pesticide issues among honey bees, the U.S. House of Representatives is trying to catch up. Representatives John Conyers (D, MI) and Earl Blumenauer (D, OR) have introduced H.R 2692 the "Save America's Pollinators Act of 2013" which seeks to suspend the use of pesticides that are known to kill or harm bees until a full scientific review indicates they are safe and field studies show that they do not harm bees and other pollinators. BC

Got A Question?

Ask Phil

Phil **Craft**

He Knows!

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

A beekeeper in New York writes:

First, thank you for your "Ask Phil" column in Bee Culture. It's the first section of the magazine I read each month.

Second, what do you think of beekeepers having an Epi Pen at their disposal to use on someone else if they have an anaphylactic reaction to a sting? Our club promotes beekeepers having one. They have a doctor who writes out a prescription to the club members. He is not their doctor, there is no exam or interview, nor is he the doctor of the possibly anaphylactic person. I find this worrisome. How do you weigh in on this topic?

Phil replies:

I do not have a medical background, but I also find the practice worrisome.

As the recipient of numerous stings in my career as a beekeeper and former state apiarist, I have a pointed interest in the subject of allergic reactions to insect stings. Here is my understanding from reading and talking to doctors over the years. Reactions to stings are classified by severity into three levels: local or mild, moderate, and severe. Local reactions consist of redness and pain at the site of the sting, lasting a few minutes. Swelling and itching around the area of the sting are also common, and can persist for a few hours or several days. Moderate reactions include the earlier symptoms, plus swelling that extends from the sting site past a major joint. For instance, a sting on the hand may cause swelling in the forearm or a sting on the calf might swell the leg above the knee. Symptoms will disappear on their own after a few days. Most people have local reactions to insect stings and a few experience moderate ones. Beekeepers who build up a tolerance for honey bee stings discover that, while they are still temporarily painful, swelling and other local reactions are reduced or non-existent, and any symptoms disappear after as little as a few minutes.

A very small number of people, however, may respond to an insect sting with a severe reaction called anaphylaxis or anaphylactic shock. Anaphylaxis is a life threatening immune response characterized by severe non-local swelling, including swelling of the throat, and can cause death through shock or asphyxiation. Symptoms of an anaphylactic reaction include hives and itching of the skin, flushed or pale skin, difficulty breathing, swelling in body parts distant from the sting site, nausea, and loss of consciousness. This condition requires immediate treatment, usually consisting of a shot of epinephrine. Epinephrine, more commonly known as adrenaline, is produced by the human body. It is also used, by medical personnel in emergency situations, to increase the flow of blood during cardiac arrest, or to treat anaphylactic shock resulting from a severe allergic reaction to an insect sting.

An Epi pen is merely a one use, pre-filled, disposable device used by the person for whom it is prescribed to self-administer a single dose of epinephrine. Epi pens are often prescribed for persons who have, in the past, experienced a severe or multiple moderate reactions to insect stings. Though anaphylaxis could occur upon a first sting or after numerous local reactions, a moderate reaction is a risk factor for a future severe reaction. While I would never discount the danger, potentially fatal, from anaphylactic shock, we must keep in mind that Epinephrine is a prescription medicine, and is intended for use only by the person for whom the prescription is written. As with any drug, its efficacy and safety depend on the patient's medical history and other medication use. These should be evaluated by a physician before writing any prescription. When my doctor prescribes for me, it is understood that the medication is for my use only, and not to be given to others. Thus, I share your discomfort with the situation which you describe.

While I can understand the temptation to administer, or allow the use of, an Epi pen for someone who appears to be experiencing a severe reaction to an insect sting, my advice will always to call 911 at the onset of symptoms. Administering prescription medication to someone for whom it has not been prescribed should always be a last resort - not a planned reaction to a sting.

A beekeeper in Connecticut writes:

I live in Connecticut and I am in my second year of beekeeping. I have four hives this year, three of them are

new in April and one is from last year. That's what I started with last year, one hive. My question to you is in two of the four hives the bees aren't drawing out any comb in my honey supers. The one from last year has drawn out comb already in the one honey super which they are storing honey right now. The second hive from April this year is going like gang busters already have two honey supers the first is all drawn out and mostly filled the second 3/4 ways done. The other two nothing drawn. The queens are laying a lot of brood plenty of room for her to lay they have stored honey on the top of some deep frames. My local beekeeper I have contact with suggested I requeen in both because they may not be good bee producers. Is this OK to do have you ever heard this before? We have a good nectar flow in CT now plus from the other two strong hives I see that.

Any suggestions or tips would be great.

Phil replies:

Many years ago, in Maryville, Tennessee, I heard a talk on making honey by a beekeeper named Odra Turner. Odra keeps bees in one of the most beautiful parts of this country, near the Great Smokey Mountains National Park. While his location gives him some advantage (there are lots of nectar sources in his area), Odra has a clear understanding of what is required to maximize honey production. In this photo of some of his hives, all except the top super or two are full of honey. His ideas, which he shared with those of us in the audience, are not complicated, but must be followed through on. For a colony to draw out comb in supers and fill it with honey, three conditions must be met.

1. Strong colonies during the nectar flow

That means the hives must be full of bees, and the bees must be making use of all, or virtually all, of the frames in the brood boxes to rear brood or to store nectar and pollen. Early in the Spring, more frames will be utilized for brood production and fewer for food storage. As the season advances, that ratio will change. We take advantage of the bees' urge to increase nectar storage by adding honey supers. Another part of the strong hive formula is that the colony must be healthy. Unhealthy hives are slow to achieve an adequate population, or fail to build up at all. *Varroa* is often the culprit and can be a problem in new hives as well as in existing ones. Nosema disease is also a possibility. Swarming can slow the growth of colonies as well, but it's not a simple equation of swarm prevention equals strong hives. Colonies often rebound after swarming. The same conditions – an extended, plentiful nectar flow and warm weather – which encourage heavy swarming, also enable hives to build up rapidly afterwards. Several years ago I made a great honey crop after seeing ALL of my hives swarm.

2. Proper supering

Honey supers should be added to the hive as the brood boxes fill up with bees and brood. Once the colony's population builds up, there should always be some empty honey supers on for the duration of the nectar flow. I typically place two or three supers initially, and add others as the bees start moving into the top super. Having frames of drawn comb helps as well, especially early in the flow. This allows the bees to store nectar as they draw more comb. If I'm using supers with just foundation, I make sure that the first one over the brood box contains lots of drawn comb.

3. A good nectar flow

You have no control over this. However, understanding when nectar producing plants bloom in your area will help in timing the placement of honey supers. You can get an idea of the quality (which means quantity) of a nectar flow by noting the amount of fresh nectar in both supers and brood boxes. For newer beekeepers, talking with other beekeepers in the area can be helpful. They can tell you what the local nectar sources are, when to expect a flow, and how current flows compare to years past. I've noticed that inexperienced beekeepers sometimes expect their bees to make honey when, in fact, the nectar flow is over by the time their new colony has reared sufficient field bees to work it.

As to the queen's being to blame for your lack of honey production, I think beekeepers are often too quick to blame the queen. If the colony is producing a lot of brood, there is most likely nothing wrong with her. I suggest that you first make sure that the brood boxes in those two hives are really full, with 90% of the frames full of brood and/or honey. If they are not, the hives are not yet ready for supers. New colonies, from either packages or nucs, can differ. Some just take off faster than others.

Are you using queen excluders? If you are, try taking them off for a week or so, then replace them after the bees have moved up into the honey supers. Sometimes bees are slow to move through them. See my June, 2014 column for a question/answer regarding queen excluders.

From your letter, it sounds as though you started with frames of foundation in the supers on the new hives. Try replacing three or four of them with frames of drawn comb, preferably with fresh nectar in them, from the two hives which are producing well. Beekeepers sometimes refer to these as bait combs. They may help to attract the bees up into the supers if you have enough healthy bees and the nectar flow is still on.

By the way, while looking at the picture of Odra's hives, I wondered why he left so many full supers in place instead of extracting and replacing them a few at a time. There are obvious difficulties in having them stacked so high: supporting such a top heavy structure, reaching

the top supers, etc. When I asked the reason, the answer was, "Showin' off."

A beekeeper in Kentucky writes:

We are in our second year with two hives. Our bees made it through the winter just fine and we were looking forward to harvesting honey this year. In April both hives had laying queens and the population was growing, so we put on our supers before leaving for vacation at the end of April/beginning of May.

When we returned both hives must have swarmed. Both had numerous queen cells. We decided to wait it out for a new queen to get mated and start laying again. One hive has done well and we see brood but the other has not. Two days ago, I saw a small queen in that hive but no eggs yet. We are wondering if we need to replace that queen (if we can find one for purchase) or if we should continue to wait for her to get mated and laying and still expect to have honey this year.

My husband and I have loved learning about and observing our bees, but we also are looking forward to our own honey!

Phil replies:

It's not time to panic yet, but it's close. The small queen you saw in the second hive may have been a virgin or a newly mated queen that has yet to start laying eggs. If you check them again in a week or so, you might find eggs or young larvae. If not, that is the time to consider installing a new queen.

We need to keep in mind the time that elapses between the capping of queen cells (the signal for a swarm to depart) and the onset of egg laying by a new queen. It takes seven or eight days from the time the cell is capped until the queen emerges, but she does not immediately fly and mate. She needs an additional four to six days (similar to the period required for workers and drones) for her exoskeleton to harden. Then, she is ready to make her first, short, orientation flights. During this period, she also continues to mature sexually. Her mating flights begin shortly after the orientation flights, and can take several days to accomplish. The time required depends on the availability and proximity of drone congregation areas as well as on weather conditions. The new queen will not begin egg laying until two to five days after the final mating flight. Together, these time periods: capping of queen cells to emergence (at least 7 days), emergence to completion of mating (as many as 14 days), and final mating flight to the start of egg laying (two to five days), add up to nearly three weeks and perhaps as many as four.

That you are already seeing brood in the other hive does not mean that you should be observing eggs or larvae in this one. The two hives did not necessarily swarm at the same time; development times, as noted, can vary from queen to queen; and unfavorable weather can delay both orientation and mating flights. It is quite normal during the swarming process for a hive to go through a period, after all the brood from the old queen has emerged and the new queen has not begun laying, during which no brood at any stage is to be observed. Such a hive seems to be queen-less unless, as you did, one chances to actually see the queen. I refer to this condition as an apparently queen-less hive: one with no eggs, larvae, or capped brood, but in fact the colony has a either a virgin queen or a young one that has not begun laying.

This situation is an exception to the constant counsel of folks like myself to verify the existence of a queen by the presence of eggs or larvae. I offer the following amendment to that advice. During the swarm season, for any hive with a population strong enough to swarm, wait until as long as two weeks after all brood has emerged before concluding that a hive is queen-less. I have had numerous calls and emails from beekeepers who have ordered a new queen for an apparently queen-less hive only to find that it contains eggs and/or larvae when they go to install her. The question is what to do with a perfectly good, but superfluous new queen. I usually suggest that they donate her to me.

On the other hand, you can't wait indefinitely for a swarm queen to prove her viability. As I wrote in my April, 2013, *Ask* Phil column:

Once she is mature enough to begin the mating flights, [the new queen] has only about three weeks in which to mate successfully. Delays would be weather related. Queens who do not mate during this three week window will often start laying unfertilized eggs which will produce only drones.

If it has been more than four or five weeks since your queen emerged, it is unlikely that she will mate. In that case, you should plan on combining it with another hive, or re-queen it when you can obtain a queen. You will need to kill the current queen before using either approach.

I wish you a successful honey harvest from one or both of your hives this year. BC

Bees, Pesticides And A Game-Changing Presidential Initiative

M.E.A. **McNeil**

"The system's broke and it needs to be fixed." The exasperated frustration of Dave Hackenberg, Chair of the beekeepers' National Honey Bee Advisory Board (NHBAB),[1] echoed the tone of many who were first interviewed for this article on bees and pesticides, promising an unenviable assignment.

And then, on June 20, President Obama signed an Executive Memorandum. The surge of responding optimism was matched only by the degree of surprise at its scope.

Penn State Entomologist Jim Frazier said he had never seen anything like it in his long career. Laurie Adams of the Pollinator Partnership said, "The most powerful office on this planet is saying pollinators are important."

The following is, at best, an album of snapshots – a collection of diverse responses and appraisals of one complex part of a complex problem.

Laurie Davies Adams is the Executive Director of the Pollinator Partnership, a nonprofit organization working to protect the health of managed and native pollinators. She has overseen the North American Pollinator Protection Campaign (NAPPC), a broad collaboration of stakeholders. National Pollinator Week is the result of a NAPPC campaign.

The Presidential Memorandum

The "Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators" states that "given the breadth, severity, and persistence of pollinator losses, it is critical to expand Federal efforts".[2] That expansion is unprecedented: A Pollinator Health Task Force, to be co-chaired by the Secretary of Agriculture and the Administrator of the Environmental Protection Agency, includes, just for starters, representatives from the Departments of State, Defense, Interior, Housing and Urban Development, Transportation, Energy, Education; Councils on Environmental Quality, Domestic Policy, National Security; the General Services Administration, National Science Foundation; the Offices of Management and Budget, Science and Technology Policy.

Jim Frazier, an entomologist at Penn State University, was on the Steering Committee for the Pellston Conference on Pesticide Risk Assessment for Pollinators. He is also the scientific advisor to the National Honey Bee Advisory Board, a joint project of the American Honey Producers Association and the American Beekeeping Federation. He is a member of the PSU/USDA team that found 121 pesticides and metabolites in bee colonies. (photo courtesy of Maryann Frazier)

Why such a huge and disparate coalition? "That's what we need. It gets attention from ripples across many branches of the government," said Dennis van Engelsdorp of the Bee Informed Partnership and the University of Maryland. "We need a revolution, so that pollinator health influences what we all do – like recycling."

The pollinator-pesticide problem reaches across the environment, from agriculture to back yards. Nation-wide bee losses have hovered around a third for six years. A team from Penn State University and the USDA found 121 pesticides in bee pollen and wax. In the first suburban county the team tested, Marin, CA, an array of pesticides were found, six highly toxic to bees – 95% applied by homeowners.[3]

Last May, a stakeholder meeting was convened at the White House.[4] Ways to address the decline of pollinators were addressed by researchers, environmental groups, beekeepers and industries as diverse as automotive manufacturing. This initiative creates a governmental Task Force charged with coming up with a National Pollinator Health Strategy with goals and timelines for progress in "understanding, preventing, and recovering from pollinator losses." The plan will include: habitat restoration, educational programs, data gathering and dissemination as well as research on pesticides, nutrition, pests and pathogens.

These federal agencies have forage land, research facilities and venues for education; in addition, a public-

private partnership is part of the plan. "It's clear that the economic climate is one where we have to do more with less," said van Engelsdorp. "So industry has to step up with interest in social causes. What's needed is direct investment or change in behavior."

Too Many Faces

The problem of bee loss is many faceted, with the role of pesticides interrelated. The initiative states that "The Environmental Protection Agency shall assess the effect of pesticides, including neonicotinoids, on bee and other pollinator health and take action, as appropriate, to protect pollinators.

When it comes to pesticides, the President's directive arrives in a conflicted and mistrustful atmosphere. Some researchers were willing to speak for this article only off the record. The thinking of the NHBAB is that "the EPA and the states are resistant to address concerns we have brought to light and have little interest in resolving system deficiencies." Yet beekeeper reluctance to report losses to the government for fear of losing pollination contracts – most recently evident in the last massive California losses – has a long history. Throughout 35 years of his UC Davis newsletter, Eric Mussen has appealed to reticent beekeepers to report pesticide kills to establish a government record.

At the same time, diverse stakeholders applaud the presidential initiative. Jay Evans, interim Research Leader of the USDA-ARS, welcomed a promising collaborative effort. Frazier called it "a huge opportunity, and it is coming from the top. The climate is right." Jerry Hayes of Montsanto said, "I think it's long overdue – there has never been a coordinator. It's brought in many agencies and has accountability."

To turn disillusionment into hope, it is tempting to focus on the positive, laying aside divisive differences. Ignoring contradiction, however, may contribute less to creative solutions than taking on the clash of value systems; that alchemy has the potential for producing a new reality.

That being said, when it comes to pesticides, one might begin by defining what "it" is. In the old cartoon with two people saying "Dog", one thought balloon pictures a St. Bernard and the other a chihuahua. Hayes points out, "Everyone is talking about the same thing – how to feed the world safely and sanely." But how that is being accomplished and how to rectify it are seen quite differently among the stakeholders – what the tradeoffs are or even whether there need to be tradeoffs at all.

Jay Evans, an interim co-director of research at the USDA/ARS, sees the presidential directive as a good opportunity for collaboration and data sharing. (photo by Stephen Ausmus)

The Chemicals

Conservation Biologist Claire Kremen of UC Berkeley says that in the monoculture system, pest insects can rapidly spread and the only way to control them is with "chemical pesticides that target insects, and bees are insects. They also eradicate the habitats for predator species that naturally prey on these harmful pests." On what has been called the pesticide treadmill, farmers need to use increasingly larger amounts or more toxic pesticides on increasingly resistant pests.[5] Beekeepers' use of acaracides to control *Varroa* is an example, and the vast dead zone in the Gulf of Mexico is a result.

"Every chemical company realizes that pesticides don't last and target organisms develop immunity," said Hayes. "At Monsanto they are looking at different ways to do this – biologicals, bacteria and fungicides, to protect plants."

A dream project of Jay Evans at the USDA-ARS is to discover how differences in the biologies of mites and bees, such as developmental cues, can be used to control *Varroa*.

> Bees Don't Visit Corn. Period.
>
> CropLife America

Beyond philosophical divides is a tangle of factual disputes. Jay Vroom of CropLife America, which represents manufacturers of agricultural chemicals, has stated that bees don't visit corn and soybeans. Maryann Frazier, a researcher at Penn State University, said, "Although bees widely gather corn pollen, corn is considered to be a wind-pollinated crop; there is no consideration for pollinator exposure when chemical treatments are registered for such plants".

Bayer's Fischer said that seed treatments are an "environmentally friendly way to use an insecticide." In consideration of research to the contrary, the European Commission last year decided to enact a two-year ban on three neonics for reevaluation. Three environmental and food safety groups are suing the California Department of Pesticide Regulation (DPR) over its June approval of two neonics.[6] The Center for Food Safety filed a legal brief in December in support of a lawsuit to reverse the EPA's 2013 decision to approve the neonicotinoid sulfoxaflor – the first to invoke the US Endangered Species Act to protect bees. A bill to suspend neonicotinoid licensing during further testing failed in the U.S. House of Representatives. A meta-analysis of 800 peer-reviewed papers by The Task Force on Systemic Pesticides concludes that there is enough evidence of harm to trigger regulatory action.[7]

Penn State University Entomologist Christina Grozinger said, "Neonics are not all the same. There are many studies on the negative effects, but they have different levels of toxicity. It's complex but manageable. Banning them as a class only kicks the can down the road. I have spoken to people on both sides of the neonic issue, and they are all satisfied with [the presidential memorandum directing further study]."

"If you take the mindset that you are going to use pesticides no matter what," said William Quarles, editor of the IPM Quarterly and a chemist, "Then the alternative to neonics are organophosphates, which are neurotoxins" –

Christina Grozinger, Professor of Entomology and Director, Center for Pollinator Research at Penn State University, envisions university collaboration among several universities for research that could be helped by the new initiative. She also sees it as a means of defining common interests. (photo by Harland Patch)

problematic to both bees and humans. IPM offers non-toxic and least-toxic, integrated pest management solutions to urban and agricultural pest problems.[8]

In one of the first crops pollinated this year, an estimated 80,000 bee colonies were killed or impaired from a tank mix that included a fungicide, insect growth regulator and a new adjuvant, according to Eric Mussen, Emeritus Extension Apiarist at UC Davis. "No one did anything illegal," said Hackenberg. "The label on these products doesn't say anything about bees." Losses for that event are estimated at $64 million, borne by the beekeepers.

"The almond growers who applied tank mixes this year followed official label guidelines," said Michele Colopy, program director of the Pollinator Stewardship Council.

"The EPA generally does not consider the impact of pesticide mixtures on bee health," said Jim Frazier. "None of this has been adequately studied or taken into consideration for registration purposes."

Where to from here?

At this point, the number of non-industry researchers pursuing this work would make up a board game of Wits and Wagers.[9] Most, if not all certified GLP labs (those with a set of specific, stringent, costly requirements) are at chemical companies or the EPA, according to Hackenberg, which means that potentially more objective university studies are less readily accepted for testing review.

In the EU, evaluation by the precautionary principle requires determination of whether an agricultural chemical is harmful before it is registered for use. Therein lies a fork in the road to agreement. "We have a regulatory system that allows you to bring [pesticides] to market before you can fully understand what the impacts are," said Paul Towers of the Pesticide Action Network North America.

"We have a concern in general with the approach that the EU takes to risk management," said Daniella Taveau, a senior trade adviser in EPA's Office of Chemical Safety & Pollution Prevention.

The new guideline for testing, Guidance for Assessing Pesticide Risks to Bees, issued three days after the presidential memorandum, was created by the EPA with Canadian and California officials. It directs a tiered approach.

In the U.S., the first tier of testing consists of a contact toxicity test, the LD50, to establish the dose that kills 50% of the organisms. At present, even temporary permits (called Section 18, which can be active for years) use a cost-benefit analysis that does not consider IPM alternatives that favor pollinators or the potential impacts on beekeepers or the environment. Researchers have increasingly called for the inclusion of mounting data on sub-lethal, cumulative doses of chemicals in regulatory appraisal, and the new guidelines appear to make an effort to begin to include them. A Penn State study extended the EPA's usual 48 hour toxic analysis to four days and found that results could shift dramatically from no response to high mortality during the additional days.[10] The new guide states, "For chronic effects, a longer study duration including an overwintering component may be considered."

Jim Frazier was on the Steering Committee for The Pellston Conference, an international gathering in 2011 titled Pesticide Risk Assessment for Pollinators.[11] The resulting document, written by the participants and edited by two scientists, from the EPA and Bayer, was a basis for the new guidelines. It recommended a revamping of the evaluation process, including prediction of both systemic and non-systemic exposure. A risk hypothesis was outlined, tracing pesticide residues from contact with foragers to in-hive exposures. Specific measures were developed during the workshop that have influenced the resulting assessment plan.

Frazier found the document to be "a definite improvement over the current EPA testing scheme, but it falls far short of what it should be based on current science. While the improved tier testing system adds chronic oral toxicity for adults and larval bees, it only is done on active ingredients and leaves out all the additives in formulated pesticides actually applied in the field. There is no excuse for this. Also no pesticide combinations are tested; there is no excuse for this either, especially since tank mixes are allowed and there are many known examples of fungicides synergizing pesticides they are mixed with and applied simultaneously."[12]

"When the dust settled," said Hackenberg, "It looked like they got their way."

The EPA And Environmental Realism

Depending on whom you talk to, the P in EPA could stand for Protection or Phooey. In the new book, *Poison Spring*, 25-year EPA employee E.G. Vallianatos documents his experience with collusion and laxity in the agency, as well as a revolving door connecting leadership to the chemical industry.

Getting the EPA side of the story was no easy task, with an interview request shuttled along five times, requiring pre-submitted questions; persistence was rewarded with a 20 minute conversation assertively monitored by a media person. Nonetheless, Rick Keigwin of the Pesticide Re-Evaluation Division seemed genuinely glad of the new directive, saying "The EPA is very supportive of the President's effort" and pointing out the importance of a collaborative relationship. "We can get this moving quickly."

The guidelines describe the first testing tier as "a screening-level risk assessment that is intended to be sufficiently conservative such that chemicals that pass the screen are considered to represent a relatively low risk of adverse effects to bees." Frazier points out that no formulation materials are used for determining the

initial toxicity to trigger any testing to follow. For those that don't pass, "refinements in exposure estimates and/or mitigation measures" are recommended "such that further refinements are not needed." On the third tier, "additional refinements in exposure and/or effects estimates can be made based on studies with increasing levels of environmental realism." We will, perhaps, be hearing more about what "environmental realism" means.

If you are assigning blame to the EPA, "you are barking up the wrong tree," according to another EPA scientist, who declined to be named because of media-contact rules. He pointed out that the EPA must follow regulations that cite tests and cost-benefit analysis that preclude some considerations for pollinators. "The cost-benefit analysis does not include a balance, for example, between fumigates in soil and nonchemical management techniques like crop rotation." He added that the EPA can call for more testing, but compliance by applicants is not required by law; the last time the toxic substances control act was updated was 1980. Further, he said, California is the only state in which pesticide use can be tracked; "everywhere else you have to go to the suppliers to see how much is produced or sold."[13]

Jim Jones oversees the EPA's Office of Pesticide Programs, which implements pesticide, toxic chemical, and pollution prevention laws; it also registers new pesticides and reviews and regulates those on the market. His office, with 1,200 employees and a $230 million annual budget, is working with declining resources and a corresponding drop in its workforce.

Jones cites population-level studies on bees being carried out by several pesticide manufacturers: "They are going to be instrumental in our ultimate assessment." In addition, the EPA is working with seed companies to use a new agent that helps keep pesticides on treated seeds during planting; "We've worked with manufacturers to come up with a better sticking agent so that the pesticide doesn't blow off the seed. EPA is hoping that by 2015 it becomes the standard." By press time, the EPA plans to provide data on residual toxicity of pesticides that can harm bees. "Ideally, if you are in and around bees, you will use chemicals with a shorter residual toxicity rather than a longer one." He adds that the EPA plans to use a hazard assessment to determine whether new chemicals are safer than those on the market, and they are currently evaluating all existing pesticides for their impact on bees.[14]

Jim Frazier, while a senior scientist working with formulating chemists at DuPont for over eight years, said, "The EPA announces that they are making new stringent standards. But those standards will not be in effect for neonicotinoids until 2018 to 2020, by which time they will be off patent. It is delayed so long as to be meaningless. I've seen it from the inside, and I know how it works . . . Delay and do nothing."

Pesticide regulation is carried out by the Environmental Protection Agency from this office in Washington, DC and dozens of branches throughout the country. (photo by Christian Bradford with permission granted)

After five years of knocking at the door, reports Hackenberg, the beekeepers now have an ear inside the EPA for the first time. Sitting on a hive in a bee yard, he said, he has reported by phone to an EPA scientist. Frazier, science advisor to the NHBAB, said of their efforts, "They have done a yeoman's effort to be heard, and they have come a long way. They have paid their own way and done a good job of representing both bee organizations. Their current issue is the language on pesticide labels to stop spraying during bloom. At first they said it was not possible, and now it is on the table."

"Someone has to stop the daytime spraying. I'm not going to shoot the plane out of the air," said Hackenberg.

Reevaluating pesticide labels has been a beginning. As of last year, labels for neonicotinoids will carry an icon of a bee to signal potential risk to bees, according to Jones. The labeling, which will be broadened to include other insecticides, also says that application is prohibited when bees are present. It was not made clear how that can apply to systemics.

Labels, Inerts And The Law

Labeling is not a straightforward issue. Metabolites and inert ingredients continue to be unknowns. In 2012, Jim Frazier published research showing that some chemicals sprayed on almonds can impair honey bee learning – including inerts. The example of Bravo, a fungicide, is cited by Hackenberg. "The chemical companies use the same label, even though it was strengthened, worse than before. They changed the inert ingredients." Inert ingredients are not revealed by chemical companies either on the label or to regulators; the presidential initiative states that "Nothing in this memorandum shall be construed to require the disclosure of confidential business information or trade secrets . . ."

A problem repeatedly pointed out by researchers and beekeepers is that testing in the U.S. is done only on main "active" ingredients in a pesticide, not the complete formula. A logical solution is to test off-the-shelf products – what pollinators are exposed to – without the privileged inerts being revealed. Keigwin pointed out that the new guidelines direct further testing "if data suggests" the necessity.

Hayes agrees that "Some adjuvants and surfactants can be more powerful than the active ingredients. But more labeling – who reads those things? There needs to be a level of respect, best management practices; this is where training comes in."

Hackenberg would agree on a need for training. "The guys who are not at the table are the pesticide salesmen, the middle men" who are recommending chemicals "whether they are needed or not." When there is a bee kill, Hackenberg reports that the farmer typically says "this is what my chemical guy told me to do, and the guy doing the selling tells me it's none of my business, and that his business is to sell chemicals. Someone gets a fishing trip out of this." What, he asks, if chemical salesmen did not have incentives based on sales volume?

Change May Be In The Air

Whatever change is in the air, "People are taking this very seriously," said van Engelsdorp. "The Secretary of Agriculture and the EPA are willing to do science-based policy. They are rewriting the rules. I'm told that the President talks about this at dinner with his family. Still change takes a long time."

Change of this proposed magnitude takes money, too, and there is no shortage of good ideas that have fallen away for lack of financing. It is, at this point, not clear how all of these initiatives will be funded, but individual departments will play a part as they prioritize pollinator health. Obama's budget for next year recommends about $50 million for multiple agencies to help fund research and increase the number of acres dedicated to pollinator conservation programs – with pollinators including not only honey bees but butterflies, moths, beetles, birds, native bees, bats and other mammals. Hackenberg calculates that the budget so far dedicated for planting forage, "doesn't go far, since it takes $200-$400 per acre to seed, getting 40,000 acres against 40,000,000 acres that are in pesticide-treated land."

In the Memorandum, $25 million is set aside for pollination and pollinator health – including consideration of non-Apis pollinators.[15] Of that, $5 million would go to a multi-agency effort to address the decline of honey bees. Such an amount shared 2008-12 in the CAP (Coordinated Agricultural Project), while productive, was like a tablespoon of peanut butter spread over a loaf of bread. Many stakeholders are reaching out to other funding sources.

Funding All this?

Business for Bees is a new collaboration formed by The Pollinator Partnership. Adams has coordinated the funding and business acumen of companies and associations such as Boeing, General Mills, Burt's Bees, Toyota and the Almond Board.[16]

The Honey Bee Health Coalition at the Keystone Center aims to bring diverse views together, according to organizer Julie Shapiro. At first glance, the group, originally funded by Monsanto, is over half business interests, about a fifth commercial beekeepers, with something over a 10th conservation organizations including those concerned with pheasant and duck hunting, plus a governmental agency and a university represented. But it is a new group, invitations have been broadly sent, and the participating contribution can be time and input rather than money.

Another collaborative idea, from Grozinger, is for a Pollinator Innovation Institute that would be comprised of several universities on a model from The National Science Foundation, which has a group of universities and private groups that conduct and share basic and applied research – like medical bench-to-bedside. "It should be more feasible to run long-term projects within a smaller consortium," she said.

Science-based data sharing and education may be the fabric of the whole enterprise. "Databases showing forage, climate, disease, pesticides, and bee colony fates are now being collected. Analyzing those all together would be a dream and could go a long way toward predicting and decreasing colony losses," said Evans. Van Engelsdorp is starting such a pilot project, called Sentinel Apiaries.

Of this initiative, Frazier said, "This is an unusual possibility. You have to look at the positive side and make the most of it. It is a Mt. Everest to climb."

"We are worth a lot to a lot of people," said Hackenberg, but we're short now. The President of the United States has stood up and said 'We have a problem.' We don't know what's going to happen with it. We're hopeful for anything."

"I can't believe how smart this is," said Adams. "What has happened is the single most collaborative coordinated strategic conservation project in the 21st century."

The stakeholders turn out to be us all. "Peel back and you find a pollinator. Everyone eats." How it may play out may be in small acts – like when NHBAB beekeepers concluded a meeting in an apiary with a chemical company representative by using a couple of hive tools and a piece of wire to help him get into his car with the keys locked in. BC

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REFERENCES

Allred, Elizabeth, E.G. Gouge, I.L. Maw (2014) *AAAS Report XXXVIII: Research and Development FY 2014, Chapter 10,* U.S. Department of Agriculture, Association of Land Grant Universities.

Brooks, David (2014) *The Creative Climate,* The New York Times Opinion Page, July 7.

Fischer, D., Bayer Corporation; T. Moriarty, EPA (2011) *Pellston Conference: Pesticide Risk Assessment for Pollinators, January 15-21, Pensacola, FL,* **https://c.ymcdn.com/sites/www.setac.org/resource/resmgr/publications_and_resources/executivesummarypollinators_.pdf**

Hackenberg, David (2007) talk at Healthy Communites: *Green Solutions for Safer Environments Forum.*

Colopy, Michele (2014), *Letter to Beekeepers from the Program Director,* Pollinator Stewardship Council, P.O. Box 304, Perkinston, MS 39573, **www.pollinatorstewardship.org**.

Erickson, Britt (2014) *Pesticide Priorities: EPA assistant administrator sees opportunities in complex challenges, but resources have dwindled,* Chemical and Engineering News, American Chemical Society, Volume 92 Issue 25, 23-26

Evans, Jay (2014), USDA-ARS, interview July 2.

Frazier, James (2014), Entomologist, Pennsylvania State University, interview June 27.

Fischer, David, Bayer Crop Science, and Thomas Moriarty, Environmental Protection Agency (2011) Pesticide Risk Assessment for Pollinators: Summary of a SETAC Pellston Workshop, January 15-21.

Grozinger, Christina (2014), Entomologist, Pennsylvania State University, interview June 30.

Hackenberg, David (2014), Chairman, National Honey Bee Advisory Board, interviews June 27 and July 9.

Hayes, Jerry (2014), Monsanto, interview July 2.

Karimi, Faith (2014) *Obama Announces Plan to Save Honey Bees,* June 23, CNN.

Keigwin, Rick, Pesticide Re-Evaluation Division, EPA with Catherine Milbourn, EPA Media Office (2014) interview July 14.

Levin, Sam (2014) East Bay Express, *What's Poisoning the Bees, May 28, 2014.*

Obama, Barack (2014) Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators, June 20.

Mussen, Eric (2014), Extension Apiarist, UC Davis, interview May 7.

Shapiro, Julie (2014), Keystone Center Coordinator for the Honey Bee Health Coalition, interview July 2.

Quarles, William (2014) Editor, IPM Quarterly, Bio-Integral Resource Center, interview, July 14.

United States Environmental Protection Agency, Health Canada Pest Management Regulatory Agency, California Department of Pesticide Regulation (2014) Guidance for Assessing Pesticide Risks to Bees, June 23, **http://www.epa.gov/pesticides/science/efed/policy_guidance/team_authors/terrestrial_biology_tech_team/GuidanceAssessingPesticideRisk2Bees.pdf**

Vallianatos, E.G. (2014) *Poison spring; The Secret History of Pollution and the EPA*, Bloomsbury Press, New York. Chapter 5, Why Are the Honeybees Disappearing?

Van Englesdorp, Dennis (2014), *Bee Informed Partnership*, University of Maryland, interview June 29.

White, Kasey, S. Spizzirri, H. Kelly (2014) AAAS Report XXXVIII: Research and Development FY 2014 Chapter 12, Environmental Protection Agency.

Footnotes

[1]The parent organizations are the American Honey Producers Association and the American Beekeeping Federation.

[2]For the complete text, see: **http://www.whitehouse.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b**

[3]For data from the Marin Pollen Project, see: M.E.A. McNeil and Maryann Frazier, "What the Bees Brought Home," American Bee Journal, April, 2014.

[4]The meeting was organized by the White House Domestic Policy Council and Office of Science and Technology Policy.

[5]See Davis, A. et al. (2012) Increasing Cropping System Diversity Balances Productivity, Profitability and Environmental Health, PLoS One, October 10. This study indicates that diverse cropping systems can meet or exceed the performance of monocropping while requiring significantly smaller amounts of agrochemicals. **http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0047149**

[6]The groups are The Pesticide Action Network North America, the Center for Food Safety, and Beyond Pesticide The neonicotinoids in question are Venom Insecticide and Dinotefuran 20SG.

[7]The analysis, known as the Worldwide Integrated Assessment (WIA) is to be published in the peer-reviewed Journal of Environmental Science and Pollution Research. It was undertaken by the Task Force on Systemic Pesticides, an international group of independent scientists affiliated with the International Union for Conservation of Nature (IUCN) Commission on Ecosystem Management and the IUCN Species Survival Commission.

[8]See: Quarles, W. and J. Grossman (2002) Insectary plants, intercropping and biological control. IPM Practitioner 24(3):1-11. Also: Liebman, M., L.R. Gibson, D.N. Sundberg et al. 2008. Agronomic and economic characteristics of conventional and low external input cropping systems in the central corn belt. Agronomy J. 100:600-610. BIRC website: **http://www.birc.org/**.

[9]Among them are Jamie Ellis, University of Florida; Keith Delaplane and Jennifer Berry, University of Georgia; Reed Johnson, Ohio State; Jeff Pettis and Anita Collins, USDA; Brian Eitzer and Kim Stoner, Connecticut Agricultural Experiment Station; Judy Wu, University of Minnesota, and a consortium of scientists at Penn State including Chris Mullen, Jim Frazier and Maryann Frazier.

[10]The Penn State Center for Pollination Research (CPR) website publishes information on projects: http://ento.psu.edu/pollinators. On that site see: "High Levels of Miticides and Agrochemicals in North American Apiaries: Implications for Honey Bee Health", Christopher A. Mullin, Maryann Frazier, James L. Frazier, Sara Ashcraft, Roger Simonds, Dennis vanEngelsdorp, Jeffery S. Pettis.

[11]See complete text of Pellston Conference report at: **http://c.ymcdn.com/sites/www.setac.org/resource/resmgr/publications_and_resources/executivesummarypollinators_.**

A BETTER WAY

Mike **Palmer**

"Almost every emergency of management can be met by putting something into or taking something out of a nucleus, while nuclei themselves seldom present emergencies." E.B. Wedmore, *A Manual of Beekeeping*

The beginnings of a new plan

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

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

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

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

Beekeeping is just like all other agricultural endeavors. It is a tough way to make a living and it seems that every year something goes wrong. How many times have you said it will all be better next year? Next year your bees will winter successfully, or they will make a big honey crop because you will do this or that or something else. That is the great hope of every farmer everywhere, no matter what they grow or where they farm. Next year will be the year. So I approached my beekeeping with an eye to the future and the belief that next year will be the year.

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

The 1990s was a tough time to be a beekeeper. Winter losses were high and Spring clusters were small. As an apple pollinator with a contract to fulfill, I found it difficult to maintain the required number of suitable colonies to pollinate the orchard. Some years, with numbers way down and very few colonies strong enough for Spring splits, I resorted to buying bees. That is where the singles from South Carolina, the nuclei from Florida,

Four overwintered nuclei at dandelion bloom.

Supering up Summer made nucleus colonies.

Brood factory ready for harvest.

and the frames of brood from New York came in. It was mandatory that I fulfill my pollination contract. I had no choice but to buy in replacement bees and pay for them with my pollination check and it went like that for several years. Buy replacement bees in the spring spending what money I had and hope a decent honey crop would come my way. You all know how fickle the honey crop can be, so this was not a good plan. I felt as if I was slowly losing my business. There really had to be a better way.

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

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

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

Maintaining honey producing apiaries

For the first few years I wintered nucleus colonies, I thought of them as stocks for replacing Winter losses and as stocks for making increase. Dead colonies were cleaned up and new equipment was readied. Nucleus colonies that had successfully wintered were transferred to the empty equipment and apiaries were filled after the long Winter. Nucleus colonies were perfect for both uses and often built up faster than many of the over-wintered production colonies. In fact, they absolutely exploded on the dandelion flow when hived on drawn comb.

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

As I said, in the beginning nucleus colonies were future production colonies to be used in my apiary. I made them up before the middle of July, using brood and bees from hives that were not strong enough to make a honey crop. The little colonies would build up, filling their four frame cavities. When August arrived, with hot and humid 90°F weather, it was all I could do to keep them in their boxes. The only solution seemed to be to remove frames of brood and bees, replace them with comb or foundation, and start more nuclei. That worked to some extent, but nucleus colonies made up after the beginning of August do not Winter well here in Vermont. So what to do? I chose to add that excess brood to struggling production colonies. This turned out to be a good use of those resources. Imagine placing a deep body of brood on the floor of a colony having difficulty growing enough of a population

A nice apiary of nuclei colonies in late Summer.

to survive the coming Winter. The results were quick and lasting. The larger cluster created by adding combs of emerging brood not only boosted the colony population in the short term, that increased cluster size lasted through the Winter and come Spring, those colonies were among the strongest in the apiary. It was as if I had dropped a bomb on each colony and I jokingly referred to them as 'Bee Bombs' in an article I wrote for this magazine. Drop the bomb and the population explodes.

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

Brood factories

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

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

In the Spring of 2011, I set up 50 nice over wintered, four over four, two-story nucleus colonies in double nucleus boxes. Each nucleus was given a nucleus super with four additional combs, for a total of 12 combs each. Beginning in early May, I began removing sealed brood with adhering bees to strengthen my cell building colonies. Every four days, starting with the first nucleus, I removed two or three frames of brood from each nucleus until the day's brood requirement was filled. Four days later, I repeated the process, harvesting brood from the nuclei next in line. My intention was to remove enough

brood from each to fill my needs, but not enough to significantly weaken the colonies. I needed them to be strong enough to fill combs of brood quickly, but not so strong they would swarm before I returned for another harvest. From May 9 until June 19 I harvested 245 combs of brood to set up my 35 cell builders, each receiving seven combs of sealed brood and two of honey. Then, after the last cell builders had been set up, I switched the focus of my brood harvest to making the Summer's nucleus colonies. Those 50 nuclei gave me enough additional combs of brood and bees to establish 330 more nucleus colonies. Think of it! More than 900 combs of brood and bees harvested from only 50 over-wintered nucs.

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

I never thought I would look at individual colonies in my apiary as being disposable. They were all 'sacred cows' to be preserved, come what may. I no longer feel the need to preserve every colony, or to give every queen just one more chance to prove herself. With a supply of nucleus colonies on the other side of the apiary, or down the road in an out apiary, I can afford to be ruthless. Unproductive colonies and poorly performing queens become completely disposable. My bees benefit, my apiaries benefit, and I benefit as well. And the same process benefits the bees when working on a much smaller scale.

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

The brood factory apiary wrapped for Winter.

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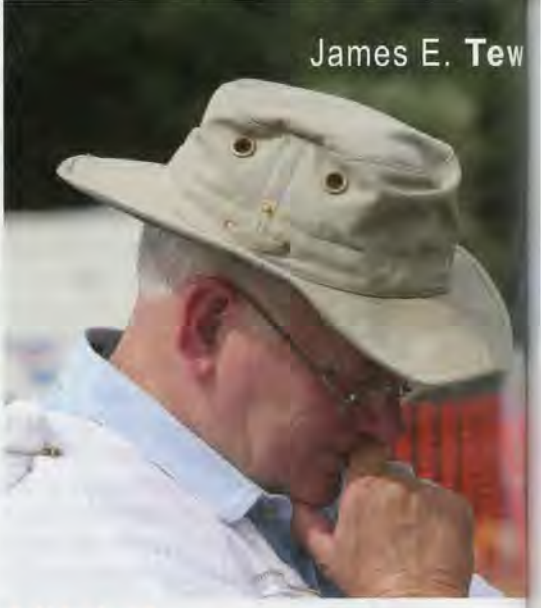
Are The Biggest Colonies Always The Best Colonies?

Can beekeepers have too much of a good thing?



A conversation – not a complaint

My comments here are a conversation and not a complaint. Just now, I have nothing bee-related about which I feel a need to complain. My colonies look great. Since things will change quickly enough, I need to say that while I can.

I admitted, in full detail, a couple of years ago that my great-looking colonies in June were dead from *Varroa* predation by late August. I'm alert to danger this time, but just being alert does not mean that the protection of these large colonies will be easy. It would seem to be easier to control diseases and pests in smaller but none-the-less healthy colonies. So I ask, *"Are colonies with large populations always the best colonies in the apiary?"*

No science

I have no literature citations, but I would guess that the typical healthy feral colony has a noticeably smaller bee population than the typical healthy managed colony. I pose this guess because feral colonies do not have aggressive queen replacement programs, beekeeper subsidized pest control programs, and the feral colony would typically have a smaller nest cavity than that of the average managed colony. At this point, would it be okay if I suggested that managed colonies with large populations are features of our bee management programs?

Others have said and so have I

Colonies with large populations are more efficient than colonies with smaller populations. Many authorities have made that statement, and I have repeated it several times. It is obvious that larger colonies make more honey and require more space than colonies with smaller populations. I agree – large colonies of honey bees clearly are more efficient honey producers than smaller colonies – to a point.

However, I don't know where that upper limit point is. Where does the colony efficiency level top out? If a colony grew to be as big as a pickup truck and had millions of worker bees, would it be a wildly efficient colony? I suspect that the limiting factor to colony population growth is the distribution of the queen's pheromones across an ever-increasing population of worker bees. Also, food resources and limited foraging seasons would also limit the colony size. But if pheromones, food, and season were not limited, just how large can a colony grow? I don't know. Would I want to manage a colony as large as a pickup truck containing millions of bees? Increasingly, I really don't think so.

These large hives are about 18" off the ground. Even so, they are big bee boxes.

I did what I was suppose to do

After my catastrophic colony loss a few years ago, I was rattled. I'm still a bit shaken. That such populous colonies could crash so completely was something that before now could only have been achieved with toxic insecticides. I stayed on top of things this season (as best I could). I don't ever want that big of a surprise to happen again.

As you recall, last Winter was a seriously cold one for most of the United States. I was fully expecting a total loss in my apiary, but as I wrote a couple of months ago, I *only* lost about 40% of my bees. I was committed to doing what I could to help my survivors thrive.

My management goals were traditional ones – essentially I just implemented current best management practices (BMPs). I replaced queens, provided stimulative spring sugar syrup, and constantly provided pollen substitutes. I allowed extra space before the colonies needed it and also conducted a conscientious mite control program. Importantly, I started during late Winter/early Spring. I did not wait until the season was already underway.

Now, I have crazy big colonies

As Winter ended, my colonies began to rebuild slowly at first. As is always the case, some colonies were better than others, but they all seemed to be steadily recovering from winter's cold. Then they kept recovering and, as weeks passed, they recovered even more. I soon had all the previous dead-out equipment back on the growing colonies. Then, when that was not enough, I began to do the

late night assembly of equipment and put it – unpainted – on the colonies. Some of the colonies are as tall as I am. As is so typically the case with keeping bees, the management requirements of the colonies was moving from the hobby designation to the work designation. *(Please remember my opening sentence. I am not complaining.)*

Colonies in hives like the single deep, five-frame split are enjoyable and educational to work.

Then the threats of swarming started

I wrote about this development at length last month. *Apparently* – I stopped the swarms before they became issues with my neighbors. I divided a single booming colony with a strong population that was producing abundant swarm cells into three colonies. Using the procedure of colony splits to control swarming means colony numbers increase – unless I recombine the colonies later in the season.

(At this point, I really don't want to say too much more about my personal bees. Due to splitting overwintered colonies and installing new packages, I have more colonies in my yard than I intended. I suspect I may be unintentionally brushing against local zoning regulations. My neighbors are tolerant and have not said anything, but they are aware. My point . . . successful beekeeping and healthy colonies opens the door to different challenges than those presented when managing weaker colonies. Big healthy colonies bring new issues. With beekeeping, it's always something, but that's a good thing.)

The big four unaddressed issues in urban beekeeping

In no order of priority, the big four urban beekeeping issues in my personal bee life are: (1) neighbors' fear of bee stings, (2) swarms landing on neighbors' property, (3) water foragers at neighbors' pools or fountains, and (4) fecal spots on neighbors' cars or buildings. During recent years, there have been many articles in *Bee Culture* on these subjects. I suppose these four subjects are a bit like Small Hive Beetles. So long as you don't have them, they are not a problem. To all the beekeepers who do not have to deal with close neighbors, you are missing a significant aspect of modern urban beekeeping.

Please don't fill my email inbox questioning my beekeeping sanity, but issues 1-4 above would be significantly lessened if my colonies' populations were not so large. So I doggedly ask again, is a colony with a huge population necessarily a better colony than a colony with 30% fewer bees. If you are a dedicated honey producer, the usual answer is yes. You will need big populations to produce big honey crops. If a beekeeper were producing bees to make splits, a large population would be desirable. However, if a hobby beekeeper is keeping three colonies on a half-acre lot with neighbors on both sides, what is gained by having such large populations?

Big colonies die, too

I can readily tell you from personal experience that big colonies can frequently die and can die quickly and die in hot or cold weather. Just having a large population is not a guarantee that only good things are going to happen with such colonies. I have dutifully written about all my experiences with this type of colony death. In some way, *Varroa* mites were usually involved.

A few Master Gardeners have told me they would like to have some bees – but not so many. I did not have a good recommendation for them about keeping bees that way. Several years ago, I approached a prominent USDA ARS scientist asking if healthy colonies had to be huge colonies and could a queen selection program be developed to produce queens that provided good stock but didn't develop such a large population. I asked that because presently, bee colonies only come in one size – extra large. If a colony is not extra large, it appears to have a genetic dream to become that size. I was not 100% serious when I had the conversation with the scientist. Indeed, I am not 100% committed to my thoughts here in this article about maintaining smaller populations but something is calling to me about these urban apiary settings and the occasional disruptions our bees pose to non-bee people living near by.

Until you have talked with your neighbor about bees at their pool, or until you have helplessly watched as a swarm drifted off your property onto the neighbor's property, or unless you have sneakily walked by your neighbor's fecal-spotted car, then you probably have no idea about what I am writing. It is a clumsy feeling.

It's a conundrum

Increasingly, the current disease and pest control theme is to, *"Keep your colonies strong and healthy."* The very management schemes that keep your colonies strong and healthy also increase the population to what? Extra large. Maybe I have my answer – big colonies are healthy colonies. Otherwise, I don't see an obvious answer on how to keep a colony strong and healthy without it becoming big and disruptive.

Queens – always at fault

Queen breeders past and present (and future), have spent extraordinary amounts of time selecting the best queens that produce the most of everything. How could it otherwise be? Would the advertisement for a low-output queen be, *"Available – medium population queens"*? (To use the common idiom of the day, they would be called MPQs. *You do know that I'm kidding?)* Or how

about someone breeding queens that were called something like *"neighbor queens"* that produce fewer bees that fecal spot less and don't visit neighbors' water sources as often. Clearly, those strains of bees are not going to be developed. If anything, we need to continue to produce the best quality queens we can, but rather than letting them just go "flat-out" all the time, we should do a better job of controlling their brood output.

Just re-caging the queen for some time – maybe a week – then releasing her would result in a brood break that would help restrict the population and its related swarming tendencies. How many times should she be caged? I have no idea. I have delicately offered an unpopular suggestion in past articles. For no other reason than to reduce the worker bee population, colonies in crowded areas should possibly not be requeened as often recommended.

Pruning

Many years ago, I read of research that explored "root pruning." Rather than pruning apple tree limbs, the concept was for the grower to prune the tree's roots. A sub-soiling plow was offset and run 12 inches deep. Plowing one to four feet from the tree's trunk, the implement was used to cut shallow lateral roots. Obviously, the vigor of the tree was reduced. Could there be a similar process that called something like *"brood pruning?"*

The queen could be confined in an improvised cage made of queen-excluder grids. The cage would cover three or so frames and could be removed as the swarm season passed in order to develop a complement of new bees that would pass into Winter. Alternatively, to reduce the protein availability, a pollen trap could be kept on longer than usual, or an even simpler plan would be to withhold pollen supplements to the colony.

I have no science and no data, but superficially, it does appear that pollen supplements result in more bees. If I reduced the amount of protein supplement that I fed the bees, it would require them to work harder to collect pollen – which may or may not be available. Reduced protein would be the primary factor in lowering populations.

New beekeepers

I don't know how many are out there, but there is a new group of beekeepers whose only apiary location is in their urban backyard. Most likely, various zoning ordnances restrict these new keepers and the bees they keep. It would easy for those of us not experiencing the problems of a close neighboring compacted society to just tell the neophyte beekeeper to move the colony somewhere more rural. That is not always possible or convenient. If they do keep their colonies there, I can expect these new people are going to run into all or at least part of the 1-4 list above, and they will not have access to good answers.

Old beekeepers

I love the natural smells in my apiary. I enjoy watching the bees work. I enjoy the sound of the contented hum that the apiary produces, but at some point, I need to actually work the colonies.

As the season passes and colonies grow, I am compelled to add more equipment. After all, I put in new queens and have been feeding these colonies for weeks. Why do I have a need to keep pushing the bees to be all they can be? The answer can only be because that is how I was trained to keep bees. In my early bee years, I was taught to view bees as work animals that toiled to produce far more honey than they would ever need. Now, late in my career, I view bees as a pleasant pastime, a storehouse of memories, and a biological wonderment. But even when I was a much younger man, I was always drawn to those smaller colonies. They were easier to open and did not go crazy defending the colony. I enjoyed interacting with them.

In few minutes, I will go the apiary and snap a few photos for this article. I will open a colony or two. It ***will*** be the smaller ones. The big ones are impressive and productive. I certainly want them around, but they are far more work and far more defensive. The small, healthy ones help me enjoy beekeeping. BC

Dr. James E. Tew, State Specialist, Beekeeping, The AL Cooperative Extension System, Auburn Univ; ***tewbee2@gmail.com; http://www.onetew.com; http://www.facebook.com/tewbee2; twitter@onetewbee; http://www.youtube.com/***

SEVEN

Small-scale beekeepers with only a few hives do quite a bit of manual labor when removing the honey crop from hives.

Ann **Harman**

This month we are going to do some simple calculations. Ugh – arithmetic – don't worry – you can use all your fingers and toes. And you can use any sort of calculator if you wish. Don't be frightened – it's all very simple.

You will need some way to measure the time involved in all the tasks before you. You need to know the time down to the minute, not to seconds and hundredths of seconds needed for the Olympics.

First

We are going to take our honey crop off the hives and prepare it for market. It seems that conventional wisdom says a beekeeper handles every pound of honey sold seven times, starting with lifting off the hive to setting it on the shelf to sell. Let's see if we agree abut the seven times. And see if your honey is sold at the right price.

Now you have arrived at your beeyard. You are about ready to get the fume boards on so note the time. Some hives may have one super; some may have many more. Depending on the weather – bright sun and warmth increase the action of the fume boards – you will be moving fume boards from hive to hive. The cleared supers will be stacked into your choice of vehicle. If you only have a wheelbarrow for transport, removal may take a while. Removing honey supers is the **First Handling** of your honey.

While you are doing this it might be well to think about how quick and easy or how slow and cumbersome this First Handling is. Should your hives have been sited in a better place? Is your bear fence or urban flight fence so close to the hives that you have to carry each super 10 feet or more to reach your vehicle? All that walking back and forth is adding up the minutes for First Handling.

Second

So you chose a wheelbarrow or perhaps a little trailer on a lawn tractor for transport. Now you are taking the few supers (maybe you can only stack two or three high) back to your 'honey house.' This can be anything from temporary use of your garage to a nicely built real honey house. Upon arrival you now have to offload the supers and carry them into the building you will use for extracting. This is the **Second Handling.** The timing for this should be the actual time it takes to put the supers into the honey house and return to the beeyard for more supers.

Now go back to the beeyard for more honey supers. Stop timing the Second Handling at this point. Now start timing First Handling again because this will be the first time you took off these supers. Yes, it's a bit complicated at this point. You could have skipped this second (or more) First Handling time by using a larger vehicle, maybe the pickup with a clean bed.

Third

You are ready for the **Third Handling**. Let's include in this timing taking a super, removing individual frames, uncapping and placing frames in extractor. Also include spinning time. Pulling the emptied frames out of the extractor and putting them back into the empty super is not exactly 'handling honey' but it is a part of getting honey from your hives. So that should be a part of Third Handling time.

Will you be putting the empty wet supers back on hives over the inner cover for the bees to clean? If so, then include that time taken in Third Handling. In addition better count the time to take the dry supers off for storage until the next honey flow. These times are a part of your harvesting even though you are not actually physically handling your honey.

Another part of Third Handling could be doing something with the cappings if you used an uncapping knife. You cannot just ignore the cappings or you will have every ant from miles around. Perhaps they should be grouped with a clean-up time. The extractor, buckets, floor, and anything else you used (including your cell phone) will have to be washed clean. So save all these chores for later.

Fourth

Honey is now running from extractor, through some strainers, into buckets. Now begins **Fourth Handling.** Perhaps you have a nice settling tank. Now you will be pouring honey from the buckets, perhaps through another strainer, into the settling tank. Although it takes only a very short time to carry bucket to tank it may be done a number of times. So it is perfectly OK just to measure the time of one round trip (extractor to tank and back to extractor) then multiply by number of round trips to get the total time.

By the way, you are writing all these Handling times down aren't you? Do not include interruptions such as stopping for a meal.

Fifth After a few days the honey in the settling tank is now ready for bottling. Here comes **Fifth Handling.** So assemble containers and lids and begin. You may be filling several sizes and types of containers so you will need to decide just how you will arrange the handling and timing of this part of the project. Let's assume you fill the container and fasten lid on and set aside in the box the container came in. Do you sell in squeeze bears? They usually come in big bags so you have already solved the problem of where to put the filled, capped bears.

It is possible that you sell your honey in one gallon or five-gallon buckets instead of small containers. Bulk sales certainly do save time over filling numerous small containers, but you also receive a lower price per pound. That makes sense. At least at the moment.

Even if you take breaks during filling and capping or take several days to do it, be certain to add up all the time spent in filling and capping. Oh yes, don't forget to add in any time spent cleaning up the mess made when you knocked over or dropped an open container.

Sixth The step following filling and capping individual containers is usually labeling the container. Many beekeepers save labeling until the honey is ready to be sold. If a particular honey is prone to crystallization unlabeled containers can easily be reliquefied. So keep your records of Handling times handy for the next step.

Since you will be handling the filled containers individually for labeling you have now entered the **Sixth Handling**. If you purchased labels already printed with your contact information and weight they may be on a roll. Now you can easily make a stand to hold the roll as you peel off the label. Those preprinted rolls will certainly save time. Some beekeepers will print their own labels on blank sheets for computer printers. These make labeling fairly quick. The slowest time is probably individually stamping contact and weight information onto a roll of labels. Yes, label preparation is part of Sixth Handling. Even if you make many interruptions to labeling, don't forget to keep track of the time taken. (Don't get annoyed. You are only doing the Honey Handling project once unless you greatly modify your Handling and wish to see if that made a difference.)

The price of containers and labels is not really included in Handling but you might wish to keep those costs in mind. Don't forget, if you are making your own labels you still have to buy printer inks and label stock. You might wish to compare various costs: buying preprinted labels, making your own, and stamping preprinted. Yes, figure in the time for these three choices.

Seventh Your honey is all ready for sale. We have one Handling left. So it looks like the **Seventh Handling** will match what conventional wisdom indicates. However, depending on where you sell your honey this Seventh Handling may really only count for one Handling so an Eighth or Ninth or more may have to be added.

For example, perhaps you sell at a farmers' market and at a shop in a town near your home. Taking honey to and from the farmers' market can count as one Handling. But taking honey in the other direction to the shop should really count as another Handling. So different selling places could add on as different Handlings.

Now you need to gather all your scraps of paper giving the times you spent in the different Handlings. It is time to combine them and see just how much time you spent for each one. And then add up to get the grand total.

One benefit of adding up all this time is that you may discover ways to make one or many of the Handlings more efficient.

All done? Great!. Hey – wait a minute. Although this is not exactly handling the honey it is a necessary step. We forgot to take into consideration the time spent assembling all our gear to go out to the beeyard to get the supers. Drat. We need the fume board and repellent (your choice). The bee bucket with hive tools, a lit smoker in case a problem arises. A veil, and gloves if you wish. And decide whether to take the wheelbarrow or the pickup (is the pickup bed clean or is it layered with compost?). OK. Decide on the time taken for all of this.

Oops! Go back to Third Handling. Remember the cappings and the clean-up time? Well, that is a part of preparing honey for sale. You can make it a separate section, just like assembling gear above. After all, both are necessary for your honey production.

Convert all the time to money. How? Most small-scale beekeepers consider their work at $0.00 per hour. But look at the time spent for the Seven Handlings of your honey! How much is your time worth?

So now are you really getting the correct price for your honey? BC

Ann Harman handles her honey and her bees at her home in Flint Hill, Virginia.

ISLAND OF OPPORTUNITY

A Bee Population That's Uncommonly Healthy

Cory **Collins**

The island of Newfoundland forms the easternmost province of Canada, contains the most eastern point in North America, and according to the Flat Earth Society, holds one of the four corners of the world. It's little wonder then that this relative isolation has left it with a bee population that's uncommonly healthy and with no sign of colony collapse disorder.

The island is the world's sixteenth largest and is the smaller portion of Newfoundland and Labrador, Canada's tenth and youngest province. Despite its size, Newfoundland is home to less than 500,000 people and has vast swaths of unspoilt wilderness.

Dave Shutler, a parisitologist at Acadia University in nearby Nova Scotia, says isolation has created unique circumstances and advantages for Newfoundland's small number of beekeepers.

"The colonies were established before the scourge of disease. Another important aspect is that the densities of the bees is much lower compared to everywhere else", he said.

Dr. Shutler emphasized that these low densities also help slow or prevent the spread of many diseases.

"If a disease arrives in North America in January, it's everywhere in the continent by the end of the year. In Newfoundland, even if a particular disease arrived, it could become extinct locally and not affect bee populations elsewhere on the island", he added.

Importantly, the best available research indicates that Newfoundland bees show no sign of the *Varroa* mite or the tracheal mite, pests which routinely devastate colonies in much of world and can be a continual frustration for beekeepers. Their absence means that Newfoundland beekeepers have no need for pesticides that have become common elsewhere and can sometimes add significant expense to beekeeping operations.

"Neither of those parasites have been discovered", Shutler said. "And [the bees] probably aren't exposed to hardly any pesticides. A lot of the blueberries in Newfoundland, for example, grow almost ferally. There is some blueberry agriculture there but not much", he added.

Newfoundland also has an abundance of wildflowers and only a small amount of commercial farming, and what little exists is spread over an area larger than Kentucky.

Aubrey Goulding runs Paradise Farms, one of Newfoundland's few commercial beekeeping operations. Begun in 1984 with his wife Viola as a hobby, years later they went commercial and have enjoyed increasing success as the demand for local honey has grown.

Goulding is especially thankful that the mites are not around to create problems, and could only speculate on what they would mean for his expenses.

"Extra work? Tremendous. I guess it would be cost in losing hives. It would be very laborious, keeping your eye on those mites. And losing all those hives would be very disheartening for me. Thankfully, right now, we're safe."

Newfoundland's strong domestic market for local honey and related products has left Goulding with no need to export, but he emphasized the possibility of great opportunity for others to do so, given the right amount of motivation.

"There was a guy who came over about four or five years ago from one of the Scandinavian countries. He said Newfoundland could be a powerhouse for organic honey", Goulding said. "But it takes people young enough, creative enough, with lots of energy, to move this opportunity."

According to researchers who highlighted Newfoundland's healthy bees in *The Canadian Entomologist*, belief in Newfoundland's potential future in organic honey is well-founded. Goulding says his own experience shows that interest in new businesses at home and abroad has been increasing.

"There's huge demand to get people going, there's a huge interest there. It's growing but very slowly. I've just recently got an interest from Vermont. We've got people phoning in from Alberta, and another operation in North Sydney [Nova Scotia]."

Currently, Paradise Farms also manufactures beeswax body care products, sealants, specialty honeys,

and furniture polish. The island's other established *commercial operation, the Newfoundland Bee Company, is an eight hour drive away in Little Rapids, a community on its west coast.*

The small industry is assisted by staff at Newfoundland's provincial Department of Natural Resources, and Goulding has found government involvement to be helpful, especially in relation to marketing strategies and in attempts to preserve the health of honey bees.

Dave Jennings, the director of the Department's production and market development division, is determined to keep the mites at bay.

"We as a province are still free from many pests. The significance of having a disease free area for bees is huge."

He also noted that despite the detection of Nosema ceranae (a small, unicellular parasite), the trouble it has caused has been minimal. "They do see it from time to time but the issues with it are much lower than you would see in other places", said Jennings.

To be sure, *Nosema ceranae* has also been tentatively linked to colony collapse disorder, but perfectly healthy colonies have it as well.

Jeff Pettis, a bee researcher with the USDA, has explained in the past that this means that this species "cannot be the sole cause." High levels of the parasite are mostly thought of as a stress disorder of honey bees, and often as a symptom in unhealthy colonies rather than as a cause of ill health itself.

Regardless, the remaining uncertainty around CCD has left officials convinced of the need to protect local populations.

"We have a very strict regulation around what we will permit", Jennings added, noting that the government is mindful of the industry's potential. "And we have regulations around the movement of honey bees. If they are found and aren't certified, they'll be confiscated and destroyed."

This regulation stems from the Animal Health and Protection Act, a provincial law that came into effect in 2012, which explicitly includes honey bees and defines honey as an animal product.

Regulations around the movement of honey bees and other agricultural products can be particularly important for tourists. In light of that, Aubrey Goulding suggested that the government might consider placing extra signage at the ferry in Port aux Basques, a main point of entry into Newfoundland from mainland Canada; other products are also the subject of inspections in Newfoundland and Nova Scotia, from where ferries to the island depart.

Though it does not affect beekeepers, strict inspections are performed to look for soil on car tires. From there, inspectors may search, wash or vacuum cars contaminated with soil. The inspections help limit the spread of organisms between provinces that may affect potato crop yields.

Jennings thinks the suggestion to take extra steps to protect bees is a sound one.

"I think that's a good idea, something we should definitely look at. We also need to put some information on the ferry itself to explain the restrictions. I'd put it in North Sydney [Nova Scotia] as well."

Ultimately though, Jennings is optimistic about prospects for growth in Newfoundland and highlighted Canadian programs to support agriculture. Growing Forward, a federal program that assists with innovation, competitiveness, and marketing, can also provide funding to buy equipment or upgrade infrastructure.

Beekeepers are also eligible for a group of provincial agricultural assistance programs, updated in 2012 as part of Newfoundland's new provincial agriculture strategy.

"Opportunities exist within the Newfoundland and Labrador agriculture and agrifoods industry to increase production levels of almost all agricultural products", the strategy reads. "Therefore it is essential for us to increase our research capacity, value-added production and local market share so local farms can supply a greater portion of the provincial market and expand further into export markets."

Though Newfoundland has little agricultural activity overall, farmers in the province are already exporting milk, eggs, chicken, furs, ice cream and many other products.

Some beekeepers in Newfoundland have sold nucs on an individual basis, and word seems to be spreading within the island among enterprising people.

"We actually have a growing group of producers now. We have maybe 40 people now raising bees in this province, and they're a pretty educated group of people", Jennings said.

However, Phillip Cairns, a hobby beekeeper in St. John's, says being in a smaller community can create a barrier for people just starting out. He described his biggest challenge as "simply not having many experienced beekeepers around to show me what I was doing wrong."

But he says the presence of mites could be a deterrent to many people who might be concerned about start-up costs in the first place. "I'm not rich. If I had to start paying for Varroa treatments on top of everything else, I'd give it up", Cairns said. "But for commercial beekeepers with hundreds or thousands of colonies, a place that's varroa-free like Newfoundland must seem like a dream."

Dave Jennings told me he has also observed increasing interest in buying hives.

"We're certainly getting lots of interest about buying bees. In the last year I've probably referred through our office perhaps 10 inquiries", he said.

When asked about the local market conditions, Jennings was equally positive.

"Everybody that has product tells me that they simply don't have enough to sell. The demand outstrips supply every year. It's clear that there's a real opportunity to grow." BC

BIGGER PICTURE

Jessica **Louque**

The Parent Pollen Trap

I'm sure everyone remembers a time that Lindsey Lohan was popular and didn't embarrass herself with every breath she took. Her remake of The Parent Trap was one of my favorite movies, probably because all kids think it's so great to pull those kinds of tricks on their clueless parents. Everybody loves a ridiculously unrealistic happy ending as well. If only pollen traps and bees were so simple as Hollywood . . .

I am a flower fanatic. I can't walk through a seed section without coming away with fewer than five packs of seeds. One of the stranger connections that brought me closer to my husband Bobby was the love of unusual plants. In particular, we both had artic kiwi plants stubbornly growing on a fence in our respective yards, and had a hoarding problem with orchids. Fortunately, this connection makes Bobby much more lenient towards my rampant flower purchasing, and occasionally digging a lot of holes. My favorite purchases are things to see if the bees will like it. Sometimes they are picky little things, and I end up with a pile of bumble bees or solitary bees. Not that it's bad to have those, but it wasn't what I wanted. Some things that should have been a bee magnet did nothing (the bee balm, for example, never has bees), and some things that should have attracted other insects had so many bees that nothing else would come to it (the abelia bush is covered with bees if there's a drought).

Beeless balm.

There's also a general interest in honey-producing plants, but everyone always forgets the pollen. Honey is delicious and profitable, but pollen is what keeps the brood going. A lot of people don't put any emphasis on pollen-producing plants, but in reality, how do you know what produces pollen? You can go to a farmers' market and find dozens of honey types. You can find alfalfa honey in a lot of places, but bees don't usually get pollen from alfalfa because of the trigger mechanism. If a honey bee tries to get pollen from an alfalfa flower, it will smack her in the head. Obviously, they don't like that, so they don't take the pollen. Now, if an alfalfa leafcutter bee takes the pollen first and releases the head smacker, then the honey bee will go in and take the nectar. Sometimes they will anyway if they can do it without triggering the head smack. However, I have had multiple opportunities to try to sample alfalfa pollen and failed miserably every time, because the bees don't take it. Soybeans are the same way. Being self pollinated, they can be mildly helped by visiting honey bees, but honey bees only gather nectar from soybeans, and inadvertently move pollen from one place to the next (if they get any pollen at all). If you are looking around at plants, you see honey bees, but how do you know if they are collecting pollen or nectar? Often you can see their pollen baskets when they are out on their pollen missions, but it's difficult to have them stand still long enough to tell. Do you know the best place to see a bee with a pollen basket? That would be back at the hive.

When you see bees returning with all their pollen baskets, it's a very exciting scene. I personally like to take a few (hundred) photos of the bees floating around with their little saddle bags in a rainbow of colors. By this point, you see the baskets and the color of the pollen, but the best you can do is guess the origin. It also seems that nature has an inordinate fondness for yellowish-orange pollen. This could be nearly anything in the pollen world. Once last year, Bobby and I kept seeing what we called "cheeto dust pollen" in the hives and in the pollen baskets. We had recently learned how awesome sumac bobs were in a smoker from a NY beekeeper, so we were collecting last year's bobs (maybe it was the end of June or July?) and a dusting of the bright orange pollen came off the plants. That's how we found the sumac pollen.

Separately from this, we took pollen trap samples throughout the course of last Summer/Fall from different locations in the area, and sent them to Dr. Allen Olmstead at Bayer CropScience. He located some really skilled palynologists (professional pollen peeps), Dr. Sophie Warny at LSU and Dr. Vaughn Bryant at Texas A&M. These were samples from 12 sites over four counties in North Carolina, sampled from June until October. But the area was disclosed due to local flora changing so frequently. What they found was a little surprising to me, but nonetheless, extremely interesting. I would love to pester them with even more samples continuously, but I don't want to end up on a "blocked caller" list. I would also like to know what color pollen corresponds to each

species, but perhaps that will come at a later time.

The major pollen source was *Parthenocissus quinquefolia*, which is Virginia Creeper. I had heard that this was a good bee plant before, but half the time I think it's poison ivy so I often overlook it or viciously attack it in the same way other people might attack a small spider in their house, as though its sole purpose in life is to murder their entire family in the most horrendous way possible. I've never seen this climber bloom, but I know it's a fairly prevalent native plant on the east coast. It stayed around for a good part of the Summer as the dominant pollen. Depending on the time of year, the other big pollen sources were sweet clover, plantain, sumac, and goldenrod. These five plants were the astonishing majority of collected pollen during the Summer season. The lack of diversity was a bit astonishing, but just as strange were some of the minor players for the pollen baskets. One additional plant was in this list for its prevalence in one spot, and that was something in the carrot (or umbel) family. This particular sample seemed to cause some difficulty for the researchers, particularly with the massive diversity of the family and the time limitations, but Queen Anne's Lace (wild carrot) is THE premier field flower later in the Summer here, so I would have been surprised if it didn't show up at least a little bit. The goldenrods dominated the fall collection with almost no competition.

The secondary types were somewhat baffling to me too. As far as I knew previously, honey bees were not fond of crape myrtles, but here they were showing up as a minority sample in the late Summer. We had one site that produced consistently weird results that didn't match any of the other sites, but maybe it just had a lot of eccentric gardeners and had to take what it could get. This site had an abundance of magnolia pollen, some corn pollen, and a rare tropical plant pollen called poorjoe that's related to coffee. Some of the other minor plants included buckwheat, white clover, and buttercups. Dandelions made the list, but that's not surprising to anyone, I wouldn't think. Dr. Byrant did explain to me that they weren't surprised by any of these pollen samples as most of the pollen plants in our area did not overlap the honey plants, and that our major honey plants were sumac, poison ivy, tupelo, tulip tree, sourwood, several plants in the rose family (like apples), and several plants in the composite family (asters, like sunflowers). Since the honey source is so much more important to beekeepers, I think we forget about the pollen sources sometime.

Much to my dismay, most of my landscaping plants were falling into the minor category (which I guess is better than not showing up at all), but then again it is pretty rural out here. Eucalyptus pollen was in a few samples, and I know that besides ours, there are at least three other trees in the area – or at least there were before the Great Ice Storm of 2014. It knocked our 20 foot tree back to side buds on the first foot of the trunk, and I've seen a lot completely cut back now. Some *Convolvulus* (FYI, morning glory) pollen showed up, and considering we are in tobacco area, and lots of gardeners, I'm not particularly surprised that it made an appearance. That stuff is the devil, but it's good to know that something somewhere gets some good out of that awful plant. *Polygonum*, or smartweed, was another minor pollen source. I have that weed in the top three in the yard contending with pokeweed and poison ivy for most unwanted takeover. Then there was *Oxydendrum arboreum*, the ever-coveted sourwood. This is indeed an interesting occurrence because when testing for sourwood honey, the pollen grains are considerably less than the normal expected percent because it produces so little pollen. That means there was probably a lot of really nice sourwood honey in those hives and I never knew!

The always popular camellia bush had a presence and there was some confusion over what appeared to be some sort of Euphorbia plant. This is the poinsettia family, but some of the other plants are really neat in landscaping – and I have a few different kinds. I'm sure the week when Southern States had a sale on yard plants that most of my neighbors bought them out (Facebook confirmed this as well). There was also a touch of honeysuckle pollen, which is a staple for the south. If it weren't for honeysuckle, kudzu and wisteria, I'm pretty sure our trees couldn't stay upright. I was actually surprised to not find any wisteria, but I think it may be only a nectar producing plant. Impatiens were also on the list, which I thought was really strange because I didn't even realize they had pollen anywhere. I also thought *Vitis* was a strange minor pollen because normally bees don't like grapes. Evening primrose was one of my biggest border plants last year and showed up as a minor source. I think it is also a popular garden plant here because mine comes back yearly.

I was surprised to not see more of the Aster family *en masse*, as well as bachelor's button, basil, coneflowers, and other clovers. There was more diversity (in my opinion based on colors) in the springtime, but we didn't take any samples until June. Perhaps this will be something we can look at in the future! Remember kids, the moral of the story is: don't let your bees turn out like Lindsey Lohan. BC

Jessica Louque and her family are living off the land in North Carolina.

A bee with purple pollen baskets.

Bonesets And Related Wildflowers for Bees

Connie **Krochmal**


Common Boneset

The bonesets, thoroughworts, and other eupatoriums are related to the joe-pye-weeds. All in all, around fifty native species are found in the U.S. and perhaps 450 to 500 or so worldwide. Fairly widespread, these wildflowers occur in most areas of the East. Some are also native to the West.

The Latin name for the genus, Eupatorium, means "of a noble father." The group is named for Mithridates Eupator, a Persian general who was victorious against the Romans. He was also known as King Mithridates VI.

At least 20 species are known to be reliable honey plants. Their blossoms are eagerly sought by bees. The eupatoriums are important bee plants in the Southeast, the Plains, Alaska, and Hawaii.

All species are good sources of nectar and pollen, and are considered excellent honey sources. The plants, which are fairly common, can bring good crops of honey. The yield can be rather small in some cases. Generally, the honeys from the various species are combined with that from other Fall-blooming plants.

General Description

Generally, these tall, coarse plants can vary in height from four feet up to 12 feet or so. They're some of our tallest wildflowers. The leaves, which are usually aromatic, can be in whorls or opposite. They assume assorted shapes from round or wedge-shaped to lance-like. The foliage is covered with large, resinous dots. Typically, the bonesets and snakeroots are noted for their paired leaves and white blossoms.

Members of the daisy family, the plants are widely known for their conspicuous blossoms. Their compound, tubular, disk flowers feature long, decorative styles. The flower colors vary by species, but are usually purple, purplish-pink, or white.

The blossoms form small, rounded, fluffy, crowded, eye catching flower clusters from late Summer into Fall. The heads can be either dense and close or lax and arching. Each one contains many individual blossoms.

Growing Eupatoriums

The eupatoriums are easy to grow. Adapted to most soil types, these prefer an average, rich, moist soil. The plants are generally suited to full sun and partial shade. The exception is white snakeroot, which requires some shade. This species also favors an alkaline soil.

Give the plants plenty of room for they often form four foot wide clumps. These wildflowers adapt easily to transplanting. Usually, they're propagated from seed or cuttings. Once planted, the eupatoriums often self-sow. Division is rarely needed except for the mistflower, which should be divided during the Spring.

Recommended Eupatoriums for Bee Gardens

The following are only some of the many native eupatoriums that are visited by bees.

Common Boneset (*Eupatorium perfoliatum*)

Hardy to zone three, common boneset is also known as ague weed, feverwort, Indian sage, and sweating plant. It is a short lived, Fall blooming perennial.

In addition to this species, a number of related species are also called boneset. However, this one is easy to identify by the distinctive foliage that joins together at the bases to surround or perforate the stem. This leaf arrangement explains the Latin species name as well as another of the common names – thoroughwort, which means 'through the leaf.'

This plant is common in the East from New England and New York through the Carolinas to Florida, Alabama, and Louisiana westward to Texas and the Dakotas. However, it occurs less frequently than some other Fall-blooming species, such as asters and goldenrods.

Common boneset is typically found in low ground, especially along wet shores and swales, sunny wet meadows, waste places, bogs, prairies, thickets, alluvial woods, and wet low places over much of the East.

The clump forming, coarse, hairy plant features solid, erect, stout, much branched stems. The plants reach 4½ to six feet in heig ht.

Eight inches in length and 1½ inches wide, the lance-like, wrinkled, heavily veined, leathery leaves are opposite. They're lance-like with pointed tips. Hairs are found on the undersides of the leaves. Although prominent resinous dots appear on both surfaces, these are more common underneath.

Common boneset blooms from late July into October. These open in dense, loose, terminal, flat topped clusters. Each crowded, round flower head can

feature over a dozen blooms. Generally creamy white, the rayless blossoms are occasionally blue, purple, or purple-tinged. They feature flamboyant, white corollas and long showy styles that resemble threads.

This species requires a consistently moist soil. It should be transplanted from late Spring through early Summer. The plants are attacked by various kinds of insects more so than the various joe-pye-weeds, which are relatives.

Common boneset was widely used by both Native Americans and European settlers for medicinal purposes, especially for snakebite and fevers, such as dengue, as well as for other illnesses.

The plant can provide a huge honey surplus. Often used for baking, this has been described as one of the best honeys in Nebraska, the North, and Canada. It is sometimes mixed with other Fall honeys. Common boneset is an important honey source in some regions.

The very heavy honey is light to dark reddish amber or deep amber. Its texture is so thick that this resembles molasses. Although the flavor and aroma are somewhat strong initially, much of this disappears as the honey ages.

Late flowering thoroughwort (*Eupatorium serotinum*)

Late flowering thoroughwort, also known as boneset, can be found from Massachusetts and New Jersey to West Virginia and Ohio southward to the Carolinas, Florida, and Louisiana westward to Wisconsin, Kansas, and Texas.

The species is most commonly found in alluvial soils, clearings, borders of woods, railroad embankments, old fields, moist woods, bottomlands, waste places, open areas, and thickets. It occurs in both dry and damp ground.

From one to seven feet in height, this bushy, hairy plant has erect, solid stems that form clumps. The young plants feature reddish tinged stems.

On long petioles, the sharply toothed, hairy leaves have sticky dots underneath. Generally, they're narrowly ovate, elliptical or lance-like. These range from two to eight inches in length and are almost half as wide. Although the foliage is typically opposite, the upper leaves can sometimes be alternate.

Late flowering thoroughwort blooms feature white or pastel lilac corollas. The flowers emerge from late August through October in rounded clusters. The individual, hairy, branched flower heads feature up to 15 blooms.

The blossoms are very rich in nectar and are a good source of honey, which is light amber to amber with a strong odor. In some locations, late flowering thoroughwort is a major honey source, especially in Louisiana. This honey has been known to ferment.

Mistflower or hardy ageratum (*Eupatorium coelestinum*)

Also called blue mistflower, this has become a popular garden plant. Mistflower is also known as hardy ageratum since the flowers resemble those of the annual ageratum. It is hardy to zone five.

Easy to grow from seed, this perennial is found in the East from New York, New Jersey, and Pennsylvania southward to Florida westward to the Midwest, Missouri, Nebraska, Kansas, and Texas. It prefers fields, woods, lowlands, wet meadows, damp roadsides, borders of streams, damp clearings, and thickets. This is one of the most widely cultivated species of the group.

One to three feet in height, this branching perennial has a densely hairy, solid, square, erect stem arising from a cord-like rhizome. Mistflower eventually spreads to form colonies.

The opposite, reddish-green, puckered, stalked leaves are thin and blunt. Coarsely toothed, the rough, hairy foliage ranges in shape from oval or ovate to triangular or almost oblong. This is two to three inches in length. Typically, the leaves have resinous spots on the underside.

Mistflower blooms make their appearance from late July into October for about six to eight weeks. When given enough sun and moisture, these plants can put on quite a show. The compact, flat topped, dense, terminal hairy flower clusters are up to four inches wide. Lots of blossoms are in each head – around 50 or so. Only disk flowers are present. The long styles lend a fuzzy look to the blossoms.

One-half-inch across, the blooms can be blue-violet, pale blue, violet, lavender, purplish-red or rarely white. The Latin species name refers to the blue flowers for which they're named.

Because the stems of mistflower are rather weak and tend to fall over, gardeners often stake them. To keep the plant bushy, pinch it back during the Spring. Less vigorous in clay soils, this species tends to spread easily and very quickly, especially in sandy loams.

In some cases, the plant is aggressive enough to crowd nearby garden plants. Mistflower can be divided during the Spring every couple years. The plants can also be propagated by seeds and cuttings.

White snakeroot (*Eupatorium urticaefolium or Ageratina altissima*)

This species is also called Indian sanicle, rich weed, and white sanicle. White snakeroot is very common over much of the East southward from New England to Florida, Georgia, and Louisiana. Its range extends into the Midwest and North Central States to North Dakota and Texas.

The plant is found in moderately moist areas on basic soils. White snakeroot's habitats typically include limestone-rich cliffs in woods, wooded bluffs,

White snakeroot (Eupatorium urticaefolium *or* Ageratina altissima)

mountainous woods, thickets, old fields, pastures, clearings, and open rich woods.

Often grown as a garden plant, white snakeroot is one to six feet tall. Similar to some of the bonesets, this species tends to be shorter. It features a single brown, much branched, firm stem that can be hairy or smooth. This arises from tough, knotted rhizomes.

The coarse, opposite foliage, two to seven inches in length, is wrinkled, and toothed. The leaves are oval to egg-shaped with a heart-shaped base. On long leaf stalks, these can be densely hairy on the undersides. They lack the sticky dots found on many related species.

White snakeroot blooms from July until frost. The flowers form loosely branched, dense, open, rounded flower heads that can be 2½ to four inches across. These emerge from the upper leaf axils. The bright white flowers, 1/4 inch wide, feature white corollas. The blossoms give the plant its common name.

Several varieties of white snakeroot are available. These include Braunlaub, which has brown tinges on the blossoms. The young leaves are blushed with brown.

Another cultivar called Chocolate features brownish-purple foliage and purplish stems. Only two to four feet in height, this cultivar is hardy in zones four through eight. It is a small, rounded, dense plant.

White snakeroot usually prefers partial shade, but will grow in full sun. A well drained soil is ideal. Although it is hardy to zone three, this isn't a reliable perennial in warm areas as it prefers cool night temperatures. Propagate by division, cuttings, or seeds. The species tends to spread rather easily.

This wildflower is best known for poisoning perhaps thousands of European settlers when the dried plants became mixed with animal fodder, which resulted in poisonous milk. This caused an illness known as milk sickness. One of the best known victims was Abraham Lincoln's mother, Nancy Hanks.

Unfortunately, many people died before the cause of death was determined to be white snakeroot. Later, there were campaigns urging farmers to eradicate the plants from their fields. This story is told by Amy Stewart in "Wicked Plants-The Weed that Killed Lincoln's Mother and Other Botanical Atrocities," published by Algonquin Books.

White snakeroot is well liked by bees. It typically brings good honey harvests. Some beekeepers have reported huge surpluses.

The honey yield can vary from one place to another although the reason for this seems to be unclear. The amount can vary somewhat even within the various regions of a state. It appears to yield less honey in the South than elsewhere despite the fact that the plants are quite plentiful in the area. The honey is light to dark amber with a strong flavor that can be unpleasant at times.

A related species of white snakeroot (*Eupatorium aromatic or Ageratina aromatica)* is found in dry sites throughout much of the east from New York and New Jersey west to Ohio and south to Florida and Louisiana. It blooms from August through October. Despite the Latin species name, this plant isn't aromatic. BC

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

WAKE UP YOUR INNER Chilihead

Jack **Blackford**

When you share hot pepper mead with friends the first thing they think is that fire is going to shoot out of their mouth if they drink it. That may be true of maniac Chileheads using Naga Jolokia Ghost Peppers or the Butch T Scorpion habenaros, but could you taste the honey in the mead after the fire dies down before you ghost out? We want to make a more balanced pepper mead, one that highlights the taste of the peppers with just a little, or if you really want, a lot, of hot pepper heat.

We have always been Chileheads, growing Thai Dragons, Carribean Red Habenaros for high levels of heat, along with milder Jalapenos for eating. We also really like the Italian style sweet peppers such as the Giant Marconi and New Mexico styles like Big Jim and Anaheim styles like the Highlander for flavor. The Marconis are in both red and golden ripe varieties, the plants are huge and healthy, and produce plenty of meaty peppers, the ripe ones are very sweet and the green ones are very good to eat. They have so much more taste than the standard bell pepper. Not that a big red ripe bell peppers isn't delicious, the Marconis have so much more flavor and I think are easier to grow. You are not likely to find these varieties in any number in a nursery, we start our own seeds every year under grow lights. We can get a lot more varieties like that, including many more different kinds of hot peppers much cheaper than buying plants. One source of crazy hot peppers is **PepperJoes.com**, we have had good luck germinating their seeds into some nice plants to put out this season and they even have the newest record heat level as of today, the Carlonia Reaper. Reaper mead, one batch of that might last you a couple of decades to drink! See people eating these on Youtube for a good laugh and a warning not to do this at home!

Jack with some of his pepper-picking-wife's beautiful ripe red and golden Marconis.

Taste is Not All Flames

We like to experiment with different varieties each year, we really like the citrus fruit flavor of the Hot Lemon pepper from Ecuador. Big Jalepenos like the Biker Billy are fun to eat and you can get pounds and pounds of peppers off of each plant. We dehydrate many of the hot peppers and grind them up to make chile powder. We have found that to make the best all around chili powder to cook with its good to blend several different kinds of chile powders as each kind of pepper has a different pattern of burn when eaten. Some peppers just flash heat across your lips and the tip of your tongue, others take a few more seconds to start sinking into the sides of your tongue and stay there for a long time. So our design for a good all around capsicumel should enhance the taste of the peppers and have a balanced heat, wether just a little heat for throwing flames from your friends' mouths. We also must make sure the honey isn't lost. This isn't the place for a delicate orange blossom honey, you want a honey with some intensity, a nice dark honey that can stand up to your pepper's taste, and can cut the heat.

Burn Your Peppers with HEAT

We have always roasted our Marconis on the grill over high heat to burn the skin and then peeled them to eat on a very hot grill outside or even under a broiler set as high as it will go. When you grow Radio Flyer red wagons full of peppers this can become a time intensive chore. My wonderful pepper picking wife finally let me get a new toy, a real chile roaster from McBroom Metal Work's at Arizonachileroasters.com that hooks up to a propane tank. Using the chile roaster vs roasting on the grill is like comparing a hand cranked extractor to a 220V motorized extractor, it takes about two minutes for a batch of chiles to be roasted. This looks like a big bingo game rotating drum, except this one has a big flame shooting into it that sears the peppers much better than a grill. These are much more common out west than here on the East coast. The peppers get dumped into the drum, you light the burners and start rotating the drum, when the peppers are charred just right you turn off the gas burner and drop the peppers into a big stainless steel pot to steam. After they are cooled we like to take scrapers, like the kind used to scrape dough off of a table, and easily scrape away most, but not all, of the burnt skin. We want some of that smokey flavor to stay with the peppers. We then eat the peppers in chili, curry, pizza, a hundred different ways. The interesting part of this roasting process to a meadmaker is that the peppers sweat out a lot of juice in the pot. Normally, when we freeze peppers for the winter, we just add this juice

back to the peppers. If you ever drank the pepper juice. it, surprisingly tastes just like pepper juice, but with lots of sweetness if you have some red ripe peppers in the roaster. I always thought this would make a great mead but never had enough juice to give it a try.

The Capsicumel – Chile Pepper Mead

Last year we put out about 50 Marconi pepper plants, both red and golden ripe ones, green ones and of course a mix of different kinds of hot peppers, we had more peppers than we could pick. We had our new pepper roaster. I had some nice Knotweed honey from Charles Walters, one of the Russian queen breeders whose bees really know how to work the knotweeds. I had everything to finally make this roasted pepper mead. As we roasted pepper after pepper we collected some of the juice from each batch and froze it. Along with the Marconis for taste, as they don't have very much heat, we added some big red ripe Biker Billy jalapeno juice, that was pretty hot, to the mead at the end of the primary fermentation to boost the heat levels. We also added some whole split Thai Dragon peppers and Hot Lemon peppers, you would add these to your own heat levels and taste, to round out both the different kind of heat from different peppers and to add some more pepper flavor. We added these peppers whole, split down the middle to expose the seed membrane where the capsicum is, during the last part of the primary fermentation. This is because alcohol can dissolve the capsicum better than water and will draw out more heat at this stage then if the peppers are just used early in the primary.

We finally collected enough pepper juice to make the mead. We strained out the burnt skin pieces, they had flavored the juice already, and mixed in the honey with a drill mounted stirrer to get the must well oxegenated. To modernize our meadmaking a little, we wanted to boost the body by adding Feri Blanc soft tannins. To enhance the fermentation we added yeast nutrients like Fermaid K and Fermocel P, any standard balanced nutrient would work well as long as it's not just nitrogen only like DAP. Also a little Opti-Red to smooth out the mead and to help preserve the flavor and tannins present in the mead. We also added pectinase as a safeguard, and amylase to digest any starch from the peppers that had not been converted to sugars in the unripe peppers.

A more traditional way to make a capsicumel is to basically make a traditional mead and then add hot peppers to the secondary. Older recipes added the juice of lemons and oranges to balance out the taste and to acidify the must to favor the yeast activity. Most meads made this way are more focused on just the heat levels and not so much on capturing the overall pepper flavors. But, depending on which variety of hot pepper used and how much of each is used more pepper flavor can be achieved without just making a honey flavored hot pepper sauce. To add more depth of flavor to these styles of capsicumels some ground Ancho or Anaheim chile powders may be added during the primary fermentation, the churning of the yeast keeps the powders in suspension and extracts the flavors, then when the fermentation slows down the powders can drop out with the yeasts or may need to be fined later before bottling. Stay away from green bell peppers, this is a negative taste to mead judges, associated with poorly made wines and meads,

A wagon full of big sweet Marconi peppers, a wagon train of peppers followed all Summer and really made us appreciate our new Arizona roaster. The Arizona Roaster shoots HOT jet flames into the peppers, the hotter the better to burn the outside skin off but not make the inside mushy. It gives them a nice smokey flavor.

even if you explain to them you meant that taste to be in there they won't be able to appreciate the green pepper taste and will knock points off for it even if you label you entry green pepper mead.

For 1 gallon:
1 packet of K1-V1116 Lalvin yeast
1 gal roasted pepper juice
Pectinase for any pectins
Amylase for starches
Yeast Nutrient
0.5gm Fermi Blanc Tannin soft
0.2gm OptiRed
Dark Honey to SG of 1.100

The peppers were roasted and the juice collected as described above, the pepper juice alone without any honey had a specific gravity of 1.03, surprisingly sweet and rich tasting. The bits of black skin left on during the roasting process adds a smoky grilled taste, very unique and contributes a lot to the overall taste of this mead. We choose K1-V1116 yeast as it is one of our standard mead yeasts because it is not picky and is very

The roaster filled with peppers. Note the GLOVES! Flames are so hot you cannot see them in the picture. The smells coming off of the roaster are wonderful to a Chilehead.

Chiles after the hot flames finished them, a couple minutes at most. Some eye protection is good to keep the hot juices out of your eyes if they pop. Remember do not touch any sensitive areas or you will be sorry.

The Capsicumel turned out a nice caramel color, it's crystal clear and its essence fills the room with Summer roasted peppers when it's opened. You can grow peppers in half whiskey barrels, this is a 2014 Jamaican Hot, a very interesting traditional pepper that is very attractive in a barrel.

adaptable so we knew we could count on it to ferment this mead. A starting gravity of 1.10 might seem a little high for a melomel, but we plan on back sweetening a little to balance the heat levels and higher alcohol levels. The primary fermentation was done in a glass carboy, we didn't use a plastic fermentor as we didn't want the capsaicin to stick to the plastic. The top of the carboy was covered with just a nylon stocking to keep bugs out but to let air in and CO_2 out easily. A drill mounted stirrer was used to mix up the mead and during fermentation the carboy was swirled briskly a couple of times a day, or more often as swirling carboys is pretty much a lot of fun, to keep the yeast and everything mixed up. Hot peppers were just added through the top of the primary to be strained out later. Once the gravity reached 1.010 and the fermentation had settled down the mead was transferred to a smaller carboy to limit the airspace and allowed to finish fermenting under an airlock.

Letting it Age

In just seven months and only one racking this mead has turned crystal clear and a nice caramel color. It's a little gassy yet. The richness of the roasted peppers really shows up in the thick body, helped by the honey, and the deep tastes of the peppers as well. When you open up the carboy the whole room smells like you are roasting peppers. There is also a smoky flavor extracted from the charred skins, a little oak would also go good with this mead. It's not hot, we will add that later when we put a dried Thai chile in a few bottles for Chileheads that need everything to be hot. We topped off the carboy after racking with more honey to sweeten just a little and some ginger wine to add a bit of spice that blends in perfectly with the peppers. We are going to let it rest a while longer. One stormy weekend this Summer when we can't work the bees or be in the pepper patch we will degass and finally bottle.

Its been a few years thinking about making this mead. We finally grew enough peppers, were able to use the Arizona roaster and accumulate roasted pepper juice a quart at a time. It has turned out to be well worth the wait. We expanded the pepper patch a little this year, a few more of the hotter chiles and long rows dedicated to Marconis. Hoping for a hot Summer and lots of hot peppers for our next melomel, Scorpoins Revenge! BC

Jack and Toni live on a small farm in WV growing chile peppers and bees. **wvmjack@yahoo.com**

DOWNTOWN

Vandalism And The Urban Bee

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

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

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

Beekeeping may belong in the city, but not everybody thinks so, and that's why we have to think of this as the single least attractive feature of our chosen habitat. Just like a sure-fire mite treatment or the definitive response to CCD, this article cannot promise a guaranteed solution, but we can talk about why and how vandalism is most likely, and some strategies for minimizing your risk.

Two-Legged Bears

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

It's a bit of an exaggeration, but we tell students here that the most dangerous threat to an urban bee is three urban teenagers – mix 'em up any way you want: any gender, any level of education, any economic status, any place on the planet – because it goes like this:
Teenager #1: "Isn't that a beehive?"
Teenager #2: "I hear they sting!"
Teenager #3: "I dare you!"

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

Preventative strategies

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

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

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

Can you add camouflage to your fence? If you have a fence, you may have the option of installing fence slats or fence screen. This is a product that construction companies attach to chain link around active building sites to block wind-carried debris and hide the temporary ugly

It Takes A City To Keep Bees Safe

before the beautiful new takes shape. It's also a tool for managing bee flight upward, and for causing nearby pedestrians to remain clueless. If you have to buy it yourself, prices start at $10 per linear foot. But if you are not particular, you can reach out to the companies that are prominently featured on the fences of projects nearing completion, and ask them if they are interested in recycling the stuff and getting a positive shout out from neighborhood beekeepers. Of course, then your beehives will be advertised as attractive modern living locations...

Bee kill. (photo by Randy Oliver)

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

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

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

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

Victims of Fear, Uncertainty, and Dread

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

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

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

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

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

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

Bear damage. (photo courtesy of Black Bear Conservation)

Strategies for Managing Fear Vandals

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

• *Know your neighborhood and your neighbors.* Do you live in an area that is changing rapidly? Are you a new arrival? Have you made friends with anyone nearby yet? People you talk to are more likely to see you as a person and not a heedless threat to their wellbeing. Keep your antennae out for folks who signal unfriendliness or unhappiness with your bees, and watch for whether such stress seems on the rise. It's worth starting a conversation with them, as well, to signal that you see their concern and would like to alleviate it through information or even a visit to your apiary. Plus, vandalism is a coward's game, and they might worry about being identified. And this is sad: if you live in a hot hate zone, consider finding an out apiary. Not every site is habitat.

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

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

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

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

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

Take a breath

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

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

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

GLEANINGS

SEPTEMBER 2014 • ALL THE NEWS THAT FITS

COMPETITIVE LAWN MOWERS BEEWARE!

The Nova Scotia Beekeepers' Association is going to be popular with men everywhere – it is asking homeowners to help bees by not mowing their lawns so often.

Association president Joe Goetz says the majority of people are well aware that it is in everybody's best interests to heed the message of the pollinators – theirs and ours is a stressed environment.

"Providing habitat for pollinators is a cost effective solution for businesses, agencies and individual property owners," Geotz says in an open letter to government and business leaders, media and the general public.

"One hundred years ago, lawns, graveyards and rifle ranges were covered with wild flowers and were mowed by sheep and cows," he says. "Today, at significant cost in labor, fuel and equipment maintenance, these spaces look like golf greens.

"Today we have the impression that a short cut, manicured lawn is the best thing that we can do. It might look nice but if we change our perception that manicured lawn is a green desert and has virtually no nutritional value for any pollinators at all.

"For pollinators, this is the epitome of a green desert."

Geotz says for those incurring the costs associated with mowing, financial costs could be lowered or eliminated by reducing the amount of grass cut.

"In the case of some venues such as rifle ranges and ditches, income could be generated by allowing farmers to turn green growth into hay," he says. "Through these examples, it is clear that providing natural habitat for pollinators is cost effective."

Simple management changes to how green spaces along roadsides, highway shoulders, rifle ranges, cemeteries, prisons, parks and other crown land could be of substantial benefit to bees and other wild pollinators.

"Implementing these strategies would also save money for taxpayers, business and home owners," Goetz says.

Alan Harman

Report Bee Kills. Support Funding Evidence Kits

Bee kills reported to the Pollinator Stewardship Council last year came from 13 states and totaled 14,976 colonies. During the Spring of 2014 bee kills reported to us totalled 89,000 colonies in five states. These bee kills were obvious with piles of dead bees at the entrance, dead brood inside the hive, dead adult bees inside the hive, and often dead queens. Not all of the bees, wax, and pollen from bee kills was collected for lab analysis due simply to the cost. If a beekeeper's bees are harmed by the actions of others, the beekeeper must pay $300+ upfront to have the bees tested for pesticide levels. This is cost prohibitive for many, as that $300 is needed to replace weakened or dead bee colony.

The science behind the lab tests is important to help beekeepers, and growers, understand the environment of the honey bee. The real-world of tank-mixed pesticides, of "other ingredients" in pesticides with unknown, un-tested toxicity levels, of pesticide coated seeds wherein the pesticide is often exuded through the pollen and nectar of the plant, are at the root of the health decline of honey bees.

Help us provide the science of the real world of honey bees. We want to provide 200 bee kill evidence kits and the lab analysis for pesticide-related bee kills. Support our work to provide the scientific analysis of the real-world pesticide exposure of honey bees in rural, suburban, and urban areas. Help us protect pollinators. The bees you help today, will be able to pollinate your food tomorrow.

SCIENTISTS TRACK GENE ACTIVITY

Many beekeepers feed their honey bees sucrose or high-fructose corn syrup when times are lean inside the hive. Some suspect that inadequate nutrition plays a role in honey bee declines.

In a new study, researchers took a broad look at changes in gene activity in response to diet in the Western honey bee (*Apis mellifera*), and found significant differences occur depending on what the bees eat.

The researchers looked specifically at an energy storage tissue in bees called the fat body, which functions like the liver and fat tissues in humans and other vertebrates.

"We figured that the fat body might be a particularly revealing tissue to examine, and it did turn out to be the case," said University of Illinois entomology professor and Institute for Institute for Genomic Biology director Gene Robinson.

The researchers limited their analysis to foraging bees, which are older, have a higher metabolic rate and less energy reserves (in the form of lipids stored in the fat body) than their hive-bound nest mates – making the foragers much more dependent on a carbohydrate-rich diet.

"We reasoned that the foragers might be more sensitive to the effects of different carbohydrate sources," he said.

The researchers focused on gene activity in response to feeding with honey, high-fructose corn syrup (HFCS), or sucrose. They found that those bees fed honey had a very different profile of gene activity in the fat body than those relying on HFCS or sucrose. Hundreds of genes showed differences in activity in honey bees consuming honey compared with those fed HFCS or sucrose. These differences remained even in an experimental hive that the researchers discovered was infected with deformed wing virus, one of the many maladies that afflict honey bees around the world.

"Our results parallel suggestive findings in humans," Robinson said. "It seems that in both bees and humans, sugar is not sugar – different carbohydrate sources can act differently in the body."

Some of the genes that were activated differently in the honey-eating bees have been linked to protein metabolism, brain-signaling and immune defense. The latter finding supports a 2013 study led by U. of I. entomology professor and department head May Berenbaum, who reported that some substances in honey increase the activity of genes that help the bees break down potentially toxic substances such as pesticides.

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JZsBZs 81
Kelley, Walter 1
Mann Lake Supply ..... 26,39 ..... Back Cover
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Queen Right Colonies 9
Root Publications 61,70
Ross Rounds 53
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Thorne Bee Supply 80
Valley Bee Supply 57

On July 6, 1994, right here, the South Canyon wildfire exploded on Storm King Mountain and overran 14 firefighters. The oldest was 44. Most were in their 20s. My neighbor was their crew boss. His reaction: "I just killed 14 kids!" He was wrong to take the blame, but that's how he is.

He cut me off in my driveway this morning on my way to work. He wanted to know how my bees were doing, and he just likes to talk. They just had a 20-year memorial for the firefighters, in Glenwood Springs. There were helicopters, hotshot crews, fire trucks, honor guards, politicians, and relatives of the fallen. It was a big deal. The local press wrung the last teardrop into their dispatches. I'd never mentioned the fire to my neighbor, until today. "How'd you survive the memorial?" I asked.

He's plucky. He speaks his mind. He said, "I saw a lot of old friends – old-time firefighters. But not all the families wanted this. Some wanted to remember in private."

You grieve, but you never really heal.

Our conversation reminded me of Mongo's story of the man buried in the ice. Mongo worked in Denali Park, Alaska, as a paramedic on Mt. Denali. One day a party of descending climbers reported they'd found a man buried in the ice. They took Mongo to show him. When Mongo radioed the park service brass for instructions, his bosses said, "Dig him out of there."

Mongo and his crew found some identification, and by checking park records, determined that the man in the ice perished in 1963. He was thoroughly frozen and remarkably well preserved. Even now, he was a singularly handsome dead young man.

Mongo located the deceased's widow. He called her in Wyoming, 40 years after her husband disappeared, offering condolences. He also inquired about burial instructions. The National Park Service would ship the body to Wyoming.

The woman was understandably taken aback. She explained that she'd finished grieving long ago. She'd re-married, given birth to children fathered by another man, grown old, and now the government wanted to ship her the perfectly preserved corpse of the dashing young man she'd loved and kissed farewell a lifetime ago?

"Leave him on the mountain," she said. "Don't send him here."

The Park administrators didn't like her response but finally relented. Mongo said they hauled the ice man high onto that frozen mountain and stuffed him into a crack in the rocks, where he remains, hopefully for eternity.

Bee Culture's own Jim Tew entertained in his down-home way at the Colorado State Beekeepers' summer meeting at Paul's place in Silt. I got my picture taken with American Honey Queen Susannah Austin, and later she charmed us at our table at the beekeepers' banquet. Watch out! She's a pool hustler! Ah, to be young and feisty, to have freckles and wear the honey queen tiara and have your whole life stretched out in front of you! Does she know how lucky she is?

I gave a talk about adventures at the Apimondia bee conference in Ukraine last Fall, but first I lost my notes. I knew I had them with me at the meeting. Somebody had to have seen them, so I stood up and asked for help. A woman came up right away and said, "I saw those! I'll see if they're still there. I'll be right back." Another woman said she's seen them, too. But why hadn't they picked them up? Why did this all seem so mysterious? And then I never saw either woman again! Now when I made my announcement, Jim Tew was in the adjoining room, so he never heard me. I kept walking around, looking, and finally I spotted my notes on the table he'd set up to sell his books.

I said, "Jim, where'd you find my notes?"

He grinned. "On the floor of the porta-potty. They looked important. I knew somebody had to be looking for these."

Thank you, Jim.

There's a path up Storm King Mountain now. At the trailhead, you see photos of 14 proud young men and women. A favorite: Bonnie Jean Holtby, Redmond, Oregon. Her face blackened from smoke, she wears a firefighter's hardhat as she smiles over her shoulder at the photographer. She died in the line of duty a month after her 21st birthday.

Fire crew stickers cover the visitor sign-in: Boulder Fire-Rescue Hot Irons, Salt Lake Helitack, Boise Smoke Jumpers. On the ground, a snoose can, a "Lone Peak Hotshots" T-shirt, scattered leather work gloves. It stabs you in the heart.

I pause in a sort of reverie, watching bumblebees work the milk vetch, next to a pile of old firefighter boots, some with flowers sprouting out of them. I believe there's a God in Heaven and that ultimately everything will be all right. At least I try to believe that. But sometimes I'm not so sure.

Ed **Colby**

A Pool Shark