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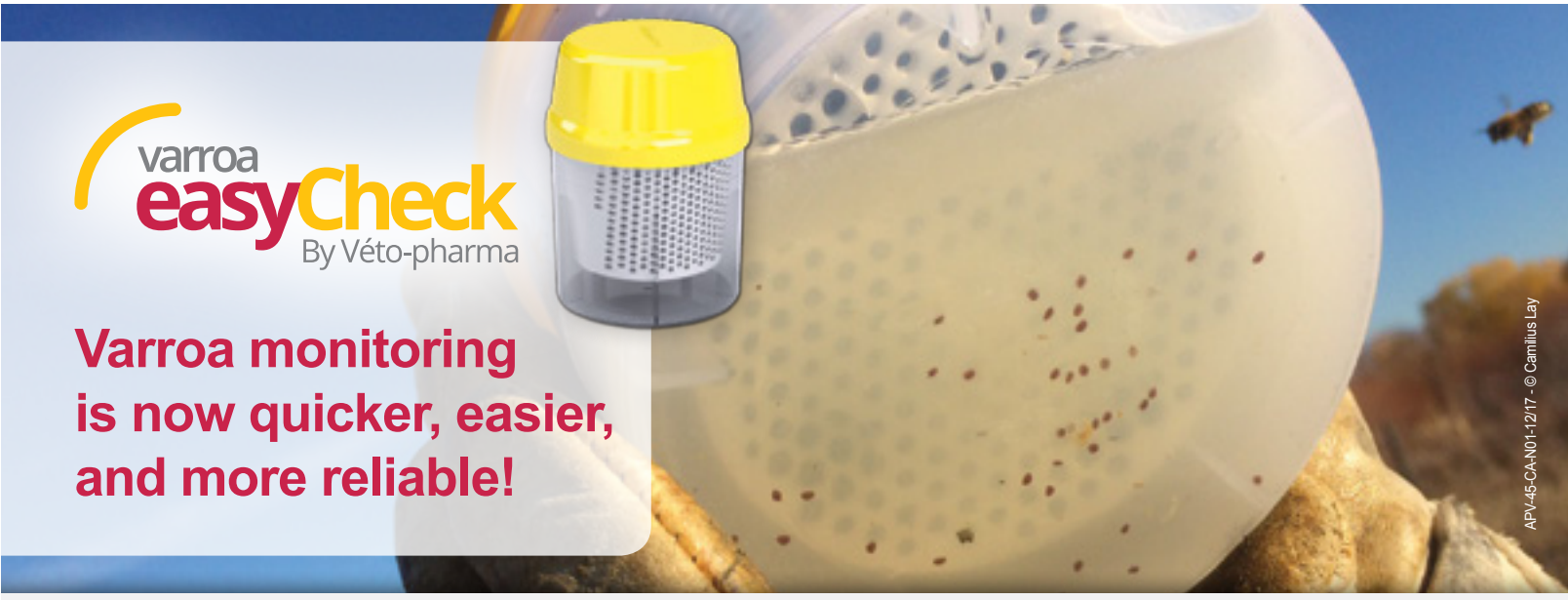

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Bee Culture

July Features . . .

800.289.7668
Executive Publisher – Brad Root
Associate Publisher, Senior Editor – Jerry Hayes, Jerry@BeeCulture.com, Ext. 3214
Assistant Editor, Design – Kathy Summers, Kathy@BeeCulture.com, Ext. 3215
Social Media, Event Specialist & Subscription Coordinator – Amanda DeSimone, Amanda@BeeCulture.com, Ext. 3255
Advertising – Jean Newcombe, JNewcombe@BeeCulture.com, Ext. 3216

Contributors
Clarence Collison • James E. Tew • Ann Harman • Kim Lehman • Jay Evans
Connie Krochmal • Jessica Louque • Toni Burnham • Ross Conrad • Jennifer Berry • Ed Colby

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The Murder Hornet. Lots of information to sort out. WA Dept of Ag photo.

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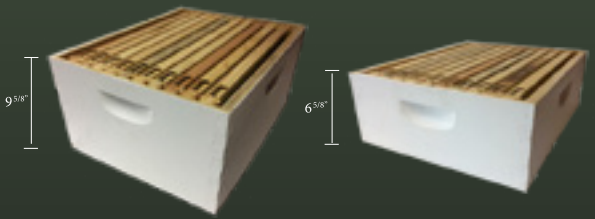

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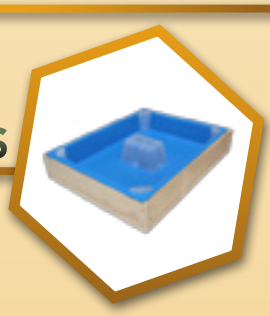

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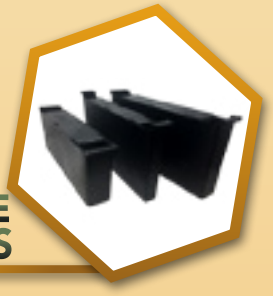

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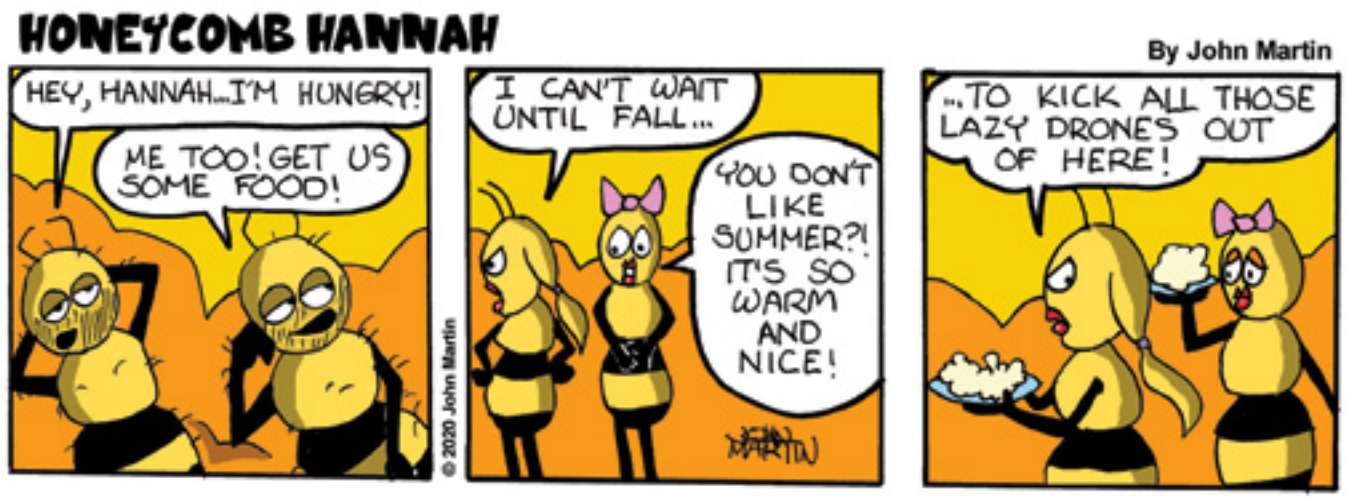

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Response To February Bottom Board

I was astounded at the incoherence and errors in Jacek Wierzbicka's letter in *BC's* May issue attacking Ed Colby's first-rate February 2020 article. While railing against the politicization of global warming, Wierzbicka connects this scientific finding of our human role in the rise in global temperatures with *"open borders, Medicare for all, free college etc."* This exemplifies the political demagoguery that he attacks. By giving examples of how science has erred in the past, he claims that *"universally agreed upon science means nothing."* This view is at odds with the entire scientific community. The road to becoming a scientist is paved with mastering *"universally agreed upon science,"* just as physicians, engineers, and beekeepers study current understanding and best practices.

Scientific progress is made when current science cannot accommodate experimental evidence and a more elegant or comprehensive theory is proposed and evaluated. The current scientific paradigm cannot simply be disregarded; it is the structure against which all new claims must be measured and, if found wanting, rejected. Erroneously arguing that scientists commonly viewed the earth as flat (evidence for the spherical shape of the Earth was known and accepted from 330 BC and its circumference since 255 BC) or that Giordano Bruno was condemned to death because of his belief in heliocentrism (not his religious and philosophical beliefs), just perpetuates myths fabricated for political purposes, something Wierzbicka decries. Moreover, belittling those not formally trained in science as "poorly educated" or "mentally challenged" shows a dangerous ignorance of the enormous scientific contributions made despite a lack of formal education (Antonie von Leeuwenhoek's discovery of bacteria; Michael Faraday's discovery of electromagnetic induction), questioned sanity (the Nobel-winning mathematician, John Nash, a diagnosed schizophrenic), or amateur status (Gregor Mendel, father of genetics; Lorenzo Langstroth, father of American beekeeping). Science is not infallible, but it makes great progress through its self-correcting nature, nonetheless.

Philip M. Sadler, Ed.D
Cambridge, MA

•

Enjoyed Ed Colby's Column, Bottom Board, in February *Bee Culture*. He has accurately invoked Science to make his case. If the preponderance of the Scientific community's consensus is not enough to convert even the most vacuous naysayers, it now appears the anecdotal evidence is also "in". The short time that human activity has been slowed, due to Covid 19, the environment has already begun to make corrections. NASA's resources have given us an eyewitness view of what just a modicum of effort to care for our earth could do! I must say that I cannot express enough my angst that Jacek Wierzbicka's feelings were hurt over the article. I am sure though he feels better, and his case is strengthened by attacking a teenager, and a well-educated (Boston College, International studies and Economics, *Cum Laude*, 2011) Congress Woman.

Stuart Rowan
Melbourne, FL

•

I was disturbed by the letter from Jacek Wierzbicka (*Global Warming Again*) in the May 2020 issue of BC, in part because he does not identify himself by location nor as anything but 'a scientist (retired)' -what kind of scientist with what kind of qualifications? A search of scientific data bases does not bring up his name - and in part because of his use of ideological language which is essentially unscientific (*leftist points of view, global warming as a political tool, a poorly educated bartender, mentally challenged Swedish teenager.*) Judgmental comments without foundation, all of them.

There are certain topics that should not make their way into a journal devoted to honey bees and their management – politics and religion are two, although reading old issues of *Gleanings* it is startling how blatant were the published political and religious biases. A survey of the editorial comments would make an article in itself for *Bee Culture*!

Most beekeepers have observed first hand changes in bee behaviors and in the environment in which they exist. Climate change (which is more than just global warming) is, in my opinion, a relevant topic for *Bee Culture* and apiarists, but lets discuss it objectively, without personal invective. In that regard, Jacek Wierzbicka invites us to read James Hansen's article in *The Guardian*; I would refer readers to the rebuttal from the Nuclear Energy Agency and the International Energy Agency themselves.

Over the years Ed Colby has proven himself to be a gem, and like many gifted story tellers, words of wisdom are woven into the strands of each of his chronicles. Long may it be so.

Jeremy Barnes
Seven Valleys, PA

Pesticide Response

Shame on you! Why did you devote three pages of the May 2020 issue of *Bee Culture* to an article by David Zaruk that appears to be advising PR flacks and industry apologists for chemical companies on how to persuade the public that pesticides, fungicides and herbicides are safe?

Are you aware that Zaruk is a former chemical industry lobbyist who once worked for the

public relations firm Burson-Marsteller. Although identified as a "professor," he was fired from his job as a lecturer at the University of Brussels. His main claim to fame is as a point man for Monsanto's attack on the IARC's publication identifying glyphosate as a carcinogen. What is this article doing in a beekeeping magazine?

Anonymous

Two Swarms In A Day

This month has been quite exciting. Started off with two swarms in the same day. My wife calls me out and when I go outside I hear this incredible noise and see these bees flying back and forth to a pine tree by my driveway. I first thought that they were getting resin then as time went on, they calmed down and settled on the pine about four feet up in a big cluster. I decide to grab an empty hive and within a half hour they moved to the front of that hive.

A little bit later she calls me back outside and this time there is all of this activity in front of my sugar house. She grabs a chair for me and I sit down watching them in amazement. The area of activity gets smaller and smaller and I keep moving the chair in closer towards my sugar house. I can see the bees landing on the porch and then after a little bit you can see the bees moving across the porch to an empty box in my sugar house. These were the two easiest swarms that I have ever caught. Well, did I actually catch them or did they just find a home in my equipment? That may be a better description, I didn't catch them, they moved into empty equipment that I had. All I had at the time was a bait hive that survived the Winter. I do not believe that they came from there. I do think I have a bee tree some where near me. I'll have to do some investigating.

Then this past weekend, Saturday, I saw a swarm leave the bait hive that I mentioned above. I was planning on moving it over to my outyard on Sunday, did move it any ways along with the two swarms that moved in. In a matter of ten or so days, three swarms. Unfortunately the swarm from Saturday, never even gave anything around me a second thought. Flew up to treetop height and departed.

David Shimo
Mercer, PA

David is one of our monthly Honey Reporters

History Repeating Itself

This is not a gang of highway robbers but a meeting of beekeepers wearing "flu" masks in Visalia, CA at a short course in beekeeping. The influenza was so bad that masks were required to be worn indoors where there was any crowd. It's a 100 year old photo, but it shows the way it was.

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CropLife International interviewed me several weeks ago. For those of you who may not know much about me here is a bit of insight in Q&A form. You may like it, you may not but the my goal in life is openness and transparency not confirmation bias. Because, for me, Honey Bees and what they do and how they do it is incredibly important and there is little not to appreciate. You wouldn't be a Beekeeper if you didn't think so too. Jerry

CL How did you initially become interested in pollinators?

JH I started out after college as a High School teacher. I hated it for a variety of reasons so left and went into another line of work. I had a guy working with me who was a Beekeeper. Back in those days everybody knew about honey bees but nobody actually knew a Beekeeper. I thought that was pretty cool so started asking him random questions. And his answers and insight were very cool. So I asked him more and more and more. It was fascinating. I started reading about honey bees and asked more questions and read some more and my interest and passion grew. I decided to become a backyard beekeeper in suburbia. I did all the fun and crazy things new beekeepers do. I made things, tried different hive configurations, different strains of honey bees etc. It was pretty easy back then because we didn't have the pests, parasites and diseases we have now that kill so many of the new beekeepers' colonies.

My passion and interest grew. I took an online course from a University. I wanted to pursue this interest and wondered if somebody could actually make a living with honey bees and take care of a family. I had a very patient wife and we decided that I would go back to school to learn more. The Ohio State University had a Honey Bee program under Dr. Jim Tew, and I applied, was accepted and we loaded up the car, put our two-year old in the car seat, pulled a U-Haul trailer and off to Ohio we went.

Other than great wife and family this is the best thing I ever did. Jim Tew was phenomenal and I immersed myself in this world of honey bees. It consumed me. I went from there to the USDA Bee Breeding Center in Baton Rouge, then to Dadant and Sons the largest beekeeping supply distributor for many years, then to Florida as Chief of the Apiary Inspection Section, then to Monsanto as Honey Bee Health Lead and now as Editor of *Bee Culture* magazine. I have travelled the world on behalf of honey bees – amazing. I never would have guessed it.

CL What do you see as the most pressing challenges affecting honey bees?

JH The industry's major challenge like so many others including the COVID-19 human issue is introduced diseases, accompanying parasites and then secondary predators.

The major negative driving force in declining honey bee health is a parasite, introduced from Asia, called the *Varroa destructor* mite. Like a flea on a pet dog this mite attaches itself to a honey bee and feeds on it. But unlike a tiny flea on a large dog this is a mite on another insect if you will. Make a fist. Put your fist someplace on your body. Your fist is the *Varroa* mite and your body is the honey bees body. It's a HUGE mite in comparison to its host. Feeding off the bee, transferring viruses as it feed, leaving open wounds, causing immune suppression. And the crazy thing is the only thing beekeepers have been given to control the *Varroa* mite are pesticides. Beekeepers have to apply pesticides in a honey bee colony to kill a little bug on a big bug. You can dose these down of course so there is no acute damage to the honey bee but there is always long term chronic collateral damage to the honey bee after multiple applications.

CL You've been credited with the launch of the Honey Bee Health Coalition and, while at Monsanto, played a major role in bringing stakeholders together to protect honey bees. Why are innovative partnerships so critical for addressing pollinator health?

JH There was a person at Monsanto lots smarter about the corporate process than I was. Her name was Maureen Mazurek and she somehow worked the system and got sig-nificant funding for the startup of the Honey Bee Health Coalition (HBHC). Without it nothing would have happened. Anybody who says they do something positive alone, without help or support of others generally or in partnership collectively is a liar. It takes all of us working together to make good things happen and happen more quickly.

The HBHC consists of approx. 40+ members of Beekeeping Industry Organizations, NGO's, Federal Gov., large Ag. Corporations, small Ag Corporations, individual part time beekeepers and large commercial beekeepers and more. It is quite a group working hard to bring consistent stability back to beekeeping health and the vital industry they are a part of.

CL Scientific American reported this month that, of the 2.6 million honey bee colonies in the U.S, over half are infested with *Varroa* mite. Are the efforts the agriculture industry is taking to respond to *Varroa* mite working? Are you seeing successful applications of RNAi to protect honey bees? Are you optimistic about the future of honey bee health?

JH Sorry to question the Scientific American but that is a wrong figure. The real figure is 100% of managed production honey bee colonies are the home to this introduced parasitic *Varroa* mite. Killing a bug on a bug is super tough and 'we' do not have a product, process or management system to address it fully. Lots of time, effort and resources have been given over to trying to safely and sanely control *Varroa* mites but nothing is the 'silver bullet' as yet. Will there be at some time? Sure, but I have been saying this for many years.

CL How is the plant science industry helping to address *Varroa* mites?

JH When you go through the front automatic doors of your favorite Grocery or Big Box the first thing you see is not shelves of cleaning supplies or paper towels or toilet paper. You are immediately immersed in the Produce Section. The colors and shades of yellow, green, orange, red, blue, tell you that there is fresh lettuce and spinach, avocados, tomatoes, apples, oranges, tangerines, blueberry, raspberry and the bounty of more and more fresh fruits, vegetables and nuts. For the majority of these wonderful nutritious foods they are there because a honey bee was involved in pollination, the transfer of pollen (male element) from one flower part to another so a seed could be formed and a fruit, nut, or berry produced – for us!

Bees pollinate 80% of the worlds plants including 90 different food crops. One out of every three or four bites of food you eat is because of the effort of honey bees and growers working together. The honey bee is credited for approx. $17 Billion in U.S. agricultural crops each year.

The plant science industry wants to be sure that of all the overheads that agricultural food production requires to fill our plates and stomachs with nutritious healthy foods that honey bees are available and healthy themselves to do this hard laborious job of pollinating millions of acres of these foods. And that means working in collaboration with honey bee researchers and organizations to address the main cause of honey bee health decline which is the introduced *Varroa destructor* parasitic mite.

But, honey bee health is not just a corporate desire designed for fruit, nut and veg production. Honey bees in their pollination efforts travel up to 2.5 miles seeking out other plants. Plants that are flowering in your yard or along the roadside, or the trees in a park or in a forest and vacant lots and on and on. They pollinate these as well which allows these flowering plants to produce fruits, berries and seeds that feed local and migratory birds, squirrels and chipmunks, other insects and animals and reproduce themselves as those seeds germinate and another generation of flowering plants support and encourage our stressed environment.

CL What role should the plant science industry play vis a vis other partners in addressing pollinator health?

JH As I said earlier it takes all of us working together to make something good happen that will last. The plant science industry and other groups have been very active and have partnered with the Honey Bee Health Coalition, Project Apis m (PAm), Honey Bee researchers in University and Government and independently to take that time, effort and resources needed to help this vital insect, the Honey Bee, overcome the debilitating *Varroa* mite and all of the collateral health damage done secondarily from this devastating parasite.

Killing a bug on a bug is tough. If we lose the Honey Bee what happens to the 90 honey bee pollinator dependent foods we have come to expect and the nutrition they bring to us and our family and friends and community? What happens to the 80% of the worlds flowering plants that have developed this relationship with Honey Bees for them to grow and reproduce and sustain our environment? Honey Bees and other pollinators are key to the health of each of us, our pets, livestock, wild animals and the environment. If we lost them or they got so sick they couldn't pollinate it wouldn't be a good outcome.

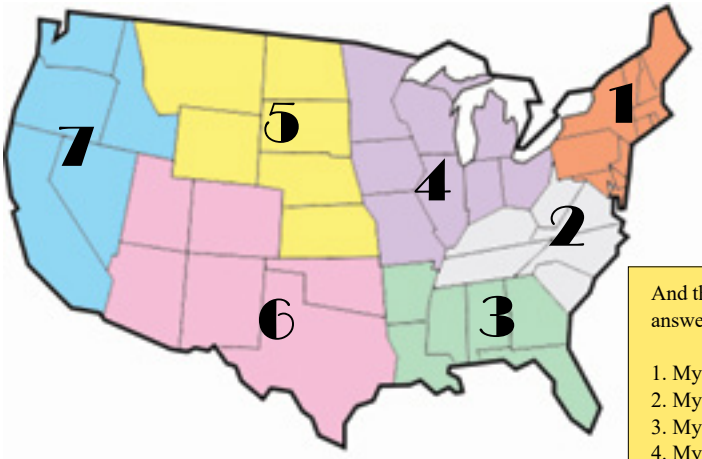
CL Murder hornets have captured people's interest and imagination over the last few weeks. Do you think murder hornets will have a significant negative impact on bee hives in the U.S. this Summer and Fall?

JH These predatory Hornets have been found only in one location in Washington State. There is a concerted effort to locate and track down nests and potential nest sites and eliminate those. The rest of the U.S. is safe for now.

CL What is your favorite insect? Why?

JH Honey Bees! We are talking about a specie of insect who has a positive relationship with totally separate organisms we call plants. They have agreed to work together. Humans are a specie and we can't even get along together with each other and we are the same specie! What other insect has allowed a relationship with humans to proliferate as well when we as humans want to kill every other insect we see? What other insect gives so much back to us and the environment . . . not taking. I think they are an example we should follow. BC

JULY – REGIONAL HONEY PRICE REPORT



Honey Consumption

The latest numbers show that of the 594.9 Million Pounds of Honey consumed in the U.S., 442.6 Million Pounds was imported from other countries!!

The extended COVID-19 shutdown we have all experienced earlier in the year and the slow recovery now what does that mean? Grocery store shelves were empty. No Farmers Markets. And with so many of us individually and potential customers out of work what sets your honey apart from the stuff called honey from other country's? How are you advertising? And the best advertising of all, what's on your label?

And the BEST advertising of all, what's on your label??? Here is how Beekeepers across the U.S. answered the Label questions. Do you see a trend?

1. My label has an appealing color graphic Yes - 76 No - 14
2. My label says Local Honey Yes - 54 No - 26
3. My Label says Product of My State Yes - 55 No - 33
4. My Label says Product of USA Yes - 21 No - 60
5. My Label says what kind of Varietal Honey Yes - 24 No - 54
6. My Label says it is a Seasonal Honey (i.e. Ohio Autumn Gold) Yes - 8 No - 75
7. I Use a label on the top lid too Yes - 28 No - 53
8. My Label has my name and contact info. Yes - 80 No - 8
9. My Label has weight listed in Lbs., ounces and/or grams Yes - 79 No - 9
10. My Label has "Do Not Feed To Infants under one year of age Yes - 34 No - 54

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3) Your State
4) Nothing About the USA
5) Nothing About Honey Flower Source
6) Nothing About Season Honey was collected from
7) No Top Label on Cap or Lid
8) Your name and Contact Information
9) Weight in Pounds and Ounces and/or Grams
10) Nothing About "Do Not Feed To Infants under 1 year of Age"

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	May 2020	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	1.98	2.26	2.17	2.05	2.20	2.03	3.00	1.55-3.00	2.16	2.16	2.16	2.22
55 Gal. Drum, Ambr	1.97	2.18	2.05	1.95	2.11	1.87	3.00	1.35-3.00	2.05	2.05	2.11	2.14
60# Light (retail)	245.91	200.67	172.50	175.50	163.33	187.75	209.17	120.00-325.00	205.01	3.42	199.62	212.92
60# Amber (retail)	233.00	200.71	187.50	172.83	213.37	181.80	218.50	120.00-325.00	204.24	3.40	202.07	211.64
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	96.91	75.72	105.60	81.50	61.20	93.00	93.00	60.00-134.40	88.80	7.40	91.63	91.23
1# 24/case	149.01	132.50	139.10	113.09	152.50	119.40	168.00	84.00-211.20	138.65	5.78	137.07	130.13
2# 12/case	132.47	105.31	125.35	103.26	111.84	96.00	126.34	72.00-192.00	120.67	5.03	124.71	120.90
12.oz. Plas. 24/cs	104.52	101.64	100.00	93.13	83.76	101.40	96.00	66.00-172.80	99.56	5.53	95.24	104.66
5# 6/case	154.09	115.45	160.20	114.49	113.16	105.00	147.50	71.50-240.00	139.25	4.64	136.26	135.08
Quarts 12/case	159.07	158.30	133.65	151.53	130.36	192.00	156.00	108.00-222.00	151.80	4.22	166.00	158.64
Pints 12/case	96.39	98.49	78.67	89.56	111.50	102.47	102.00	60.00-140.00	95.91	5.33	97.49	90.70
RETAIL SHELF PRICES												
1/2#	5.53	4.81	4.75	5.01	4.15	5.59	7.00	3.00-9.00	5.18	10.36	5.44	4.95
12 oz. Plastic	7.15	6.28	5.96	5.84	4.89	6.46	4.57	3.38-12.00	6.16	8.22	6.33	6.09
1# Glass/Plastic	8.86	7.85	8.63	6.82	7.61	6.50	8.86	4.79-14.00	8.13	8.13	8.11	7.79
2# Glass/Plastic	15.80	13.40	15.60	11.73	12.38	10.43	16.00	7.29-32.00	14.29	7.15	14.19	13.52
Pint	12.85	11.15	8.59	12.33	9.90	11.20	11.80	4.00-25.00	11.20	7.47	11.52	10.33
Quart	20.32	18.47	15.93	15.71	17.45	17.20	19.88	8.00-42.00	18.14	6.05	29.51	18.14
5# Glass/Plastic	31.26	26.72	40.75	26.14	19.58	27.29	15.51	13.62-50.00	29.05	5.81	29.51	29.14
1# Cream	10.62	8.90	8.00	9.63	14.01	13.80	12.00	6.00-27.89	10.66	10.66	11.11	9.89
1# Cut Comb	13.05	12.10	12.39	13.85	12.50	14.25	12.00	7.00-24.00	13.00	13.00	12.63	11.51
Ross Round	10.58	6.25	10.47	13.17	12.00	11.00	12.49	4.75-15.60	10.77	14.36	10.67	9.52
Wholesale Wax (Lt)	7.18	6.02	5.00	6.64	6.33	4.25	8.60	3.00-12.00	6.56	-	7.08	6.64
Wholesale Wax (Dk)	6.34	5.85	4.78	5.17	7.00	2.75	4.50	2.00-9.00	5.51	-	5.79	5.23
Pollination Fee/Col.	90.50	70.83	80.33	91.67	80.00	200.00	75.83	50.00-200.00	87.17	-	86.46	92.39

NEXT MONTH

Welcome to NEXT MONTH, where our Honey Reporters share a line or two about what they will be doing NEXT month with their bees. Advice is given for each region so you can see what others are doing where you are, and, of course in all the rest of the regions. Check these out. These reporters are successful in business.

The days are getting shorter already. Honey bees are/will be preparing for the fall and winter coming up by producing longer lived 'Winter bees'. These bees have to live for months through Winter not weeks as in Summer. In order to live for months they need more fat bodies (vitellogenin) which is the *Varroa* mite's favorite food. If you haven't started to control *Varroa* now then the 'Winter bees' are weaker and will not live as long. So, you wonder why the colony looked good in early winter and it died in February or March? You didn't control *Varroa* and the *Varroa*/Virus legacy in August/September, that's why! Just do it.

Region One
- Mite control if supers are off
- Check Queens (Good time to Requeen)
- Combine Weak and strong colonies
- Requeen
- Sample/Treat for mites
- Requeen
- Equalize colonies
- Sample/Treat mites
- Take honey off
- Sample/Treat mites
- 11 more Beekeepers responded and said, Sample/Treat for *Varroa*

Region Two
- Sample/Treat for *Varroa* if supers are off
- Feed if necessary
- Sample/Treat mites
- Check Queens
- Feed if lite
- Check for SHB
- Requeen if needed
- Make splits
- Nine more Beekeepers responded and said, Sample/Treat for *Varroa*

Region Three
- Make splits
- Sample/Treat for *Varroa* if supers are off
- Pull Honey
- Monitor Queens
- Check for SHB
- Sample/Treat mites
- Requeen
- Super
- Ventilate colonies
- Seven more Beekeepers responded and said, Sample/Treat for *Varroa*

Region Four
- Sample/Treat for *Varroa* if supers are off
- Requeen as needed
- Super for Fall Flow
- Sample/Treat mites
- Requeen as required
- Sample/Treat mites
- Combine weak and strong colonies
- Four more Beekeepers responded and said, Sample/Treat for *Varroa*

Region Five
- Sample/Treat for *Varroa* if supers are off
- Let the Bees collect honey surplus for winter
- Sample/Treat mites
- Pull supers
- Sample/Treat mites
- Requeen where needed
- Feed if needed

Region Six
- Sample/Treat for *Varroa* if supers are off
- Check Queens. Requeen if needed
- Ventilate colonies for hot west wind
- Sample for *Varroa* mites
- Super if needed
- Make Nucs
- Remove supers
- Move colonies back to home yards

Region Seven
- Check honey stores
- Sample/Treat for mites if supers are off
- Pull supers
- Sample/Treat mites
- Feed Pollen Supplement
- Feed
- Check Queen
- Sample/Treat for mites
- Mite Check
- Feed if needed going into Fall

More Honey Reporters Wanted

We are always expanding our Honey Reporter population and need new reporters in EVERY region. We ask that you fill in most of the wholesale or retail or both sections, most months, and our short survey on the back. We give you a FREE subscription for your service. So if you are interested send an email to **Amanda@BeeCulture.com** and put REPORTER in the subject line. Include name, email, phone number and mailing address and we'll get you the next Honey Report form. Sign up today and be a part of the BEST Monthly Honey Price and Beekeeping Management Report in the industry.

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Fume Board
FB

Bee-Quick
BQ2

Bee-Go
BEEG1

Uncapping Tank
UCT1

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It's Summers Time –

It's Finally Summer!

In many more ways than one, we had a very strange May this year. We honestly began to wonder if in addition to everything else that was going on, would we ever have Spring or Summer.

In May in Northeast Ohio we had snow, we had buckets of rain and cold damp weather. And of course, there were no bee meetings to go to, no church, no camps, no monthy dinners with friends. So we sat inside and waited, needing desparately to get out.

And finally, it came. And it made itself known. We've already had a couple of days hit 90° or close to it. That's pretty unusal for this part of the world. We usually average about 10 90+ days over the whole Summer. As I write this tomorrow, early June, will be 93°. But that's okay we're ready.

We checked the beehives today and combined a couple of weak ones. The rest are doing well. We have one nuc designated for an observation hive that will go back into the candle store at Root.

The candle shop opened back up in May and business has been pretty good. The Root factory is back up to full speed in candle production and even had folks working this past weekend. So life is slowly getting going again. I started to say returning to normal, but that's a confusing statement now days. Because it's not what our normal was before. Welcome to our new normal! Whatever that turns out to be.

We just finished up the third of three beautiful weekends. Like I said Summer finally got here and we are finally able to get things planted and do some beekeeping work. What a relief! I find few things more refreshing, relaxing, soothing – pick a word – than being outside planting, weeding, mowing, mulching or just taking a walk or sitting on the front porch with the elderly cat.

We have some definite signs of it finally heading toward Summer. One is the huge Tulip Poplar that stands beside our driveway. Just this past week it started to bloom. And of course, there's the planting of the tomatoes and peppers – 20+ tomatoes and maybe 10 pepper plants ranging from the sweet to the extremely hot (which we share with our loved ones). If you've known Kim for very long, you know he doesn't do hot food and his response when offered is "Food shouldn't hurt!" Part of the joy is sharing. We have friends that eat tomatoes like candy and so it always fun to hand over those freshly picked prizes.

Tulip Poplar

Iris

We're doing a raised bed for the first time this year. We bought this galvenized one, put it together and it's all planted. Not sure about our big garden plot that we've had in the past. We're thinking about maybe planting it with buckwheat.

Kim made a comment recently that he supposed he was done with bee meetings. I sure hope not. I look forward to visiting in person with all of you again. Hugs all around. But I also hope you are taking advantage of some of the very creative and clever ways folks are using technology to keep us in the loop. Online meetings, ZOOM meetings, webinars and don't forget about the BeekeepingTodayPodcasts that Kim and his buddy Jeff Ott have going on. Go to the web page **www.beekeepingtodaypodcast.com** and check it out. They have someone new just about every week. A lot of famous people you've heard of or met, but also some really good beekeepers that have never been in the spotlight before.

I wish you all a wonderful Summer as hopefully life continues to calm down a bit. Stay tuned to *Bee Culture*. We will continue to do our best to keep you informed.

BEE TALK

Send us your questions, we'll find the answers. Our regulars and our guests will share what they know. Send your questions to Jerry@BeeCulture.com, with BEETALK in the subject line.

Question

July . . . Summer is peaking and/or has peaked and winding down in some parts of the country. It is HOT, honey supers are getting filled if they haven't already, Honey Bee population has peaked and too many bees in the colony at times during a hot day and they are bearding.

How do you supply water for the colony, and ventilation? SHB should have peaked also and you may see some in the colony as you do your Varroa sampling. What do you do?

A. This question might reflect Jerry's years spent in Florida, or in St Louis where the average high temperature in July is 90°F, with humidity to match.

These conditions present the hobbyist beekeeper with several concurrent risk management challenges. Mitigating these risks requires the beekeeper to 1) bring in the honey crop safely; 2) control varroa; and 3) provide space, water and ventilation for the colony.

Heat stroke and back injury are the greatest safety risks presented by harvesting in heat and humidity. The way to prevent heat stroke is to stay hydrated, replace electrolytes while working, and get the job done fast. First, plan to start your harvest in the cool of the early morning. This will require you to prepare and preposition all the supplies on your harvesting checklist the night before you harvest (including an ice chest for your huge supply of ice, cold hand towels, and sugared Gatorade Thirst Quencher). Having all your supplies in your vehicle or wheel barrow/cart the night before you harvest will allow you time to hydrate in the morning with at least two liters of water (not caffeine) at least a half hour before you go outside.

The details of harvesting are beyond the scope of this note, but I practice the "blow and go" style. I work my 30 or so colonies with Bee Go or equivalent, four fume boards, a leaf blower, wheel barrow, plastic hive lids for the top and bottom of each stack of supers, and my 1996 4WD V8 long bed Chevrolet pickup with a camper shell – it holds 42 supers safely and is almost bee-proof. I try to sip electrolytes every 15 minutes to stay hydrated.

If I have help with me, I'll sample and treat for varroa, while we're harvesting. If my counts exceed five per 300 bees using Veto Pharma's *Varroa* Easycheck, and if the daytime temperatures don't exceed 100°F, I'll make my first application of Apiquard, a thymol-based fumigant biocide. I can also wait until the heat breaks, but I don't want to get out of July without starting treatment. I crush SHB with my hive tool for fun, but otherwise I don't need to address them, as long as the colony is headed by a good queen and I control the mites.

Don't let a back injury ruin your harvest, or the rest of your life. Learn the steps to ensure proper lifting position and technique. Don't twist or bend.

Lastly, these hive conditions require attention. I hate crowding all the bees into two deeps after they've had four or five mediums to provide space and ventilation during May and June. So sometimes I leave on a super for them to finish, and wait a couple weeks to treat. The extra super also provides ventilation, which I can increase by propping either cover with a small block or twigs from the woods that surround my yards.

My bees in the forest don't have water supply problems. They are surrounded by streams and ponds. But when I kept bees in the city, and wanted to prevent uninvited field trips to the neighbors' hose bibs and wading pools, I successfully supplied water to a six-colony yard, and kept the bees at home, with a "Little Giant" three-gallon poultry waterer that maintained constant water depth in the drinking pan. I filled the pan with stones to act as drinking stools for the little non-swimmers.

I'm glad when July ends in Missouri. Whew! ***Bob Sears, MO***

A. Hot weather – Bearding and festoons on the front of a hive is like you or I are sitting on the front porch to get some relief from the heat.

When this starts happening, I usually add a spacer between the inner cover and the telescoping cover to allow for more air circulation. Since I am now using migratory covers, I need to be a little more careful. When I add the spacers, I need to position the top weight near the front or back of the cover. The migratory covers will sometimes warp if the weight is placed where there is insufficient support.

Water – A water supply is now a constant problem. Previously when we were in the country, my very tolerant wife "allowed" the bees to use her bird bath as a water supply and there was a stream nearby. Not so now. To provide water and reduce the constant filling of the water supply, three shallow stainless serving trays are located under different downspouts. We fill these trays with old leaves and/or rocks and/or wood chips to provide a landing area. We only need to fill them during dry spells. With two or three supplies there will usually be one with a water supply. We keep a close eye on them.

There is not a Small Hive Beetle problem in this area. I have only seen it once in fifteen years and that was in a hive that returned from a trip south for the Winter.

Varroa is a horrible problem as it is everywhere. It is so bad we don't test for *Varroa* anymore. We assume that if even one hive of our yard has some they will spread like a pandemic. We treat all the hives in the spring when they arrive back from California. Then we treat them again after we pull honey in August before adding honey supers for the late nectar flow. ***Ed Simon, MN***

A. It is natural for some bearding to take place on hot summer days and evenings, however beekeepers can apply some techniques which may reduce the severity and length of time that bearding takes place.

If possible, keep the colonies off the ground and keep weeds and brush away from the entrance. If the colonies have a screened bottom board, remove the white board under the screen. The board is only meant to monitor for mite populations and does not need to be under the screen all the time. Providing an upper entrance hole boosts ventilation and allows the bees a way to go directly to the honey supers, thus reducing some congestion below. It also helps if the colony is being attacked by yellow jackets as you can reduce the bottom entrance and still allow the bees access and egress to the hive. They can defend the upper entrance more effectively than the bottom board entrance. Adding a couple extra supers under the full supers also reduces some congestion and helps with ventilation. If small hive beetles are a problem, use only one empty box, however I doubt a colony that is bearding as described has much problem with small hive beetles.

Provide a constant source of clean water (they are attracted to a slow trickle) or if they are in the country, determine if clean water is available or make arrangements so that it is. Outdoor water feeders is another possibility but it will attract marauders as well. ***Barbara Bloetscher, OH***

A. Thank God we do not have small hive beetles in SW Colorado! That means that we can add a super to let the bees spread out a bit more without creating hiding places for SHB. I've heard that adding a slatted rack can help reduce bearding and over-heating, but haven't tried it. It also doesn't really get that hot here. I do like to make it easy for the bees to collect water to cool the hive, so provide it in a bird bath with floating bark to keep the bees from drowning. Adding a tiny pinch of goat minerals gives it more that they need, and also adds a little flavor so that they can communicate about it better, without too much salt. I remove the solid slider un-der my screened bottoms and put a tiny stick under the back corners of the inner cover to hold the lid up just enough for air flow without letting bees sneak in the back door for robbing. The more we can help them with cooling and ventilation, to a point, the more efficient they will be at dehydrating nectar into cured honey. Here in the desert SW, we need to remember that the bees must maintain proper humidity in the brood chamber, or we sacrifice brood survival. ***Tina Sebestyen, CO***

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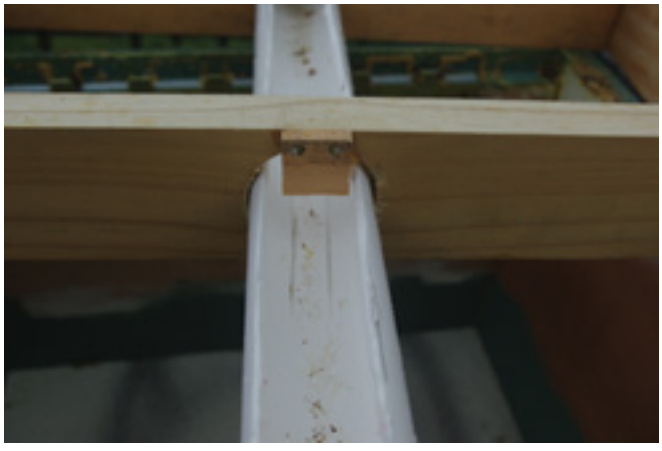
Number 1 Tip of the Month – Moth Crystal Drawer

I designed this moth crystal drawer because it's easier than building a traditional style drawer. I put one between every fourth box in the stack of boxes containing drawn comb. moth crystals evaporate over time & this allows the crystals to be replaced without disturbing the stack. just pull it out, refill, & push back in. The wood tab on the cross brace keeps the pipe from rotating side to side. *Robert Zack, Arnold, MO*



Tips For Around The Beeyard

Beekeepers are always looking for new ideas to make keeping their bees easier and better.

Bee Culture wants you to share your good ideas with our readers. Be precise and include a photo or sketch if possible, but that may not be necessary. If we use your idea you get a free one-year subscription. The best each month gets $100.

Send your ideas to

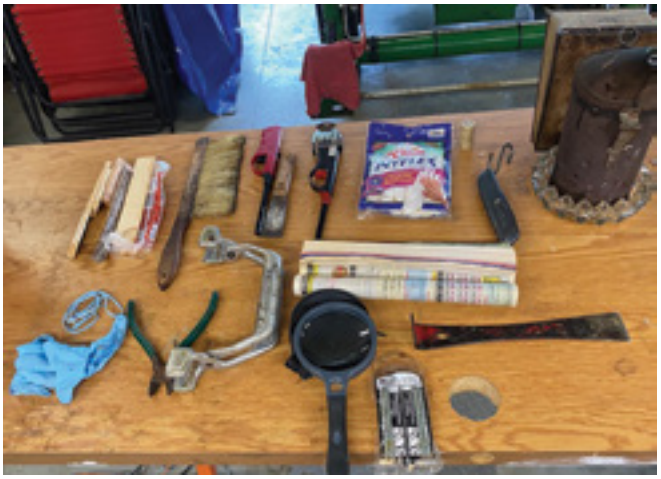
jerry@beeculture.com

All Around The Beeyard Continued –

In the never ending quest for a lightweight and convenient tool box we have settled on a store handi-basket.

Available for as little as a quarter at yard sales and online markets (think Facebook MarketPlace and Craigslist) ours was given to us after asking the local Menards manager. It helped that we had a pile of shelving boards in our cart to make hives with LOL.

The upright pipe containers are easily gotten as cut-offs from building sites or you can buy one foot pieces at home improvement stores. TyWrap them upright to keep in place. They are very important as they organize and separate your tools. Equipment piled in the bottom of other bee boxes makes them aggravating and nearly useless. Catching queens is a good example-you need a frame holder and a cage or a free hand to do it but when she's running you can't be rummaging through a tool box and watching where she's going at the same time.



Smoker fuel is kept dry and close by in a resealable dishwasher or laundry tab box or a large coffee can.

Because the basket is plastic, put your hot smoker in an ashtray. We plug the spout with an antique medicine bottle stopper but a wine cork works as well. If you don't indulge or have friends that do many large chain steakhouses have side bars where they are easily picked up. The corkscrew hole doesn't hurt a thing. Sealing the spout smothers the fire in its own smoke and saves dumping hot embers out. A big plus is the

half burned fuel lights better than any starter you can put in the smoker.

Handi-baskets are light weight, rugged, waterproof and large enough to hold any number of tools and accessories. The downside is they are so convenient it's easy to keep adding supplies until they are no longer light,so an occasional sorting out is called for.

May all your flows bee heavy and your swarms low.
Mike Haney, Ohio County Kentucky

New For The Summer –

From Superior Bee

In addition to the Polystyrene Bee Hives and our endeavor to promote successful beekeeping, in the observance of the working together of the Honey Bee colony; we also carry a full line of "Poly" family swing set, and lawn furniture. All for Family togetherness. Even as we learn much from the working together of the Honey Bee so we also promote the working and playing together of our family and friends. The old adage of "A family that prays together, stays together" is also true for "The family that invests time together, grows together"! And so develop the Honey Bee mentality of being connected to each other. What better memories, in the heart of a child than the enjoyable times we shared in bonding together, developing our social skills while relating with each other, and producing strong family ties. Poly lawn furniture and swing sets are both durable and long lasting, for many years of play and fun!

Give us a call at 844.260.2015 or email **Superiorbees@gmail.com**.

Russian Honey Bees. By Thomas E. Rinderer and Steven E. Coy. Published by Salmon Bayou Press. ISBN 9781655328138. 211 pages. 6" x 9" soft cover, black and white. $39.95 Available from Amazon.

Dr. Tom Rinderer was the Research Leader at the USDA Bee Lab in Baton Rouge in the early 1990s when he and scientists from that lab traveled to Russia to examine honey bees from the Primorski region in the far east. Dr. Victor Kuznetsov, from the Far-Eastern Branch of Russian Academy of Sciences, was the main contact for the project. They visited many apiaries there and elsewhere in the region and measured levels of varroa infestation. Russian beekeepers were not very concerned about varroa and used little chemical control. Meanwhile, honey bees in the US were being devastated by the pest, and extensive chemical control was being used.

Russian queens were finally allowed into the U.S. under quarantine in 1997. They were monitored for mites and diseases, defensiveness, and size, and allowed to increase.

After being released from quarantine, eventually a side by side trial of these bees compared to U.S. produced bees was conducted and all metrics were examined and compared – build up, varroa infestation, overwintering and honey production among the many traits being looked at.

From these several of the best lines of the Russians were chosen and commercial queen producers began raising crosses of each of the lines they were responsible for. VSH behavior was certainly one of the measures, while other traits were measured also, but it finally came down to basically honey production. The healthiest bees produced the most honey.

The Russian Bee Breeders Association was organized shortly after this and the Baton Rouge lab scientists continued to monitor the genetics of each of the breeders that sell the Russian bees. Stock certification is determined by measuring the probability that any given colony is Russian or not. A measure of 70% or higher is required for a breeder to claim the queens do in fact produce colonies that exhibit the qualities of Russian bees sought after by customers.

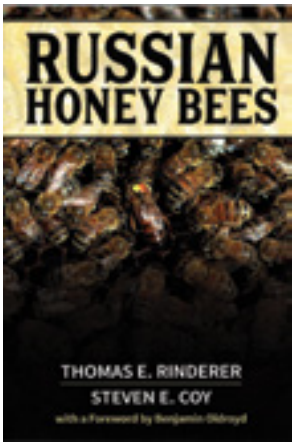
Dr. Rinderer provided most of the genetic information for this book, and Steve Coy, a commercial honey producer in Mississippi described in detail the management techniques used to get the most out of the Russian qualities.

Management of Russian bees requires a somewhat different calendar, but is not exceptionally differnt. If a small cluster overwinters, it will expand rapidly when pollen becomes available, and they will swarm earlier than most bees in the U.S. south, but later in the north. With nectar or pollen dearths they will quit raising brood producing a natural *Varroa* control period. They are managed best in eight frame hives as they expand faster in an eight-frame box.

Chapters include basic *Varroa* biology, early history and importation, development of the several lines that are each managed and then crossed, and mechanisms of resistance. There is a lot of information on management techniques for both honey production and pollination, and good information on the Russian Bee Breeders Association.

Unique for this book was that Tom wanted to make sure the reader had access to all the science that went into this project, so references and research results are at the front of each chapter, to make sure you are aware of where the information came from, and from who.

The Russian Bee Breeders Association cannot produce enough queens to satisfy demand every year, which points to their popularity. As a result, there are some producers who purchase Russian queens, then allow offspring to mate with local drones, producing hybrid Russians. These may, or may not, provide the qualities that Russian queens will. Know your producer. *Kim Flottum*



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Apistan: **94.90%** efficacy (2019, Veterinary Bee Inspector, Spain)

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Apistan + 50 g Apiguard: **97.97%** Efficacy (2018, Veterinary Bee Inspector, Spain)

Apistan: **97%** Efficacy (2014, FNOSAD, France)

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Christi Marie Heintz

We unexpectedly lost CHRISTI MARIE HEINTZ (LANDENBERGER) on May 11, 2020 a day after being celebrated on Mother's Day. One of her fondest passions was hiking and bagging peaks, but she was severely allergic to bee stings, and while coming down her latest conquest (Black Mountain near Las Vegas) she told one of her fellow hikers she had been stung by something and immediately collapsed. She was given her EpiPen injection but never regained consciousness. So tragic, but we had often talked about how we wanted to go, doing what we loved; she in nature, me on a soccer field. I believe she was one of God's favorites and seeing how happy she was, took her straight to his home, bypassing old age, infirmity, and extended illnesses that her parents had to endure.

She is so deeply missed by her family and extended sets of friends. Her absence leaves such a crushing pain. Christi was so devoted to our children and nine grandchildren. Our grandchildren even had a special name for her, Honey. Honey was passionate about teaching the kids about her interests, all things in nature, skiing, hiking, playing the guitar, photography, and singing. She was the idea person, organizer, instigator, and communicator for the family, always finding fun ways for the family to share time together. It was her idea at the inception of Covid-19 to shelter-in-place with the entire family. She taught classes in the morning and planned fun activities in the afternoon with the grandkids.

We were so fortunate to have the chance to spend time with the entire family for an extended time this year. It did mean that we had 17 people for most meals, which encouraged her to start cooking. As we work through the Arizona rules for gathering, we will have a Celebration of Life in her honor. Please check the 'stories, info, and more' tab for updates as we know more and can provide details. Hold your loved ones daily, life is precious and loss can be too quick. *Mike Heintz*

Legacy of Christi Heintz

In 2006, Project Apis m. began working diligently for commercial beekeepers by investing in research and science to solve honey bee health challenges. Founders contributed funds to support applied research projects to answer priority questions. Since then, PAm has become the largest honey bee non-profit. It has invested over $8 Million in 118 practical research projects and over $2 Million in restoring habitat to provide nutrition to honey bees. We think of ourselves as "by the beekeepers, for the beekeepers," and strive to be the go-to resource for answers. We are proud of where we are, excited by where we are going, and we know that none of this would have been possible without the vision, hard work, and tireless enthusiasm of Project Apis m's founding leader – Christi Heintz. With Christi's recent untimely passing, we hope you will join us in recognizing her contributions and the legacy she left for the beekeeping industry, through her leadership and friendship by contributing to the Christi Heintz Memorial Award, **www.ProjectApisM.com**.

In 2006, Christi was working at the Almond Board of California when she was approached by Dan Cummings, CEO of Blue Diamond Almonds, with an unusual challenge – would she be willing to launch and lead a new non-profit organization whose sole purpose was to find and fund practical research that could tackle the emerging honey bee health crisis? At the time, hives were dying, and no one knew why. The traditional management practices beekeepers learned from their fathers were no longer working. The term CCD emerged, and amidst all of this, the almond growers started planting more almonds. Almond prices were rising, and we would need more bees than ever before to pollinate what would ultimately become a million acres of almonds in California.

Almond producers and beekeepers forged a partnership and tackled the problem the best way they knew how – by digging in and doing it themselves. They envisioned what would become Project Apis m., and they turned to Christi Heintz to make it happen. Although she did not have any financial interests in the industry, she was a natural choice for the job. As Bob Curtis of the Almond Board of California recalls, she was already accomplished at building partnerships and alliances. She helped introduce and launch what would become the CA Sustainability Program and formed the Almond Board's Bee Task Force. She understood the interconnectedness of the many environmental components and how a change in one would affect another. Mostly, though, as Dan Cummings explains, "Christi was very bright, charismatic and passionate about her interests. Thankfully, honey bees became an interest and beekeepers and pollinated crops reap the fruits of her commitment to building Project Apis m. into what it is today." BC

FOUND IN TRANSLATION

Murder She Wrote –

Jay **Evans**, USDA Beltsville Bee Lab

And wrote, and wrote, and wrote. The Northern hemisphere had a respite from the sadness of COVID-19 in early May, only to fret about a two-inch wasp that has arrived on the continent and is threatening bees, humans, and other animals. This wasp, *Vespa mandarinia,* is officially the Asian giant hornet (AGH) but also goes by 'murder hornet' or 'Commander wasp' and it has indeed been found in North America. The first confirmed sightings were in the Canadian city of Vancouver, British Columbia (May, 2019) and then in Nanaimo, a beautiful town across the Strait of Georgia (August, 2019) on Vancouver Island. A single wasp was also collected in December, 2019, just across the U.S.-Canada border in Washington state. These sightings cover a worryingly large area (see map below) and are paired with some beekeeper observations of wasps attacking colonies in this range. In fact, beekeepers discovered and killed a *V. mandarinia* nest in the fall of 2019 in a Nanaimo park (sustaining multiple painful stings; **https://www.timescolonist.com/news/local/giant-hornet-stings-like-red-hot-thumbtacks-says-island-man-who-knows-first-hand-1.24129520**).

Public authorities in British Columbia (**https://bcinvasives.ca/report**), Washington state (**https://agr.wa.gov/departments/insects-pests-and-weeds/insects/hornets**) and the USDA Animal and Plant Health Inspection Service (**https://www.aphis.usda.gov/aphis/ourfocus/planthealth**) are actively engaged in efforts to locate and destroy this wasp in the new range. These efforts rely on citizen scientists, including beekeepers, to report wasps. AGH colonies are protective of both their own nests and honey bee colonies 'marked' for attack, and it is not recommended for beekeepers or other private citizens to exterminate nests. Instead, they should report sightings to local authorities immediately, usually their state Departments of Agriculture. At this point there are NO known incidences of this hornet outside of

one county in Washington state and the Vancouver region of Canada. Other than this distinct species, wasps are generally beneficial insects and do not merit an all-out attack.

One hint of a future with AGH, if the heroes battling it in the West can't keep up, comes from the spread of the yellow-legged wasp in Europe. This invasive wasp, *Vespa velutina*, was first noticed in France in 2004, but now covers much of Western Europe. Earlier this year, Daniela Laurino and colleagues in Italy provided an update on the status and impacts of *V. velutina* in the freely available article "*Vespa velutina*: An alien driver of honey bee colony Losses" (*Diversity*, **doi:10.3390/d12010005**). Along with describing significant economic and ecological costs in the past 15 years, they discuss methods to monitor and control wasp invasions. Controlling wasps in established populations is extremely challenging, leading to widespread efforts to develop early warning systems that find and eradicate wasp nests as they arrive to new regions. These include bait stations and clever wasp-hunting techniques reminiscent of those described for honey bees by Thomas Seeley in his great book "Following the Wild Bees: The Craft and Science of Bee Hunting". Fifteen years is a short time frame for an invasive species, but it is comforting that bees and people are persisting despite this new arrival.

So, how can bees themselves fight this predator? AGH's are found across much of East Asia and they have gotten decades of attention both for their extreme size and their impacts on bees and people. The Asian honey bee, *Apis cerana*, shows numerous defenses against predatory wasps, from closing down nest activity to actively suffocating attacking wasps (see Jennifer Berry's nice article on bees battling back against AGH in this issue). Sadly, *A. mellifera* lacks many of these evolved defenses. Much of this has to do with a failure to communicate. Animals, especially prey animals, can 'eavesdrop' on the sounds or smells released by other species. Honey bees perceive the smells used by predatory wasps to coordinate their attacks, but the ability to eavesdrop and defend against these predators depends on past experience. Shihao Dong and colleagues demonstrated that *Apis cerana* mounts a suffocating response to both the presence of predatory wasps at the nest entrance and the smell of the wasp alarm pheromone (Olfactory eavesdropping of predator alarm pheromone by sympatric but not allopatric prey, *Animal Behaviour*, 2018, **https://doi.org/10.1016/j.anbehav.2018.05.013**). *A. mellifera* responds less well to both cues, but the differences are most striking for the alarm pheromone, with a six-fold higher response rate by *A. cerana* than by *A. mellifera.* The authors found the alarm pheromone isopentyl acetate (IPA) to be the strongest trigger. More recently, Beverly McClenaghan and colleagues compared bee responses to an additional range of wasp smells ("Behavioral responses of honey bees, *Apis cerana* and *Apis mellifera*, to *Vespa mandarinia* marking and alarm pheromones", *Journal of Apicultural Research, 2019,* **https://doi.org/10.1080/00218839.2018.1494917**). Working with *A. cerana* in Vietnam and *A. mellifera* in Canada, these authors presented bees with the AGH alarm pheromone and a single chemical used by AGH to 'mark' bee colonies for future destruction. Two alarm pheromone chemicals (different from the one in the study above) caused *A. cerana* workers to group together on the fronts of colonies, waiting to attack wasps, while *A. mellifera* workers showed no perceptible change in behavior. The 'marking' pheromone had the opposite effect, *A. mellifera* workers continued to patrol the nest entrance while *A. cerana* workers assumed a more defensive posture inside the nest.

The McClenaghan study observed *A. mellifera* workers that have never faced significant wasp predation, and it is conceivable that *A. mellifera* will rise to the wasp challenge given experience with these predators. Indeed, looking at the *V. velutina* situation in Europe there is some hope that *A. mellifera* workers have an innate sense of how to behave in the face of wasp attacks. This behavior is 'unorganized' according to Mariangela Arca and colleagues, but shows signs that it might be awakened ("Defensive behaviour of *Apis mellifera* against *Vespa velutina* in France: Testing whether European honeybees can develop an effective collective defence against a new predator," *Behavioural Processes*, 2014, **http://dx.doi.org/10.1016/j.beproc.2014.05.002**). Like *A. cerana*, *A. mellifera* workers in southern France formed a carpet in front of the hive early on during a wasp attack. While *A. mellifera* workers did not pursue wasps more than a few inches from the nest, they did form suffocating heat balls around wasps placed on the hive entrance (killing about 10% of wasps) and they were adept at heat-killing single wasps that actually entered the hive. For the most part, *A. mellifera* colonies slowed their foraging and 'waited out' wasp attacks as a group, losing foraging time but minimizing losses of individual bees. Bees in this part of France, despite being the first to meet up with *V. velutina*, have not faced heavy wasp predation before. In other parts of Europe, honey bees have faced the smaller, but still intimidating, *Vespa crabro*, for thousands of years. This European hornet, also an established invasive in the eastern United States, attacks foraging *A. mellifera* on the wing, stinging them and returning home, but rarely enters honey bee colonies. David Barrachi and colleagues in Italy (Defence reactions of *Apis mellifera ligustica* against attacks from the European hornet *Vespa crabro*, *Ethology Ecology and Evolution*, 2010, **https://doi.org/10.1080/03949370.2010.502323**) used observations and experiments to describe how *A. mellifera* defends against this nuisance predator. With exposure to *V. crabro*, European honey bees show many of the same behaviors found in *A. cerana* when defending against the much larger AGH, including 'carpets' of defending bees on the front boards of hives and heat-balling to suffocate attacking wasps. Worker bees also fared well in individual bee-fights on the wing, often curling to sting larger wasp attackers before they themselves were stung and taken as food.

Time will tell how impactful the AGH will be for North American honey bees. My hopes are on the human defenders in the western edge of the continent as they try to protect honey bees against a growing swarm of would-be murderers, but it is comforting that bees and beekeepers will have some of their own defenses to battle back as well. BC

Jennifer **Berry**

The first time I saw the video of Asian giant hornets devouring a honey bee colony, I was heartbroken. To watch those innocent workers flying out to protect their family, only to be slaughtered at their front steps, was very disturbing. Not to play it lightly, but it reminded me of a scene out of *Game of Thrones,* where our hero's family had no chance of survival, no matter how hard they fought. At the time I watched the disturbing video, the hornets were still contained within the borders of Asia, but that is not the case now. Since then, the Asian giant hornet has found a way to invade our Western shores. Descending out of the sky like Rodan (fictional character from the Godzilla series), with its fiery breath and blood soaked fangs, it is here to terrorize, not just our bees, but us as well. The "Murder" hornet is on the hunt, so grab your children, run for the hills, hide in your homes, lock your doors, board up your windows since this time, self-quarantining and social distancing won't save you from this venomous killer!

Ok, did I get your attention? Are you scared? Have I triggered an emotion? That is exactly what the journalist intended when he titled the article 'Murder Hornets,' with stings that can kill . . . This is what discourages me about SOME journalists when they use language to evoke fear. I guess they were tired of writing about Covid-19. Back in May, the article went viral, hence calls and emails from concerned citizens across the country started bombarding county agents, universities, and anyone else involved in agriculture or would pick up the phone. The article did exactly what the author intended it to do, panic folks about this potentially new, invasive species. Even though it is months after the *New York Times* expose, I wanted to write this piece with factual information for beekeepers to help calm anxiety. Together, with factual information, instead of fear conjuring words, we can help spread correct news to our friends, neighbors and the public. So, here are the facts, just the basic facts . . .

In August of 2019, three Asian giant hornets (AGH) were identified by provincial authorities in Nanaimo, British Columbia, Canada. In December 2019, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) confirmed the identification of an AGH specimen collected by a landowner in Blaine, Washington.

Last year there were several other unconfirmed sightings in the Pacific Northwest along with a nest being destroyed in Nanaimo, British Columbia. There was also a report of a colony being killed, but this has not been confirmed as a result of an AGH attack. To date, when

Dr. Looney, entomologist for the Washington Department of Agriculture holding an Asian giant hornet. WA Dept of Ag photo.

Dr. Looney with a hornet on his jacket. WA Dept of Ag photo.

this article was written, confirmation of the AGH in the United States has only been in Washington state.

Since the release of the "Murder" Hornet article, our lab and the University of Georgia's Entomology Department have been fielding numerous phone calls and emails. One question that everyone wants to know, (other than is it in Georgia (NO!), is, how did it get here? Well, unfortunately, at this point, no one really knows. There are several theories on possible pathways, but these are just speculations. In Asia, hornets, including the AGH, are used for food, as energy supplements or as performance enhancement products. Hence, it may have been brought here on purpose to farm as an industry. Last year, a package was intercepted at a US port of entry. This package contained live AGH larvae and pupae. The larvae would have more than likely perished but the pupae could have survived, thus forming a colony.

What is the more likely scenario of how the AGH got here? Like so many other invasive species, it was accidentally brought in. As you know, there is a tremendous amount of commercial traffic between Asia and the U.S. It probably was an overwintered, hibernating queen/s that were stowed away in the ballast of a ship, in plant material or hiding in a palletized container destined for the West coast. My wager goes with 'accidentally introduced' as with so many other things that have slipped into our country.

The Asian giant hornet, *Vespa mandarinia*, is a "true" hornet and the world's largest, ranging in size from 1.5 to slightly over two inches long (38-50mm).

The AGH was first described in 1852 and has many names associated with it: the Japanese hornet, yak-killer hornet, and the giant sparrow bee. Due to their advanced social organization, cooperative brood care, and overlapping generations, this defines them as eusocial. Similar to honey bees, they are haploid-diploid with females containing two sets of chromosomes and males only one.

The stinger is nearly ¼-inch long and can deliver a powerful sting. Typical beekeeping attire will not protect you from this pest due to the length of its stinger. Special "hornet suits" should be worn if you are going to encounter these beasts.

Each year in Japan, 30-50 people die from being stung by these ferocious hymenopterans. The venom is also more toxic and the AGHs can sting repeatedly, unlike honey bees, since their stingers are not barbed. Those who are allergic to bee or wasp stings should take particular caution around them and calmly leave an area if they have seen a AGH. Actually, anyone, allergic or not, should be careful in the vicinity of these hornets.

The AGHs natural range is in the temperate to tropical forested areas of Asia.

But as with a lot of invasive species, man's movement has facilitated its spread to regions outside of these areas. And therein lies the problem. Once a species, (plant, arthropod, bird, mammal, bigfoot) escapes its natural boundaries, issues arise. Since it didn't evolve in its new digs, there are no natural predators to keep it in check. Take Chinese privet for example. If you live in the south, and you have land, then you have probably encountered this vegetative beast. Here on our farm, our mission is clear: search and destroy. But for every 10 plants we remove, it seems 20 pop up a few yards away. Nothing wild eats it, not even deer, which chew on **everything** you don't want them too. Time will tell, but I'm thinking there won't be too many critters going after the AGHs for an afternoon snack.

AGHs annual life cycle is similar to other hornets. An overwintered, fertilized queen will emerge when temperatures begin to rise in the spring. She will feed on sap from nearby trees, to provide energy. Once strong enough, she will begin to search for suitable nesting sites. AGHs prefer to nest in the ground and will inhabit abandoned rodent burrows or cavities formed by rotting roots from trees. Unlike most hornets, the AGH does not form paper nests hanging from limbs or structures but instead forms nests in the ground in forested areas (much like yellowjackets). These nests can get pretty large as well, with hundreds of individuals. Once the queen has established a rudimentary nest, she will start her colony by producing an initial clutch of around 40 eggs. This will become the first generation of workers with developmental time of about 40 days from egg to adult. As this first generation matures, and as more workers are reared, they will eventually take over all of the foraging and rearing duties. The queen will then become nest bound with her only job to lay eggs, this is called the polyethic stage.

In the Fall, the colony enters the reproductive stage. Fertilized eggs laid by the queen will become the next season's queens and unfertilized eggs will become males. Once the males have become mature, they will leave the nest and wait for their sisters to venture out. Up to a month later, the reproductive queens emerge and mate

with the males, who have been patiently waiting at the hive entrance. Males will die off but before the chill sets in, fertilized queens will find a suitable location to overwinter. They will dig into the soil, rotting wood or vegetative matter for their Winter slumber. Here she will hibernate until Spring when the cycle will begin again. Back at the original hive, the mother queen and her workers will die. Queens live for a year, while her workers live on average 15-35 days after emergence.

AGHs are predators of many types of arthropods from beetles to praying mantis, spiders and caterpillars. They will also attack and devour entire nests of yellowjackets and paper wasp colonies. As they chew and consume their prey, they turn them into a "meat ball" which will be a yummy meal for themselves or their hungry larvae back at the nest. Being turned into a meatball is not my idea of a good time, but unfortunately most arthropods have no defense against the AGH's massive jaws and powerful stingers. But there is always an exception to the rule.

Have you seen the National Geographic video of bees "cooking" a hornet to death? Here's the exception. This is the same AGH, but unfortunately not the same bee found here. AGH evolved with *Apis cerana*, which has developed a defensive response of cooking hive intruders. The bees lure the invading hornet into the hive, and pile onto it, covering the hornet completely. They then begin to vibrate, raising their thoracic temperature to over 115 degrees which is lethal to the hornet but tolerable to bees. Unfortunately, *Apis mellifera* does not display this behavioral trait.

Back in May, our lab, in concert with the University of Georgia's Center for Evasive Species and Ecosystem Health, put together some informative documents, one of which I want to share here (others you can find on our website, **www.ent.uga.edu/bees**).

As you can see, the AGH looks similar to our other U.S. hymenopteran residents, especially cicada killers. There are some key elements which can help to correctly identify a AGH. One, look at the orange head and black eyes of the AGH. It is enlarged almost to the point of being comical. Also, the size, they are quite large, up to two inches. These are easy to see, key factors in helping to distinguish between this and other wasps and hornets. We have already received emails from fearful homeowners proudly displaying dead beetles, wasps and cicada killers they thought were AGHs; I figured this would happen. Saddens me, since I hate to see cicada killers being slaughtered for no reason. Ok, I'm weird, but I love cicada killers, they are not aggressive and are so lovely to observe. Back to the story.

The Asian giant hornet is not necessarily aggressive towards humans, livestock or pets but will sting if provoked. However, this giant killer can inflict a devastating blow to honey bee colonies, with as few as 20 hornets annihilating 30,000 bees within a few hours. There are three phases to an Asian giant hornet attacking a honey bee colony. The first is the hunting or hawking phase where individual hornets search out a colony of bees. Once located, they will capture bees at the entrance of the hive, cut off their heads, and chew up the thorax forming a "meat ball". They then carry this back to their nest to feed their young the protein-rich meal.

The second phase is the slaughter phase. Single hornets will mark a particular colony with a pheromone

Close up of an Asian giant hornet on Dr. Looney's jacket. WA Dept of Ag photo.

to guide their sisters to the next target. Once assembled, numerous hornets will descend upon the colony, killing all of the workers by ripping their heads off, and dumping their bodies onto the ground below. One AGH can kill a bee every 14 seconds and they stick around for hours. When the colony is void of bees, the hornets behave as if this hive is now their own, becoming extremely aggressive to anyone or anything coming near. This is an important fact that every beekeeper needs to know. If you see a colony being attacked by AGHs or flying in and out, do not approach the hive because they may attack you. As mentioned earlier, even a bee suit is no protection from their stingers. Don't take the risk, call your local county agent, or bee inspector; but hopefully, we will never encounter such a scene.

The third is the occupation phase. Here the hornets enter the hive, collect pupae and larvae for several days until the food is exhausted and then return to their own nest to feed their carnivorous young. The aftermath of an attack will be piles of decapitated or ripped apart bees in front of a colony.

The visible key to an Asian giant hornet attack is "decapitated" or "ripped apart" bees, and not just a pile of intact dead bees, which could be the result of pesticides, starvation or something else. Skunks, shrews or other insect eating predators sometime will dine on honey bees leaving chewed up body parts in front of the hive, but rarely do they destroy an entire colony.

In 2004, Europe saw the introduction a similar species *V. velutina,* which quickly spread. This is a smaller version of *Vespula* but has caused two deaths in France. Also, more bad news, beekeepers in areas where this hornet is present, have reported a 30% decline in colony health either by being destroyed or weakened by the hornets. This has also had a direct impact on honey production with a reduction of up to 60% in some regions.

Obviously we DON'T need this beast to become established here in the states. It's hard enough to handle *Varroa* and small hive beetles, we don't need this in

Center for Invasive Species and Ecosystem Health
UNIVERSITY OF GEORGIA

Asian Giant Hornet and its SE US Lookalikes

Bumble Bees
Bombus spp.

Wrong color thorax

Honey Bee
Apis mellifera

Wrong color thorax

Black & Yellow Mud Dauber
Sceliphron caementarium

Constricted abdomen

Bald-faced Hornet
Dolichovespula maculata

Abdomen not striped

Southern Yellowjacket
Vespula squamosa

Wrong color thorax

Eastern Cicada Killer
Sphecius speciosus

Abdomen not fully striped

Paper Wasps
Polistes spp.

Thorax not fully brown

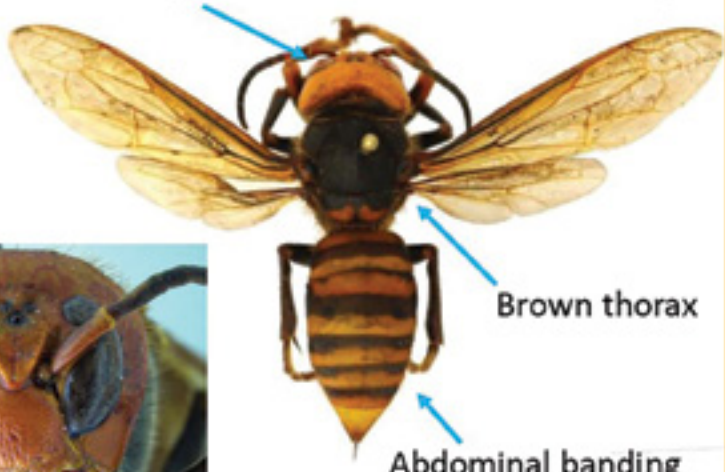
European Hornet
Vespa crabro

Thorax not fully brown

Asian giant hornet
Vespa mandarinia

Enlarged head

1.5-2 in. long



Antenna base
yellow/orange

Brown thorax

Abdominal banding
yellow and brown

Large yellow/orange head

WA State Dept of Ag, Bugwood.org

May 2020

the mix too! Thankfully, the Washington Department of Agriculture (WSDA) is taking this very seriously and is working diligently to try and contain this pest, but no one knows if they will be successful. According to Anne LeBrun, National Policy Manager for Honeybee and Pollinator Pest Programs in the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), "in fiscal year 2020, APHIS has provided over $400,000 to support exotic hornet research and the WSDA delimiting survey and eradication activities are designed to prevent the Asian giant hornet from becoming established in the U.S. APHIS is drafting a Biological and Environmental Assessment to help WSDA destroy any hornet nests, if detected. APHIS is sharing information about this pest with the National Park Service, U.S. Forest Service, and Armed Forces Pest Management Board because all three agencies oversee federal lands in the area. APHIS will also provide updates to stakeholders working to support agricultural pollinators in the United States." It's obvious that Washington state and USDA are taking this issue extremely seriously.

This is what they are up against. AGHs are powerful fliers with an average speed of up to 30 kph (18 mph). They can also forage up to 8 kms (5 miles) in search for food. Both distance and flight ability will contribute to their dispersal. One key to eradicating the species here in the U.S. is eliminating the queens. Trapping and killing overwintered queens in early spring, **before** they are able to make a nest, is crucial. Or in the Fall, killing the "next seasons" queens before they dig in and hibernate for the Winter. Another strategy is to locate and destroy already existing nests, but this can be very labor intensive because locating a nest is not easy. One way is by capturing a worker in the field and then tying a streamer to her body and hopefully being able to follow her back to the nest. Thermal imaging cameras have also been used to detect nests underground, but again, is labor intensive and where do you start looking? There are also baited and attractive traps being tested and used to try and lure them in. At this time, Washington State Department of Agriculture is engaged in a number of activities to try to contain and eliminate AGHs, but it's not going to be easy.

Beekeepers, we are on the first line of defense since AGHs seek out and destroy colonies of honey bees. A sighting, colony attack or the aftermath thereof, may be the first indication of its arrival in our area. That is why it is very important for us to familiarize ourselves with what the AGH looks like and how it compares to our local bees, wasps, or other insects. It would also be very beneficial if we can get the word out to our friends and neighbors as well. We really don't need a bunch of folks running about trapping and killing anything and everything that is flying around but at the same time we all need to be vigilant in case it makes an appearance. Let's hope this is the last we will hear of the Asian giant hornet, but **if** it does escape the borders of Washington, we, with an educated eye, will be able to correctly id it. We need to be aware, not scared, we need to be educated, not afraid, we need to be ready, not surprised!

Take care of you and your bees! BC

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

I want to thank the following for their input – Anne Lebrun: National Policy Manager for Pest Management and Plant Health Programs, USDA APHIS; Dr. Chris Looney, Entomology Lab, Washington State Department of Agriculture; Karla Salp, Public Engagement Specialist, Washington State Department of Agriculture , University of Georgia, Center for Invasive Species and Ecosystem Health

MURDER HORNET

Allen **Summers**

The Japanese Perspective

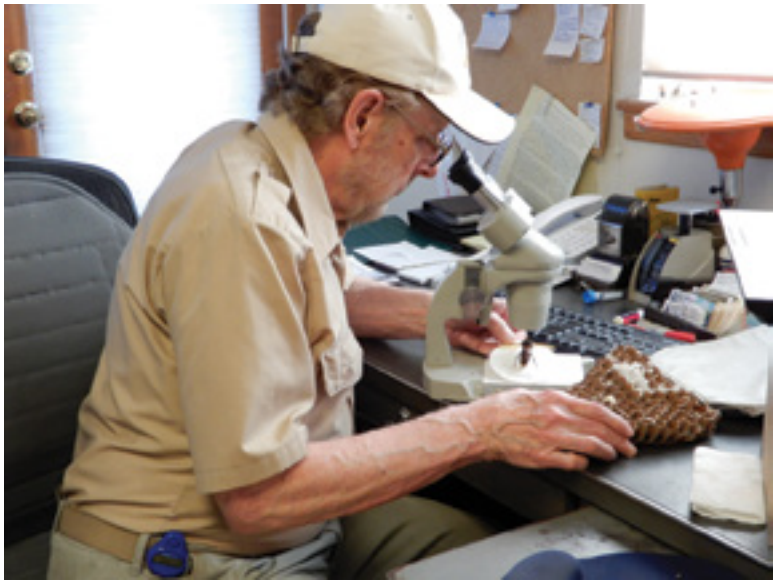
Yeah – I've been seeing the articles in media lately about "Murder Hornets" like you have. Think the way it's being presented is another example of alarmism and overkill regarding seriousness to the beekeeping industry here. You probably know that I've seen lots of those giant hornets when I've been in Japan on and off for almost 25 years now. I also have a bunch of preserved specimens of queens, workers and nests.

What it gets down to in terms of real-world effects on honey bees (A. *mellifera*) is: 1.) They can be a threat to *individual* colonies if not controlled. Doubt that they would have a lot of effect on large bee yards w/lots of colonies. But need to be controlled/mitigated nonetheless so that numbers of giant hornet nests don't increase. 2.) The established way to control for giant hornets when found and usually according to season (which is around late Summer thru Fall. Remember these are not fully *eusocial* vespids so their numbers increase then die-out over winter like most wasp/hornet species is to put entrance screens on hives, like robbing screens but adapted to trap giant hornets. Japanese beekeepers also go out with flyswatters and look for scout hornets and swat them down before they can go back to their nests to notify the rest of hornet colony. 3.) Finally, the nests of V. *mandarinia* are relatively easy to find and eradicate due to their large size conspicuous behavior aspects which is what many beekeepers do in Japan and other parts of E. Asia where they're usually found.

As some of the recent articles have mentioned one has to take extra precautions when working around them or eradicating their nests. Their stings (I haven't been stung personally but have talked with several others who have) are about a ½ cm or ¼-inch long and they can envenomate about 8 to 10 times the amount of venom as in a single Honey Bee or native hornet or wasp sting. Their venom isn't particularly more potent than any other vespid it's just the increased amount that causes problems for some people who get stung. Not too different than when people get stung multiple times by Africanized or just plain nasty bees. We have to be mindful here of the difference between 'bee-sting-phobia" and real world risks from getting stung BTW.

It's interesting that V. *mandarinia* queens are often handled like pets by some brave Japanese. Guess that's because they're top insect predators in their native habitats and in spring (when the new queens are out on initial foraging flights) they are not particularly aggressive or defensive. But like with our honey bee colonies getting into them when there's lots of brood (to defend)..or when they are on a 'slaughtering" rampage (mainly later in season when lots of brood to feed)..one has to take precautions not to get stung when around them. The suits they wear when working V. *mandarinia* nests look to me like what beekeepers wear here when working Africanized honey bees maybe a little more protective around the head and veil area (have seen some wrap thin aluminum sheets in their veils to protect from 'sting-throughs'). They also use a lot of smoke and large smokers (like when working Africanized bees) and when getting into their nests.

Believe it or not though some Japanese also *cultivate* Giant Hornets for food (larvae) and they extract a regurgitated protein from the larvae called VAAM which they sell as a performance enhancer for athletes. So, they are not seen as the fearful menaces to bees and mankind that the current American media reports seem to be trying to push. They are an indigenous part of the ecosystems in many parts of E. Asia and serve a necessary function in controlling many other insect species that would otherwise cause damage to crops and agriculture. Their colloquial name over there is "Sparrow Insect"



Examining specimens under dissecting microscope.

(Suzumebachi) which is definitely not an image of a foreboding insect/wasp. But people over there do respect the potential for harm if or when the proper precautions aren't taken when working around them.

I hope that like with a lot of the sensational stuff going around in the media currently the factual situation about finding *V. mandarinia* in isolated places in the U.S. now can be toned-down and the doom and gloom emphasis dropped. BC

Side view of Vespa mandarinia – or "Sparrow Insect" – Suzumebachi.

Specimen of V. mandarinia on her paper nest.

Size difference between V. mandarinia queen (left) and worker (right) – with penny to show relative size proportion.

Specimen of V. mandarinia worker.

V. mandarinia workers next to V. mandarinia paper nest – with V. mandarinia queen on nest.

A Closer Look

DEFORMED WING VIRUS - VARROA DESTRUCTOR VIRUS COMPLEX

Clarence **Collison**

"Most viruses infecting honey bees are positive sense single-stranded RNA viruses belonging to the Picornavirales order (Traynor et al. 2016). Approximately 24 viruses have been identified in honey bees to date, but several of these viruses are closely related and arguably are members of single-species complexes, reducing the number of distinct viruses to approximately 16-18 (Bailey and Ball 1991; de Miranda et al. 2013; Ribière et al. 2008). Honey bee viruses generally persist at low levels in honey bee populations without causing overt symptoms. However, under certain conditions, they can become pathogenic and widespread, leading to colony mortality. For example, covert honey bee virus infections often become symptomatic when their honey bee hosts face stress (DeGrandi-Hoffman et al. 2010; Di Prisco et al. 2011; Di Prisco et al. 2013). Increasing virus transmission and escalating colony health problems have been closely linked to *Varroa*-mediated virus transmission (Le Conte et al. 2010; Locke et al. 2014; vanEngelsdorp et al. 2013)."

"RNA viruses have rapid replication and high error rates, leading to immense diversity within each viral replication cycle (Domingo and Holland 1997). As a result, many RNA viruses are highly genetically heterogeneous and exist within infected population structures known as quasispecies. It has been proposed that this gives these viral pathogens an increased ability to shift to a new environmental niche, such as a new host, as a suitable mutant is more likely to already exist if this opportunity arises. The adaptability and host range of a virus are a function of the level of diversity found within a quasispecies (Mordecai et al. 2016)." Extensive research over several years has shown that a deformed wing virus quasispecies or species complex has developed.

"Aggregations of 27 nm virus-like particles were observed in electron microscopy images of sectioned *Varroa destructor* mite tissue. The scattered occurrence of individual particles and accumulation of the virions in lattices in the cytoplasm gave an apparent indication that the virus replicates in the mite. Sequence analysis of the RNA of the purified virus revealed a genome organization with high similarity to that of members of the genus Iflavirus. Phylogenetic analysis of the polymerase showed that the virus was related most closely to Deformed wing virus (DWV) and Kakugo virus (KV) of bees. The virus has a genome identity of 84% of those of DWV and KV and the polyprotein with an amino acid identity of 95% to those of DWV and KV. The name proposed for this new virus was *Varroa* destructor virus 1 (VDV-1). Both DWV and VDV-1 replicated in the *Varroa* mite (Ongus et al. 2004)."

"A country-wide screen for viral pathogens in Israeli apiaries revealed significant incidence of deformed wing virus (DWV) and *Varroa destructor-1* virus (VDV-1). To understand these viruses' possible involvement in deformed wing syndrome of honey bees, Zioni et al. (2011) studied their replication in symptomatically and asymptomatically infected bees qualitatively and quantitatively, using RT-PCR, quantitative real-time RT-PCR, and immunodetection of the major viral capsid protein VP1. They found, for the first time, replication of VDV-1 and/or a VDV-1—DWV recombinant virus in the heads of recently emerged symptomatic bees. These viruses replicated to high copy numbers, yielding the major viral capsid VP1 processed for subsequent assembly of viral particles. Their results clearly distinguished between symptomatic and asymptomatic bees infected with VDV-1 and VDV-1—DWV and suggest the hypothesis that VDV-1, in addition to DWV, may be involved in inducing the deformed wing pathology. Thus VDV-1—DWV recombination may yield virulent strains able to cause overt infections in *Varroa*-infested bee colonies."

24 Viruses

"Deformed wing virus (DWV) and the closely related *Varroa destructor* virus-1 (VDV1), are the most widespread honey bee viruses. VDV1 is known to cause high rates of overwintering colony losses in Europe, however, at the time it was unknown in the United States. Ryabov et al. (2017) using next generation sequencing, identified VDV1 in honey bee pupae in the U.S. They tested 603 apiaries in the U.S. in 2016 and found that VDV1 was present in 66.0% of them, making it the second most prevalent virus after DWV, which was present in 89.4% of the colonies.

Covert honey bee virus infections often become symptomatic when their honey bee hosts face stress.

VDV1 had the highest load in infected bees ($7.45 \times 10^{12} \pm 1.62 \times 10^{12}$ average copy number ± standard error) compared to other tested viruses, with DWV second ($1.04 \times 10^{12} \pm 0.53 \times 10^{12}$). Analysis of 75 colonies sourced in 2010 revealed that VDV1 was present in only two colonies (2.7%), suggesting that it has rapidly spread recently. They also detected newly emerged recombinants between the U.S. strains of VDV1 and DWV. The presence of these recombinants poses additional risk, because similar VDV1-DWV recombinants constitute the most virulent honey bee viruses in the UK."

"In Europe and the U.S., elevated losses of honey bee colonies are associated with the mite *Varroa destructor* (Rosenkranz et al. 2010). This parasite feeds on the internal tissues of both pupal and adult honey bees, and in the process can vector a number of RNA viruses (Rosenkranz et al. 2010; Le Conte et al. 2010). These include Deformed wing virus (DWV) (Lanzi et al. 2006), also referred to as DWV-A (Mordecai et al. 2016) and DWV-like viruses such as the *Varroa destructor* virus 1 (VDV1) (Ongus et al. 2004), also referred to as DWV-B (Mordecai et al. 2016). DWV and VDV1 are not only the most prevalent viruses in honey bees, but are also likely to be the most significant in terms of their impact on honey bee colony health (Rosenkranz et al. 2010; Highfield et al. 2009; Dainat et al. 2012; Traynor et al. 2016). *Varroa*- mediated transmission of DWV selects for highly virulent strains and decreases overall virus population diversity (Martin et al. 2012; Ryabov et al. 2014; Dalmon et al. 2017). Both VDV1 and VDV1-DWV recombinants outcompete DWV and are more virulent than DWV(DWV-A) strains (Ryabov et al. 2014; McMahon et al. 2016), although the mechanisms of the their increased virulence remain unknown. On its own, VDV1 was identified as a major predictor of elevated Winter losses in Germany (Natsopoulou et al. 2017). Little is known about the prevalence and range of VDV1 in the U.S,, a serious knowledge gap considering the potential role of this virus in observed high colony loss rates. In this study, they report that VDV1 is currently widespread in the U.S., alongside DWV. There are at least two distinct sequence variants of VDV1 present in the U.S., one of which is closely related to the European VDV1 strains. The prevalence of VDV1 in tested colonies (65%) was significantly lower than that of DWV (89%). Nevertheless, average VDV1 loads in virus-positive colonies were higher than those of DWV (Ryabov et al. 2017)."

"Moore et al. (2011) used high-throughput Illumina sequencing to identify novel recombinants between Deformed wing virus (DWV) and *Varroa destructor* virus-1 (VDV-1), which accumulate to higher levels than DWV in both honey bees and *Varroa destructor* mites. The recombinants, VDV-1VVD and VDV-1DVD, exhibit crossovers between the 59-UTR and the regions encoding the structural (capsid) and non-structural viral proteins. This implies that the genomes are modular and that each region may evolve independently. Individual honey bee pupae were infected with a mixture of observed recombinants and DWV. A strong correlation was observed between VDV-1DVD levels in honey bee pupae and associated mites, suggesting that this recombinant, with a DWV-derived 59-UTR and non-structural protein region flanking a VDV-1-derived capsid-encoding region, is better adapted to transmission between *Varroa destructor* and honey bees than the parental DWV or a recombinant bearing the VDV-1-derived 59-UTR (VDV-1VVD)."

"Deformed wing virus (DWV) is a major pathogen concern to beekeepers and recent reports have indicated the local predominance and potential virulence of recombinants between DWV and a related virus, *Varroa destructor* virus 1 (VDV-1). However, little is known about the frequency and titer of VDV and recombinants relative to DWV generally. Cornman (2017) assessed the relative occurrence and titer of DWV and VDV in public RNA-seq accessions of honey bee using a rapid, kmer-based approach. Three recombinant types were detectable graphically and corroborated by *de novo* assembly. Recombination breakpoints did not disrupt the capsid-encoding region, consistent with previous reports, and both VDV- and DWV-derived capsids were observed in recombinant backgrounds. High abundance of VDV kmers was largely restricted to recombinant forms. The recently described DWV-C lineage was not detected in the searched accessions."

"Deformed wing virus and *Varroa destructor* virus-1 have a high percentage of nucleotide identity and might be considered as closely related viruses: DWV genotype A (DWV-A) and DWV genotype B (DWV-B), respectively. They have been implicated in overwinter colony losses in association with *Varroa destructor* infestations that vectored both DWV variants. Dubois et al. (2020) performed experimental inoculations of honey bee pupae with viral suspensions prepared from honey bee heads naturally infected by either DWV-A or DWV-B. Two outcomes were observed: the inoculated pupae exhibited either higher rates of bees with deformed wings or higher mortality rates than control bees. For both DWV variants, the viral loads quantified in the head of inoculated bees were significantly greater than those in control bees. These outcomes were not correlated to the virus genotype (DWV-A or DWV-B) detected in the inocula. However, the highest mortality rates found in the study were correlated with an increase in sacbrood virus (SBV) load. Despite the fact that only either DWV-A or DWV-B was expected to be inoculated, they observed increased mortality in honey bees that were infected with both DWV and SBV.

"Normally, DWV persists in a variety of insect hosts at low prevalence, low viral load, and high strain diversity (Martin et al. 2012; Ryabov et al. 2014; Loope et al.2019). However, the introduction of *Varroa* mite-meditated DWV transmission allowed for at least one of the three DWV master variants (A, B, or C) to be selected in honey bees (Martin et al. 2012; Loope et al. 2019). Initially, only DWV-A was detected, and became closely associated with the collapse of colonies around the world (Martin et al. 2012; Schroeder and Martin 2012; Francis et al. 2013). DWV-B was first detected in *Varroa* in 2001 (Ongus et al. 2004), and was believed to be a mite-borne virus. It was originally named *Varroa Destructor* virus-1 (VDV-1). Subsequent studies have shown VDV-1 to be a master

variant of DWV (Baker and Schroeder 2008; Mordecai et al. 2016), now called DWV-B, as it is commonly detected in honey bees. DWV-C was discovered in U.K. honey bee samples from 2007 (Mordecai et al. 2016), and linked in combination with DWV-A to the death of overwintering colonies in which the mite populations were controlled at low levels (Kevill et al. 2019)."

"The strong association between *Varroa destructor*, deformed wing virus (DWV), and high overwintering colony losses (OCL) of honey bees is well established. Three DWV master variants (DWV-A, -B, and –C) have been described, and their role in colony mortality remains an open question. Kevill et al. (2019) investigated the seasonal prevalence, viral load, and changing distribution of the three DWV master variants within honey bee colonies from England, Wales and 32 states across the United States. In 2016, DWV-B was prevalent (100%, n = 249) and dominant (95%) in England and Wales, compared to the US. (56%, n=217 and 23%, respectively), where DWV-A was prevalent (83%, n=217 and dominant (63%). DWV-C was regularly detected in low viral loads (<1 x 10^7 genome equivalents per bee) and at lower prevalence (58% in England and Wales, n = 203, and 14% across the United States, n = 124) compared to DWV-A and –B. DWV-B prevalence and dominance in England and Wales coincided with low OCL (6%). Meanwhile, a 60% loss was reported by participating U.S. beekeepers. In the United States, DWV-A prevalence (89%, n = 18) and viral load were significantly higher (1 x 10^8 - 1 x 10^{11}) in colonies that died when compared to the surviving colonies (49% (n = 27), 1 x 10^6 – 1 x10^{10}). DWV-B had low prevalence (56%, n = 18) in the colonies that died with viral loads of <1 x 10^{10}. However, DWV-B was routinely detected in high viral loads (>1 x 10^{10}) in surviving colonies from all sample locations, providing further supporting evidence of DWV-A exhibiting increased virulence over DWV-B at the colony level." BC

Deformed wing virus and the closely related Varroa destructor virus-1 are the most widespread honey bee viruses.

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Clarence Collison is an Emeritus Professor of Entomology and Department Head Emeritus of Entomology and Plant Pathology at Mississippi State University, Mississippi State, MS.

Face masks have been added to the Bee Squad uniform.
Photo Credits: Jessica Helgen, Clara Costello and Brook Nikkila.

Squad Goals

Pollinator Outreach In A Pandemic

Becky **Masterman**
Bridget **Mendel**

The world has been turned upside down. This year we are all experiencing bee season through the lens of the pandemic. For us in the Bee Squad – the pollinator outreach educators of the Bee Lab – this moment provides a surprisingly illuminating backdrop to our bee heath messaging. After years of trying to find ways to explain how viruses spread amongst bee colonies, suddenly our entire nation shares a collective picture of exactly how quickly and devastatingly viruses can spread if the right precautions are not taken.

The coronavirus has, we admit, become a useful metaphor for explaining the critical health problems our honey bees have faced for years, as well as the possibility – if we aren't proactive – that honey bee pathogens may jump to native bee species (Fürst et al., 2014). As we confront just how connected we are as participants in a global economy, the precarious balance of our agricultural and ecosystems health becomes that much more obvious. Enter the invasive giant hornet: yet another moment where the consequences of a global economy for people are mirrored in the world of pollinators.

But something else has changed this year, too. Many people are slowing down and attending more closely to nature, because they finally have time – or because they are stuck at home. University of Minnesota Bee Lab Professor Marla Spivak always says, if you want to find out what plants are the bees' favorites, observe your plants to see who gets the most visitors, and then plant more of that kind of flower. As Minnesota Extension Educator and Bee Researcher Elaine Evans tells it, her lifelong study of bumble bees emerged out of a childhood fascination with the intricate life forms she found in her backyard. Now suddenly, here we all are, just like Marla and Elaine, observing life on the small scale of backyards or city parks.

With this increased attention to our close surroundings, Bee Squad is receiving numerous emails with people asking us to identify bees, provide assurance that a wasp sighting is *not* the internet-famous giant hornet, or wanting support in transforming their turf into a bee lawn. We are taking time to generate new messaging, planting guides, and online classes to satisfy a growing community of plant and insect observers. The thing is, people want to do something helpful, and helping bees is something many of us can do from home.

For those who don't have land (like many on the Bee Squad team) we are promoting citizen science projects like the collaborative Bumble Bee Watch program, now more important than ever as researchers are asked to stay out of labs, and hiring freezes limit the number of

New planting ideas like Pollinator Tea Gardens, have been well-received by Bee Squad followers. Honey bee landing on Agastache foeniculum *(anise hyssop).*
(Photo credit: Judy Griesedieck.

technicians and field workers needed to do research. The public can truly make a difference in data collection for pollinator scientists.

In our pollinator outreach work, the Bee Squad works directly with the public. We enter businesses, museums and backyards to manage the bees in our Bee Network program, often visiting with homeowners or groups of employees to answer bee questions or give demonstrations. Students at our Bee Veterans and Mentoring Apiary classes crowd around open colonies, peering into cells and passing frames from hand to hand. After class, we stay to talk bees and share stories. We've struggled to find ways to sustain this sense of close community as we work in teams of one and move all bee education online.

Teaching virtually has opened up our classes to a broader audience geographically, but nothing compares to the physical experience of working bees together. We feel for this new generation of first-time beekeepers who don't have easy access to in-person instruction. In evaluating colony health, we use sound, smell, weight, and visual observations of subtle shifts in colony activity. Even with videos and slides, learning to read a colony is very hard to do without actually opening a live colony.

With the University of Minnesota Bee Lab closed to all but a few essential workers, our team works around each other instead of with each other. We wear masks while loading up vehicles for bee work, and are careful to clean shared surfaces.

Becky Masterman led the UMN Bee Squad from 2013-2019 and currently alternates between acting as an advisor and worker bee for the program. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. (Photo of Becky and Bridget from 2014, before social distancing).

But mostly we are lucky to get to continue doing our job of taking care of bees. Getting outside to lift boxes and check bees is essential to keeping these animals healthy, but the bees do their part in keeping us healthy – and in good spirits – too. BC

Online Resources

Citizen science

https://beeinformed.org/citizen-science/sentinel-apiaries/

https://www.bumblebeewatch.org/

www.mitecheck.com

Innovative planting ideas for bees and other pollinators

https://www.beelab.umn.edu/learn-more/beelawn

https://www.beelab.umn.edu/pollinatortea

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Spring Blooming Bee Plants In The Great Plains

Connie **Krochmal**

In this article, I'm referring to Region 5 (Montana, Wyoming, the Dakotas, Nebraska, and Kansas), a six state area shown in the Regional Honey Price Report that appears monthly in *Bee Culture*. However, be aware that some other sources include parts of adjoining states in their maps of the Plains.

This area has quite a few bee plants that bloom in the Spring. The Spring flowering woody bee plants in this area include the following. Let's begin with the fruit trees.

Apple trees are sources of nectar and pollen for a couple weeks. These blossoms fill a valuable role by stimulating brood rearing. Bees also collect honeydew from apple trees.

The honey surplus can range from 45 to 80 pounds per colony. The premium quality, aromatic honey ranges from very light amber to pale yellow. The flavor mellows with age. Granulation occurs over a long period.

Pear trees bloom before apples. These flowers yield nectar and pollen, which helps to build up colonies in early Spring. Generally, pear blossoms yield less nectar than apple trees. They also bring honeydew.

Plum trees also bloom for several weeks. When weather is favorable, the flowers can bring lots of nectar and pollen. There can be a surplus of honey. Bees also collect honeydew from these trees.

Black locust can be found in all mainland states. An excellent source of nectar, the fragrant flowers yield copious quantities for a total of over an ounce per blossom. The length of the nectar flow can vary by location and cultivar, but usually lasts for about two weeks.

Bees eagerly work black locust blooms, which also provide pollen. Strong colonies are needed to take full advantage of the heavy nectar flow. The surplus honey crop can vary by location. Typically, it can be over a hundred pounds per colony or up to fifteen pounds per colony per day.

Black locust honey is comparable in quality to clover. This premium honey is usually very sweet and mild with a rich aroma and heavy body. It can remain liquid for several years, but eventually granulates.

The color of the honey can vary widely. It can be very clear, water clear, water white, very light colored, or pale yellow. When this honey isn't from a single floral source, it can often have yellow tinges.

The **redbud** (*Cercis spp.)* blossoms appear for about three weeks during the Spring before the leaves unfurl. The flowers provide bees with much nectar and pollen, which is especially beneficial to brood rearing. The light colored honey has an excellent flavor.

The **common snowberry** (*Symphoricarpos albus)* can be found throughout the Great Plains except for Kansas. It also occurs in all of the Northeast, New England, and the Midwest as well as Kentucky, Virginia, West Virginia, Tennessee, North Carolina, California, Oregon, Washington, Idaho, Utah, Colorado, and New Mexico. Hardy to zones 3b-7, it prefers shade and adapts to limestone-rich soils and clay.

Snowberries are valuable, dependable honey and pollen plants. Even during drought, they can bring a small honey crop. These are good sources of honey, averaging around twenty-five pounds of surplus per colony in the Northwest.

The mild flavored honey is either white or various shades of amber. It remains liquid for several years with little granulation. This honey is preferred for mead.

The various **willows** (*Salix spp.)* bear catkins during late Winter and early Spring. The male and female catkins are borne separately, sometimes on different plants. The males are showy. Willows are valuable because they bloom so early. While both male and female blossoms are sources of nectar, only the former are sources of pollen.

Willows are also good sources of honeydew. These plants can bring good honey crops. Details were included

Black Locust

earlier in the article on Winter blooming bee plants in Florida.

Quite a few Spring flowering bulbs are hardy in this area. Ones that provide nectar and pollen for bees include glory of the snow, winter aconite, snowdrop, hyacinth, snowflake, grape hyacinth, crocus, and some squills. Peonies, tulips, and daffodils bring pollen for bees.

Other Spring blooming bee plants in the Great Plains include Chinese tallow tree (nectar and pollen), the prickly pears (honey and pollen), spring vetch (honey and pollen), crab apples (lots of pollen and nectar, sometimes honey), European buckthorn (honey and pollen), fireberry hawthorn (pollen and lots of nectar and honey), the various maples—especially boxelder (honey and pollen), spring phlox (pollen), and flowering quince (nectar and pollen).

Additional Bee Plants in the Great Plains

While the plants featured above have been featured in previous articles, the following haven't.

Poplars (*Populus spp.)*

The poplars, which include the cottonwoods, the aspens, and the poplars, are major sources of pollen. Blooming during the Spring, these help to build up colonies. Bees also collect honeydew from poplars as well as a lot of propolis from the flower buds and leaves.

These trees are wind pollinated. One interesting fact about poplars is that the bark conducts photosynthesis when the leaves are absent.

Around 13 poplar species are found in North America. Members of the willow family, they occur in pretty much all regions of the country. These are by far the most common tree found in the Great Plains.

Two poplar species are restricted to certain areas within the Great Plains. These include balsam poplar (*Populus balsamifera),* which features buds covered with an aromatic gum-like balsam. The narrow leaf poplar (*Populus angustifolia)* can be identified by the narrow, willow-like foliage, and the fragrant buds.

Poplar.

Eastern cottonwood (*Populus deltoides)*

Despite the common name, this species occurs in all mainland states except for Washington, Oregon, Idaho, California, and Nevada. Its habitats include streambanks, moist lowlands, swamps, damp prairies, and floodplains. The tree prefers moist, well drained sand or silt. After being planted in the Great Plains by settlers, it naturalized in the area.

Suited to zones three through nine, eastern cottonwood usually reaches seventy to a hundred feet in height with a spread of twenty-five to thirty feet. This has an open, irregular, broad crown and a very thick short trunk. nearly seven feet in diameter.

Like other cottonwoods, eastern cottonwood has sticky buds. Those of the aspens are slightly resinous. The bark on older trees is dark gray with deep furrows. The tree features wide spreading, slender branches and brownish-yellow branchlets.

The alternate, triangular, shiny, toothed leaves are three to seven inches long and five inches across. They're deep green. During late Summer, these become a duller shade of yellow when compared to aspen foliage.

Flowering occurs from February to April, depending on location, for over a week. The blooms appear before the leaves unfurl.

The male and female blossoms open on separate trees. The females are yellow to green, while the males are red.

The female blooms bear four-valved capsules that contain seeds. The tree is named for the cotton-like fuzz covering the seeds. The seeds of other poplar species, including those of the quaking aspen, aren't nearly as cottony as those of the cottonwood. When the cottonwood is shedding its seeds, the fuzz can become a nuisance as it gets on everything in the area.

Plains Cottonwood (*Populus deltoides ssp. monilifera)*

This subspecies is found throughout the Great Plains as well as the Midwest, Texas, New Mexico, Colorado, Oklahoma, and Pennsylvania.

The Plains cottonwood has a short life of perhaps fifty years. The tree grows to nearly 7000 feet elevation. Its preferred habitats are bottomlands and river flooded plains.

This native adapts to a range of moist river soils and sandy soils. It grows best in a well drained, rich, deep, loamy soil.

The tree can reach nearly 95 in height. It features an open broad crown and spreading erect branches. The ridged, cracked bark is pale green. This bears smooth, stout, pale yellow branchlets.

The alternate, light green leaves are 2½ to 3½ inches long. These feature wavy edges that are coarsely toothed. The young foliage can be hairy.

The Plains cottonwood blossoms open before the leaves appear. The male and female blooms are on separate trees. These form short, stalked catkins. The males are two to 2½ inches long, while the females are four to eight inches in length. The pollen is greenish-yellow to yellow.

The cone-like fruit capsules are ½ inch long. These release small brown seeds.

Quaking Aspen (*Populus tremuloides*)

Also called trembling aspen, this native can be found throughout the western half of the country with the exception of Kansas and Oklahoma. It also occurs in the Midwest, the Northeast, and the Mid-Atlantic regions. The tree grows to 4000 feet elevation.

This species is the most widely distributed native tree in North America and also the most common as well, which is why I'm including it here even though it doesn't occur in all areas of the Plains.

Quaking aspen spreads by suckers and adapts to a range of soils from sandy rich ones to clay and rocky shallow ones. However, its preference is for a lime rich, well drained soil.

Suited to zones two through six, quaking aspen inhabits forests, bottomlands, moist woods, disturbed areas, and banks of streams and waterways.

An average life span for a quaking aspen is about 70 years. The tree can provide light shade. Most of the lower trunk is free of branches, which exposes the bark for easy viewing.

It reaches 40 to 60 feet in height with a spread of 15 to 25 feet. The tree features a short, rounded crown and a straight trunk. The bole is as smooth and white as chalk.

The thick bark typically has warty ridges but is sometimes smooth. This can provide a touch of color throughout the year. On younger ones, the bark is typically green, while that of older trees is white. The slightly drooping, slender branches are often contorted.

The small, finely toothed leaves are pale green, while those of other poplars are deep green. They're two to 3½ inches long and 1½ inch wide. The foliage brings spectacular yellow Fall color.

Aspen.

The unique thing about quaking aspen leaves is the fact they grow on very long leaf stalks that allow the foliage to pivot in the slightest breeze. This results in a quaking or fluttery sound for which the tree is named. The leaf movement also exposes the lighter colored undersides of the foliage.

Quaking aspen blooms from April to May, depending on location, before the leaves emerge. The male and female catkins are on separate trees. The males are up to 2½ inches long and females are four inches in length. The fruits contain lots of small, hairy seeds.

Growing Poplars

The various poplars are widely grown for a number of reasons. First, the trees are readily available from garden catalogs and garden centers because the poplars are easy to propagate from seeds and cuttings. In addition, the plants are easy to grow, and are tolerant of pollution and salt spray.

These are also pH adaptable. One of the main reasons gardeners choose poplars is due to their fast growth rate. They can grow two to six feet per year.

For best results, container grown plants are recommended. Poplars do best in full sun. Normally, pruning is best done in Fall or Winter as the plants tend to bleed at other times of the year.

These plants are best suited to reclamation projects of disturbed areas and in situations where they can naturalize. Although poplars have many admirable qualities, I would feel remiss if I didn't point out some less positive factors regarding poplars. First, be aware that most tend to be short lived.

The poplars are also prone to various pest and disease problems. Because these are weak wooded, the trees often suffer storm damage. The roots can damage pavement, sidewalks, water/sewer lines, and building foundations.

In addition, the trees tend to drop litter, including leaves and twigs as well as thousands of seeds, many of which will likely germinate if they land on moist spots. BC

Connie Krochmal is a plant expert and beekeeper living in Kentucky.

Are Almonds A Waste Of Water?

John **Miller**

*On May 1, 2020 the Independent [**www.independent.co.uk**] published a piece by Sophie Egan.*

Are Almonds Really as Sustainable as We Think, or Just a Waste of Water? Ms. Egan lectures at Stanford, and is a contributor to the New York Times. The piece was excerpted from her book, **How to be a Conscious Eater**, published by Workman Publishing.

Len Richardson, of Danville, CA [former editor of CA Farming Magazine] picked up the piece and shared it with Joe Traynor, a respected bee broker in Bakersfield, CA.

An email thread developed among a group of almond growers, beekeepers and others. Attribution of quotes will be shared upon request. The idea of sharing other readers observations is this: The author's use of a key word – *think* – set off the conversation.

Thread participants gave thought to the piece, and responded with *thoughts* the author, Ms. Egan failed to include in the piece.

California produces 82% of the world's almonds. Two vital inputs to growing almonds are water and honey bees. In 2021 bearing almond acreage will approach 1.3 million acres.

2.5 million colonies of bees are required to pollinate the almond crop. To grow an almond tree, have it thrive and reproduce by blooming, pollinating and making an almond seed, the nut we eat and enjoy, it needs water.

Beekeepers providing colonies have been attacked for providing this fundamental pollination service, compounding the problem of almonds demanding 'too many resources'. Here is an overview of a conversation between almond growers, agricultural observers, and beekeepers on this very topic.

Hear other thoughtful, involved voices.

"Almonds have become a favorite whipping boy for those with a sustainability bent. I didn't believe the 1 gallon/almond when I first heard it, but I did the math and it's true. Most other permanent crops use about the same amount of water as almonds [three+ acre feet/annually] – an acre-foot of water transpiring leaves, no matter what the crop. Grapes do use less per acre due to more non-transpiring [bare] space between rows. Restrictions on groundwater pumping were long overdue. We still have not figured out how to get water from flood prone areas in the U.S. to CA. CA growers are finally coming to terms with the fact that our ground water supply is finite, not infinite."

"In wet years, CA farmers recharge billions of gallons of water into underground aquifers."

"This is one of those issues that some half-informed media folks stir-the-pot sound bites without doing real [use] homework. Yes, like you say, one gal./nut. Do the aggregate math for a Big Mac – 400-500 gallons. Which has more net nutrition? 1 Big Mac, or 1 lb. of almonds?

An acre's worth of alfalfa takes about the same amount of water as a 4,000 lbs./acre almond crop in the southern SJV. The alfalfa produces much more milk than almond milk – but then throw in greenhouse cow gasses and other issues – maybe a gallon of almond milk is less CO2 equivalent."

"Don't forget that approximately 50% of the dry weight of an almond is the hull. Hulls are fed to livestock as an important part of their diet. Since the kernel is 25-30% of the whole nut, the hull is 50% and the rest shell, the water use should be accurately pro-rated and not applied exclusively to the kernels."

"Excellent point. So it took ½ gallon/nut & ½ gallon/hull? Makes the dairy cow water load even more. I don't think you can really slice it that way, but it shows how we almost never see all the real connections."

"We are also growing a tree that is storing carbon. Until a few years ago almonds were making electricity through co-generating plants powering several hundred-thousand homes annually. That same gallon of [irrigation] water was making electricity. Now that CA has determined they don't want biomass power, we will be incorporating carbon into our soils. That water must be factored into the biomass as well."

"100% useable product with many benefits. Nothing goes to waste. Seems pretty sustainable."

"I'm happy to see growers figure out they can grind and incorporate pulled orchards back into the soil. Organic farmers know the benefit of putting all that cellulose back into the [often sandy] soil, for water retention, fertilizer retention, and better microbial communities. 'Sustainability' is the hot word these days [as it should be]. Almond growers hop on that train."

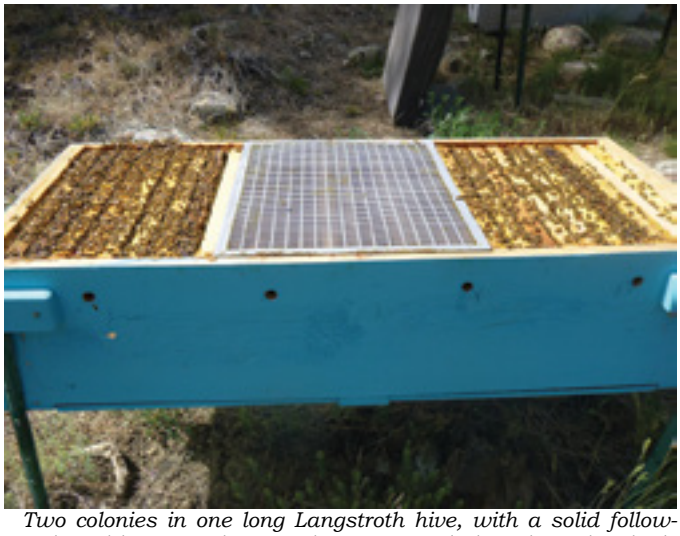
Too often the Ag producers [in this case almonds] in the media spotlight revert to "losing with dignity". Admissions don't make the case. Farmers and Ag in general do not get the chance to rebut the 'water waster' hatchet job. These days in Ag, especially California Ag we see frequent examples of good resource use and re-use. Consumers thankfully view almonds and honey, almost world wide – favorably. Ag producers and people who like to eat: Keep in mind the goal of publishers is to sell pages, clicks, and products. To do so in anxiety heightened times – publishers and authors 'Go Big'-never seeing all the real connections – by design. BC

HORIZONTAL BEEKEEPING – PART VI

Tina **Sebestyen**

Late Summer nucs and Fall queens

Late July is the perfect time for re-queening colonies, and for pulling nucs for over-wintering. Research shows that a late Summer queen will raise a higher number of fat bees for Winter than a queen that has served through the spring build-up. The brood break afforded while the colony raises their new queen helps decrease mite loads dramatically, decreasing treatments needed. In Spring, the presence of a young queen rather than an old one means that the swarming tendency is decreased. Young queens come out of Winter stronger and faster than older ones, and there is less worry about the queen running of the sperm in early spring, as well. All of this is much easier to accomplish in a horizontal hive than in a vertical one, because everything you need is right there.



Two colonies in one long Langstroth hive, with a solid follower board between them, and a queen excluder where the single stack of supers will go. If Fall, remove the supers and queen excluder, and lay a piece of burlap over the frames to keep the queens from crossing over the follower.

We aren't going to out-right kill the "old" queen, because we need her for a safe fall-back if something goes wrong. Simply find the queen, mark her if you haven't done so, and move her along with four frames of bees, two of which are food, and two of which are brood, to the back of the hive. Shake the bees off of two frames with open brood into this new nuc, since any foragers that were moved will go back to the old entrance and rejoin the original colony. These young bees will begin using the entrance at this end of the hive, opposite from the other entrance, and we have ensured that there are plenty of them, so that the queen is not abandoned and can remain very productive. Moving the queen also kicks her into gear, since she now thinks that she doesn't have enough bees for Winter. She'll be quite productive.

The colony that remains in the original position will raise a new queen (check three days after removing the queen to be sure that they are doing it). Check again after four to five weeks, and not sooner, to be sure that the

new queen returned from her mating flight and is laying eggs, she should be just getting started. This is a great time to do an oxalic acid dribble on the parent colony, since the new queen's larvae aren't capped yet, and all of the mites are phoretic (riding around on adult bees). This amount of time brings us to late August, just when mite numbers should be under control for the beginning of the production of the fat winter bees. If the new queen doesn't return from her mating flight, a bought queen can be placed, or the old queen and her nuc re-combined with the larger colony in the old position. The time elapsed while all of this happened also reduces the remaining number of summer bees, so that there are fewer old mouths to feed at the beginning of winter and more stores go to maintaining the fat Winter bees.

The nuc containing the old queen can stay where they are over the Winter, provided that there are plenty of honey frames for both the young and old colonies. They'll stay warm sharing one long Langstroth or top bar hive with only a solid divider between them, and that extra nuc can help overcome an early Spring queen loss in another colony. I am calling any queen that has been through one Spring build-up an "old" queen. Truly old queens will begin to fail in Spring, and can be replaced at that time. And if the old queen and her nuc don't survive the Winter, you really haven't lost anything, and best of all, you didn't lose the whole colony due to a queen that failed at a time that she couldn't be replaced.

Two Queen Beekeeping

In Spring, the nuc containing the old queen will need to be moved to its own full-sized hive, or they can become part of a two-queen colony in one hive body. It is a fact that a large number of bees working together make more honey than the same number of bees working in separate hives, and this is why two-queen colonies are utilized. The first weakness of two-queen systems in vertical beekeeping is obviously that more heavy boxes must be unstacked to check on the health of the lowermost colony. The other weakness is that they cannot be left stacked during the Winter because the queen in the lower colony will be abandoned below the queen excluder to freeze alone. One of the queens must be killed and the two colonies combined into one, or one must be moved at least five miles away. In horizontal beekeeping, each brood chamber can be checked with the supers intact, and they can winter just fine without combining or moving.

To create a two queen system in a long Langstroth hive or in a top bar hive, place a separate colony in opposite ends of the hive, with entrances facing in opposite directions (another good reason to have the entrances on the ends, rather than on the long sides), with a solid follower board between them. As the colonies reach the follower board, place a queen excluder over the last five frames of each colony. The stack of supers goes over the queen excluder, and the two colonies work together to fill one stack of supers with honey. One of the "rules" of beekeeping is that it is difficult to get the bees to decide to do something new, like move into a new super. Another "rule" is that you should never break up the brood chamber. Breaking this second rule is the way to overcome the first one. Place a medium frame into the brood chamber (you probably have one there already, since it is what was available at the time). Once the queen lays eggs and they hatch into larvae, move this medium up into the super. The pheromones of the brood will call the bees up to care for them, and once they decide to move through the queen excluder, they'll start working the super with honey. Of course, we have added lifting into our beekeeping again. Don't be tempted to super with deeps, they are too heavy with honey in them! I use a few medium frames in my deep long Langstroth anyway, since it is an easy way to get the bees to put drone brood below the frame, and easy to discard it that way. Top bar beekeepers can simply cut a patch of brood off of the bottom of a bar, and rubber-band it into a foundationless medium frame. My top bar hives all have one-piece roofs, so I end up using extra empty supers to fill under the lid and keep it balanced. It is important to remove these supers in plenty of time for the bees to back-fill their brood chambers with honey. They will have been using almost the entirety of the long hive body for brood, and they each have only fifteen frames, which need to be mostly filled with honey for the bees to have enough for winter (here in SW Colorado, 72 lbs).

When looking for rogue cells (the ones the bees make on frames, besides the grafts you gave them), be sure to look everywhere! This one is on a honey frame, all by itself.

Raising Queens in a Queen-Right Cell Builder/ Finisher

Queen rearing in top bar or long Langstroth hives works well, and reduces the work that it takes to raise queens in regular vertical Langstroth boxes, since there is no lifting of boxes to check on progress. To set up a queen-right cell builder/finisher, find the queen, and move her and the youngest open brood to the back of the brood chamber, behind the solid follower board and a queen excluder. Increasing the number of honey frames between the queen's contingent and the queenless front of the hive helps isolate the bees in the front from queen pheromone even more. As you move the sheets with eggs, mark one that has eggs that are laying down. These will be hatching the next day. The capped brood, and almost ready-to-cap brood, go in the front. Be sure that both areas have plenty of honey and bee bread, keeping in mind that the queen will not have much forage coming in until the solid follower board is removed. Once the older open brood gets capped, those nurse bees that were

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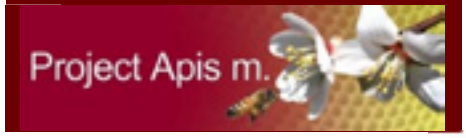


feeding them will be have nothing else to do besides feed our queen cells. Place your frame with grafting bars in the front of the hive for the bees to polish. Since there are ventilation holes along the length of the horizontal hive, even with the follower board in place, the bees can come and go from the queen-right area, helping to keep them cool, calm and productive.

After 24 hours, retrieve the frame containing the well-polished queen cups, and the marked frame that contained the oldest eggs, which should now have hatched and be barely visible floating in a pool of royal jelly. Brush the bees off of this frame into the front of the hive, where your grafted queen cups will go. Graft into the queen cups (which fit nicely into the spline cut for foundation strips), and place in the queenless front of the hive. The frame that you grafted from goes back with the queen, where it will not distract bees in the queenless section who need to concentrate on feeding the larval queens. Shake a frame or two of nurse bees from over open brood into the queenless part of the hive to feed the larvae. If grafting is too daunting or difficult, you can cut a strip of comb from the sheet of just-hatched larvae, and hang it face down from the top bar using ¼ inch wide ribbon to affix it. The larvae on the top side will die, and every other one facing down should be destroyed (a matchstick works well for this). Older comb is easier to work with than new, fragile comb, and the darker color aids in seeing the tiny larvae. After another 24 hours, you can check to see how well the grafts were accepted. If it was very poor, graft again, and check after another 24 hours. When checking grafts, do not shake them, as the tiny larvae can easily be dislodged from the royal jelly, brush the bees away very gently so that you can see, or blow on the bees to move them out of the way. Remove the solid follower board, leaving the queen excluder in place. The traffic of foragers through the entrance creates the crowded conditions that produce well-fed queens, while the queen in the back will still receive plenty of attention. Allowing traffic through the queen excluder helps ensure that there are adequate nurse bees to feed the queen cells, which they will continue to do since they have been started, even though they can now smell the queen. Be sure to check the queenless portion of the hive for rogue queen cells. The bees will have started with older larvae, and they will emerge earlier than your grafts, and kill them all. It is also great insurance to feed the colonies, so that they really have all that they need to produce well-fed queens.

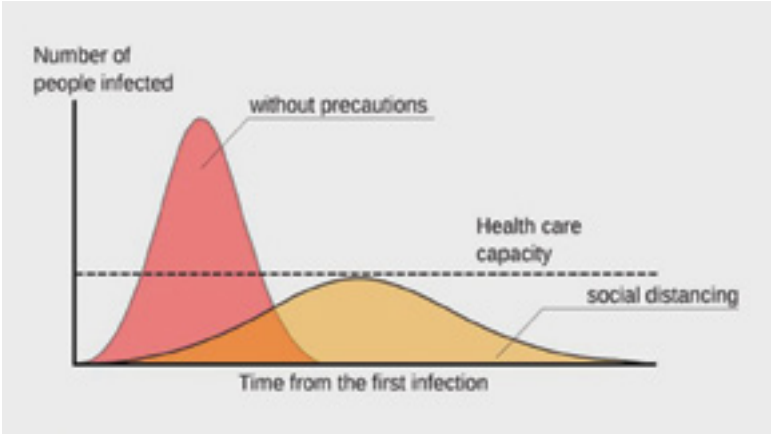
The queen cells will be capped on day five (the fifth day after grafting, they are now nine days old). Do not move the cells even to look at them on days eight or nine, since their wing buds are forming and can be damaged quite easily. On day 10, each cell needs to go into a mating nuc. The queens inside are only 14 days old, and should be emerging in two more days, but it is not uncommon for one or more to emerge early and kill all or most of their sisters/rivals. Remove the queen excluder and the extra honey frames to reunite the brood chambers. The hive will continue on as though nothing happened, though they may feel a little swarmier due to the crowding while they were feeding queen cells. Keep an eye on them, which is very easy to do, since everything is on one level and easy to access.

This is the perfect opportunity to raise a few queen cells in late Summer, and sell your local queen cells to fellow beekeepers, while re-queening your own colonies. You can benefit neighboring beekeepers, and actually make some money rather than just pouring it into your apiary. Beekeepers are feet-first kind of people, and fearless, so get in there and try to raise a few queens. You may learn a few lessons (fail) at first, and you may have great beginner's luck. You have nothing to lose by trying, since your old queen is right there, behind a follower board. I know that raising queens seems mysterious and difficult, but you really need to get in there and try! You can only learn so much by reading. It takes doing to really put everything together. BC

Rogue cells I couldn't bear to cut off, caged so that they can't kill my grafts (32 out of 45!), since they will probably emerge a day or two before my girls.

J. Lloyd Harris (2008) Effect of requeening on fall populations of honey bees on the northern Great Plains of North America, Journal of Apicultural Research, 47:4, 271-280, ***DOI: 10.1080/00218839.2008.11101474***

Flatten The Curve



Dewey **Caron**

How many times have you heard/read the term *FLATTEN THE CURVE* since March? Well I guess the answer to 'how many' depends on how much media/ political time you do these days. As with all simplifications of a complex concept, the phrase Flatten the curve can mean different things to different people. For beekeepers, flatten the curve is relevant to how we manage the typical bell shape curve of both bee and mite populations.

We **DO NOT WANT** to **FLATTEN THE CURVE**

1. For April/May colony population increase IF we are seeking to harvest honey from our colonies.
2. For colony preparations as they rear fat body-heavy bees in the Fall

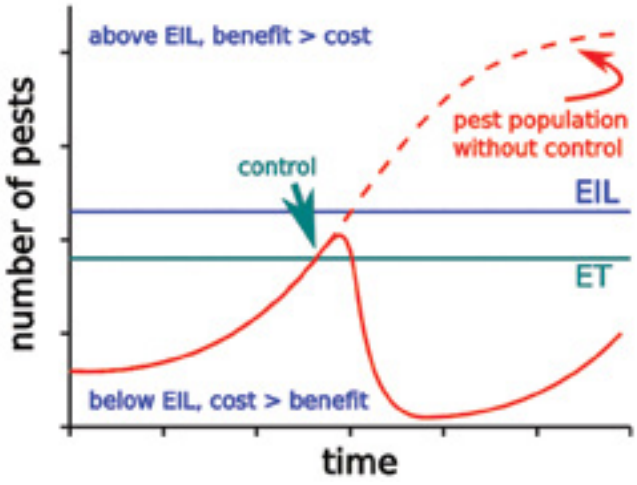
We Do Want to **FLATTEN** the **CURVE**

1. Of the colony starting swarm queen cells in Spring. It takes bees in the boxes, not swarming into the trees, to store surplus honey.
2. Of mite buildup. We need healthy bees to store surplus and overwinter successfully.

As applied in the Corona virus epidemic, Flatten the curve means reducing rapid buildup of number of human cases needing medical treatment. It is critical that infection rates remain below a level whereby there are sufficient medical facilities and trained individuals to treat individuals displaying the more severe symptoms. We seek to flatten the virus growth curve to spread out the number of ill individuals needing medical attention at one time.

In crop pest control the same concept applies. We wish to flatten a growth curve of a plant pest so it remains at a level that does not cause economic loss. We first determine an economic threshold (ET), below which the amount of damage the pest causes might not affect our yield/return. Once the pest exceeds an Economic Injury Level (EIL) control efforts pay off if we flatten the curve of the growing pest numbers below the ET level. By flattening the curve, we seek to keep the crop pest from exceeding a certain damage threshold.

For the Corona virus or crop pests the level sought may vary one location to the next. Beekeeping is population management. We seek to stay ahead - manage our bees – or they will manage us. Bee and mite growth curves are managed differently.



Spring growth curve

Bee colonies normally expand rapidly in the Spring. We can visualize it as the front slope of a typical bell shape curve. We manage colonies to maximize that growth and to keep colonies expanding so they might reach peak population timed to the nectar flow. Our two major managements are feeding of stimulatory syrup and protein patty to extend the food sources available plus opening up the brood chamber. Reversing of hive boxes, adding a 3rd brood box or checkerboarding help accomplish this. Early supering might help by providing space for ripening nectar outside the brood area.

An estimated 70% of colonies seek to reproduce via swarming under the favorable conditions of expanding growth and favorable weather during Spring. Our task is to encourage bee colony growth at least until colonies begin swarm preparations. Then we need to flatten the growth curve. Colonies that successfully swarm are not as strong as those that do not and thus not as capable of storing greater amounts of honey

Our major clue to swarming preparations is the appearance of several developing queen cells, especially on lower comb margins. The quickest way to check if a colony might be preparing to swarm is to split the two boxes containing brood (assuming your strongest colonies have expanded into two boxes) and examine the bottom

margins of the comb frames of the top box for developing queen cells. Although not all cells will be in this position, as for example in a top bar or long hive, this is a simple and rapid inspection technique to detect colonies that need to be further examined for queen cells. If no cells are seen in this position, the probability is low that a colony will swarm for at least another week. You likely will see cups – look for occupied cells

Colonies discovered rearing queen cells in the Spring buildup period can be divided (split) in such a way as to maintain the majority of bees and allow the colony to continue growing. We simply seek to open the brood area and halt the rearing of queens. Alternately we might eliminate all developing queen cells and transfer two to four frames of mostly capped brood to bolster weaker colonies (assuming there are no obvious disease symptoms in the colony). A third alternative is to build nucs by transferring frames with their queen cells to make smaller colonies. In all instances it is important to open up the brood chamber of strong colonies for better queen pheromone distribution.

Our intention is to delay swarming by skillfully flattening the growth curve until the nectar flow arrives. This is intensive management and a lot of work. Not all beekeepers wish to produce surplus honey. Such effort will not always be successful. Swarming is such a powerful force when we start late, after the bees are well on their journey to swarm our chances of stopping (or delaying) swarming is lower.

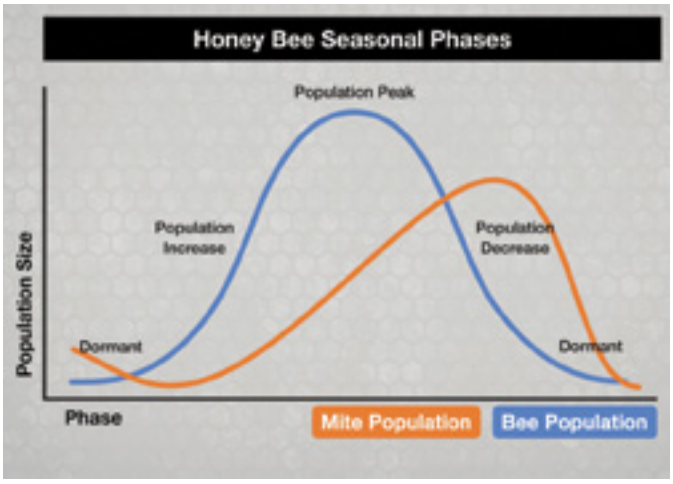
Promoting Fall colony growth

In the Fall our colonies need rear bees with abundant fat body reserves. These are the so-called Fat bees. We do not want to inhibit this critical yearly task to avoid heavy overwinter losses. Adult bees over the Winter rely on these reserves and the abundance of honey stores to survive Winter once temperatures lead to cluster formation. Feeding a thick sugar syrup and pollen patties can help promote the rearing of the Fall bees. Bees will be flattening their growth curve – we want to promote this after those critical fat Fall bees are raised.

Flatten the mite curve

With the bees we want growth to continue before the nectar flow and in the Fall – with mites we want the opposite. We WANT to FLATTEN THE CURVE of mite growth to insure our colonies remain healthy and vibrant. We need to start in May before supering colonies to knock down the mite population increase. The key to managing our bees and keeping our colonies healthy, is to have as few mites as possible feeding on our adults and reproducing within capped brood cells. By delaying growth, the colony will be healthier and able to store surplus and for Fall and Winter survival. As with swarm management, the later we start, the greater the challenge and likelihood of failure.

In Spring mite management we don't need a knock-out punch but we do need to slow mite buildup. Essential oil products of Apiguard or ApiLife Var or formic acid (Formic Pro) are chemical means of slowing Spring mite buildup; drone brood removal and splitting are good non-chemical alternatives. We need do this before adding supers. Once colonies are supered formic acid (and Hopguard) can be used but it is hard work to remove



supers; treatments need be placed within the brood area not in supers.

Apivar is the synthetic chemical control used most likely to flatten the mite growth curve but we need a minimum of six weeks for treatment and then an additional two more weeks before supering. Most of us simply don't have that much time during the Spring. Apivar is best used following surplus honey removal. Alternately essential oils and formic too can be used if temperatures are not too high. Splitting and requeening with mite resistance stock are alternative non-chemical means of knocking down mite increase.

We have too often relied on flattening the mite growth curve in the Fall after supers have been removed. It is clear that this is too late. We need to start the process earlier and not rely on being able to diminish high mite numbers just during our Fall management. But we should definitely not ignore mite control in the Fall. Managing the bees, rather than other way around, starts with monitoring mite numbers. Levels above 2% adult bee infestation in the Spring and keeping levels below 3% in the Fall are our EIL (economic injury level) targets.

Fully expanded colonies supered for honey.

How we contribute to the bee loss epidemic

One of the current methods to flatten the corona curve is social distancing for those at greatest risk and controlling incoming items and people. This includes staying at home, staying apart from crowds, use of PPE and disinfecting groceries. For our bees, physical distancing means spacing out hive placement and giving hives a distinctive "address" to reduce horizontal mite treatment. We also seek to control introduction of diseases by limiting purchase of used equipment. The distancing is a challenge, both in our backyard apiaries and for commercial beekeepers, which rely on pollination income in these days with honey prices so low.

A sidebar column in *TIME* Magazine (Double issue April 27/May 4, pg 27) entitled *Rethinking our Food System* included comments discussing the human covid-19 pandemic. The comments also apply to our bee losses. Author Laura Spinney wrote:

> *"How do we stop the next pandemic? By taking a long, hard look at our relationship with the natural world and particularly with the animals that sustain us . . . this is partly to do with the sheer number of us and the extent to which we're connected around the globe. But there is growing evidence that it is largely about the way we produce our food – in particular the ways in which modern farming forces humans, animals and microbes together. This extends to food-production systems on all continents. If the world's experience of COVID-19 has a silver lining, it could be that it galvanizes us to take seriously our role in manufacturing our own diseases."*

We gather over 2/3rds of our bee colonies together each spring to pollinate almonds. BeeInformed survey data shows that beekeepers who move their colonies, compared to those who do not, have lower mite levels. It takes healthy bees to be efficient pollinators. Commercial beekeepers taking their bees to pollinate almonds know there are risks putting so many bees in such a small area.

If we don't flatten the curve colonies may swarm.

They know they need to flatten the (mite) curve before and after this event while guiding the bee curve increase.

If we wish to control epidemics of the bee virus diseases (DWV, VDV, Chronic Bee Paralysis) how can we better flatten the curve of mite spread during the almond pollination event? Is there a better way to accomplish hive spacing? Could the way we "manufacture" our almond food be a threat to other foods important to the human diet?

The term Flatten the curve is likely to be around for quite a while with the covid-19 virus so seriously impacting our (older-aged beekeeper) population. Although not specific for viruses, honey is a valuable dietary additive to help bees and humans to remain healthy. Bee colonies storing and beekeepers harvesting surplus honey is one component of reducing virus impact for both bees and humans. The principle of flattening mite growth curve is equally as important to insure we have healthy bees following harvest and to have colonies continue to be able to do their job another year. BC

We seek to encourage Spring colonies to increase their populaton if we want honey.

Is It . . . Or Isn't . . . Honey?

Sarah **Red-Laird**

A Portrait On Katrina Klett

What word comes to mind when you think of Chinese honey? Laundering, tainted, counterfeit?

Yes, me too. That was, until I met beekeeper, scholar, and entrepreneur Katrina Klett, of Elevated Honey Co. Now I have a new vocabulary for Chinese honey: terroir, complex, pure, artisanal, gourmet. This came to be from a conversation that was years in the making. If you were to draw a Venn diagram of myself and Katrina's friend circles, the intersection would be large. In both our beekeeping and farming communities, friends have been trying to connect us for years. Unfortunately, one more thing that we have in common is a packed schedule and rare opportunities to meaningfully connect while in the same time zone. The stars aligned, however, a couple of years ago and we spent two nights and about four and a half hours (on the phone) lighting up about bees, farming, honey, policy, hilarious travel misadventures, and binge watching "Man in the High Castle." Both times I clicked off my phone my smile muscles burned, and I felt new glow and inspiration, gleaned from Katrina's love for bees.

You may have had a similar experience with Katrina if you were able to interact with her during her reign as the 2007 American Honey Princess, as a researcher at the University of Minnesota, or the USDA ARS Beltsville Labs, or on a commercial beekeeping crew in North Dakota, Texas, New Zealand, or Australia.

In the Summer of 2019, the stars aligned just right and Katrina was able to join me in Southern Oregon as a keynote speaker and workshop leader at the Western Apicultural Society conference. She blew all of us away with her talk, "Beekeeping in the Mountains." She weaved a beautiful picture of the indigenous people of Southwest China, how she came to be a part of their community, and the issues they currently face. By the end of her talk, the whole audience wanted to follow Katrina back to her village.

In our conversations, and through her WAS keynote, Katrina helped me to understand that Chinese honey isn't the problem. It's the supply chain that has so many fissures; it's become weak and broken. The system has failed both Chinese beekeepers, and worldwide consumers. With "Elevated Honey Co." she aims to spark a change. Elevated's mission, aside from preserving traditional Asian beekeeping methods to produce the world's purest honey from naturally-occurring wild beehives, is to achieve three main goals:

1. Enable honey producers to make a living wage,
2. Offer a solution to rural work that doesn't degrade the environment
3. Provide consumers with a safe and authentic product.

Bees, Farming, and Modern Rural Life in China

There is a lack of work in rural China. While ample employment opportunities exist in urban areas, these jobs are far from one's family and home, are typically low-wage, and require uncomfortable (to say the least) living conditions. Land in China is owned by the communist party, but they provide very long leases (multi-generational) to families. Rural people working the land have, until recently, been subsistence farmers; growing grains and vegetables, and keeping bees and other farm animals. They've typically just produced enough to eat what they grow, and have participated in a small, local economy. This, however, has been changing rapidly in recent

years thanks to big infrastructure, education, and housing projects by the Chinese government.

There is now opportunity for farmers to participate in the market economy and this has brought many positive changes to their lives, as well as challenges. These changes are congruent to farming communities in the U.S. As I've listened to Katrina explain the transition from traditional to modern life, I picture a future for them similar to Wendell Berry's Kentucky. How can a community maintain rural integrity while participating in a market economy far away from home?

As in Appalachia and the Mid-South there is now a lack of environmentally friendly work in rural SW China. Unfortunately, a side effect of modernization has been the emptying of villages by adults to go to cities and work. Those who stay behind in villages often take part in illegal activities, such as logging or poaching, to earn money.

Katrina lives in Diqing Prefecture, about four hours west of Myanmar. There are approximately 250,000 farmers living in Diqing and adjacent mountain communities. Nearly all of them would prefer to stay at home on their farms, and provide for their families through participating in a stable and legal marketplace. Katrina believes beekeeping can provide this opportunity as a viable option to migrant labor, in which rural communities become fractured and drained.

Currently Katrina and her husband of five years, He Guoqing, work with 26 families to provide an income stream through local, boutique honey production. Honey from Diqing is appropriately titled, "Thousand Flower Honey," as there is an abundant nectar flow during the Spring and early Summer months before the monsoon season starts. As a world biodiversity hot spot, there are thousands of endemic plant species in the mountains that provide a large diversity of pollen and nectar for the bees.

These beekeepers work with *Apis cerana*, a docile honey bee, native to Asia, that has a "stable host-parasite relationship" with the *Varroa* mite (a scenario that American beekeepers' dreams are made of). Something else I find fascinating is that *Apis cerana* doesn't collect sticky propolis, so there is no need for hive tools.

The lack of *Varroa* infestation and disease issues, coupled with the copious nutrition availability, creates abundantly healthy hives and zero need for in-hive pesticides or supplementary feed products. In addition, these beekeeping communities are high in the mountains, far from industrial agriculture, and therefore the honey is as clean and pure as you can imagine, and management costs are low.

With a plethora of bees, and next to nothing start-up costs, you may think getting started in beekeeping and honey producing in SW China is a breeze. However, unlike beekeeping in the U.S., which has become wildly popular and accessible to anyone with space, time, and money, there is a primordial and exact cultural science around honey bees in Diqing.

The community is split into family sections with informal, ancient land borders. Within these borders each family has their own network of "bee trees," a tree that houses a natural colony of bees. Communities have their own way of delineating whose land is whose, whose trees are whose. If you belong to the family group, you can scale the tree, and scoop out a few handfuls of bees to start a new hive. But don't even think about raiding someone else's bee tree (or grabbing a chicken or a head of cabbage)! There is a deep tradition of honor code in these villages, and you will be seriously publicly shamed for it.

If maintenance costs are low, and bees are free, what is the issue here?

The crux of the problem is the supply chain, and that is where Elevated Honey Co. steps in. Even for small-scale farmers and beekeepers in the rural U.S., access to a fair marketplace is difficult, and it's

no different in rural SW China. Another similarity we share is lack of transparency in the supply chain between farmer/beekeeper and consumer. It's difficult to know where your food came from, and what's in it, these days.

Foodie culture is thriving in China, and the end customer will pay a premium for food if they are sure of where it was sourced, how it was produced, and who produced it. Ensuring the farmer/beekeeper's share of the high retail price is more than a few fen on the yuan (pennies on the dollar), however, is uncommon.

Katrina and her team act as a mentors and advocates for beekeepers, helping them to bring their extraordinarily valuable honey to market, and returning the profits to the beekeepers and their communities. Pure "Thousand Flower Honey" is worth eight times as much as American commodity honey. It can easily fetch $16 per pound, wholesale, and is currently selling at almost $40 per pound, retail. Elevated provides training for small family farmers on beekeeping techniques, queen rearing, and safe and clean honey extraction. She then provides assistance with bottling and selling the honey. Katrina currently only sells locally, but aims to bring Thousand Flower Honey to an international market within Asia. Sorry Western foodies, it turns out the most valuable markets for her product are in Japan, Korea, and Singapore, but not the U.S.

Securing the Supply Chain for Social and Environmental Justice

The key of Katrina's mission is securing the supply chain. Elevated Honey Co. tests 100% of their honey for adulteration. They are also investing in their supply chain. They track their honey using a combination of new technology applicable to supply chain transparency, and rigorous monitoring of distribution partners. Elevate Honey Co. aims to keep honey safe and bring consumer trust back to an industry where very little remains.

Again, the benefits of an improved system go beyond the honey jar to real and positive change for people. A safe supply chain equitably funnels money back into the mountain villages. This will provide local, stable jobs for small farmers that are environmentally beneficial, not destructive; as well as providing the end consumer with a product we all want – pure, honest, and safe food.

A New Hive and A New Home

As you've read the story, you may be wondering how an American Honey Princess ended up landing in the mountains of SW China, and feeling compelled to immerse herself in the culture and community?

Second generation beekeeper Katrina Klett didn't grow up in Asia. Far from, it in-fact. She was raised by two beekeeping parents that split their time producing honey and raising queens in Jamestown, ND, and Beaumont, TX. Katrina loved the migratory life. Growing up between Ashland, OR, and Hollis, AK, I completely sympathized. We've gushed about the fantastic opportunity this provided us to be truly present where we were, because it wasn't going to last. Living seasonally gives you clarity, energy, and focus in the present moment. We also love the ability to have grown up with the confidence to up-and-leave when you know it's time to up-and-leave, but always with the knowledge that you can easily return.

Growing up with the nomadic lifestyle, combined with her tenure as the 2007 American Honey Princess, fostered a wanderlust in Katrina. After graduating with a degree in Chinese Language and Literature, from University of MN, she jetted to Asia, Europe, Australia, and New Zealand to hone her love and skills in language, and bees.

Landing in the mystic mountains of Southwest China, Katrina has seemed to seamlessly transition from the roll of traveling worker bee to queen bee. She's found sweet honey in the form of her husband, their young son, and a community that not only has accepted her, but was expecting her. If you ever get a chance to share a glass of wine with her, ask about the legend that preceded her arrival. BC

To follow Katrina Klett's journey of making this world a better place for bees and people visit her website, ***elevatedhoneyco.com****.*

Some Beekeeping Realities

James E. **Tew**

Patience is one primary beekeeping virtue – but not the only required beekeeping virtue.

Reality #1

Most of beekeeping is getting ready to keep bees

For those of us who are beekeeping enthusiasts, our *"open hive"* event is one of the shortest tasks that we have to do. Cutting grass, assembling and maintaining equipment, ordering queens, attending meetings, and educating ourselves – all preparatory events – take much more time than actually looking at bees within the hive.

Organizing my beehive paraphernalia is never ending. Are my queen cages all in one place? *Varroa* control components must be inventoried. What's still usable? How much do I have? Where did I order it the last time? Should I use this product again? How do I dispose of the remaining out-of-date strips? Did I wash those feeders so mold will not grow inside? I need to buy sugar for bee feeding (a trip my grocery store). I need a new striker for lighting my smoker (a trip to my building supply store), but I should also make arrangements to get smoker fuel (a trip to my farm supply store). My bee suits need washing, but I have been told that event will not happen in our personal washing machine (a trip to my commercial laundry). Am I keeping my bees when I sit in the car outside a commercial laundry while my bee suits are going through a wash cycle? No, I am not, but I am *preparing* to keep my bees as I sit it that car.

Am I hammering this point too much? When I actually stand beside one of my hives with a frame in my hand, a significant amount of required preparation has already been performed. That took much more time than what I am actually doing at the hive-opening moment. Most of beekeeping is not truly managing bees, but rather getting ready to manage bees. When a person unfamiliar with beekeeping asks, *"How much time does it take to keep bees?"*, this becomes a question with a vague answer

What beekeepers enjoy the most but do the least – be in an open hive.

Reality #2

Patience in beekeeping is an absolute requirement

Indeed, patience is a requirement in life. I can give nearly endless examples of life's patience, but within beekeeping, patience is mandated. Yet, I have never seen a book chapter on beekeeper patience.

Wait five to eight days before releasing the queen. Wait a week before checking to see if eggs are present. I put on empty supers and wait. I graft larvae and check a day or so later to see how many were accepted. I destroy swarm cells and wait to see if swarming behavior has been abated. If it was not, I get equipment ready (see #1 above – more prep work.) and hive the swarm. Then I wait to see if the swarm accepts my nest box. I wait for proper weather. I wait to check to see if my mite control plan worked. I wait. I wait I wait. If you keep bees, you wait a lot. That requires patience. Most events in life require patience, so the patience required to keep bees is not unique.

Reality #3

Offer help to your colonies ***before*** **they need it**

We should never forget that bees are not our friends. In fact, our bees really do not like us. At this very moment,

Waiting for my honey crop.

I should have supered before now. At this point I have missed some of the honey crop and will probably have a swarm leave.

I have 10 packages of bees that I installed weeks ago. I gave each package two deep frames of capped honey that I had stored from last season. That was the bees' carbohydrate source. Additionally, I also put on a small amount of pollen substitute for a protein source. Then I waited for Spring.

My Spring season, like last season, has been unexciting. Lots of gray, cool rainy days. I tenuously got the queens accepted. I then spent some time worrying about my monetary investment. Marginal spring weather continued. Having nothing more than the two honey frames I gave them and pushing the new colonies to produce brood, required feeding from reserve stocks. This caused me to fret that they were burning through the reserves I gave them.

Yet, if I open the hives on one of these cool, rainy days, the bees will see me as an intruder and get all defensive and fly from the hive. Am I helping? Should I have given them even more stores at the outset? In retrospect, probably yes. But that insight is not fair to me. I know more now than I knew then. At the time, all I could do was give my best guess, but now I must deal with trying to help my bees ***when*** they need help. It would have been better to have helped ***before*** the colonies needed my assistance.

(Sorry, but I am not quite finished here.) By my human standards, bees are hyperactive. When I feed them on cool days, they fly from the hive. I talk to them. I tell them to stay calm, that I will be in and out quickly. Nope. Out they come. When I install packages, they come out right away – having no idea where they are – and fly around the area. *Everyone (I'm referring to the bees here) just calm down.* When I try to do a Winter stores check, here comes the guard bees taking to wing with essentially no hope of getting back to the warm cluster. I can't always tell that I am helping the needy colony. Ergo, my suggestion, so much as possible, help the bees before they need it. In general, helping a colony when it needs it is much more difficult. At those moments, the bees and I do not see the world the same way. What I see as help, the bees seem to see as an attack.

Reality #4
I'm tired of doing this

As beekeepers (and as humans), we wax and wane. We make resolutions for the new year that we can't fully implement. We lose weight and we put it back on. We wax and wane in life and we wax and wane in our beekeeping.

Every season, I start out as though I am going to kill every *Varroa* mite in Ohio. Yet, consistent mite treatment requires seasonal perseverance (See #2 above). *"It's time to mite treat again, but it seems like I just did it."* Every season of every year, in Sisyphean fashion, I do it over and over again. I confess that at times, I am more eager than at other times to get my beekeeping tasks done. During my down times, I am truly glad that, to a great degree, the bees can manage themselves.

But mite control programs challenge both us and the bees. Controlling mite populations cannot be ignored or delayed. I have to stay on top of this issue, but that does not mean that I do not sometimes tire of the responsibility of mite-control-regularity. However, many things in life require our fatigued attention – not just our bees. This blind attention management regularity can become a burden of beekeeping.

Combining colonies results in a "black out" period.

My dad and brother's beeyard 25 years ago. Specific hive numbers were not important so much as the general health of all the colonies within the yard.

Reality #5

Bee colony management has "black-out" periods

Obliquely referred to in Reality #2 (*Patience*) above, most of the time, beekeepers must make their management decisions based on simple guesses. Actual activities within the hive are blacked out. During a nectar flow, we hope that we have enough super space on the hive. To check would require disrupting the bees' foraging activities. I look at entrance activities. Are bees clustering outside the hive? I try to gently break the propolis seal that glues the inner cover in place to see if the outside frames have been filled. More often than not, I am required to just guess that I have enough super space on the colony.

A classic black out time is during queen introduction periods. Was she accepted or not? Should I be trying to get another queen, or do I wait to see how the introduced queen fares? A wintering colony is another dark period. What's actually happening inside the colony? Did I leave enough stores in place? Many times, the beekeeper simply does not precisely know what is ongoing within the colony.

Reality #6

Colony numbers are relative

What beekeeper has not been asked, *"How many hives do you have?"* I got the best answer from a Venezuelan beekeeper many years ago. When I asked the question, he responded, *"I have 40-50."* Being puzzled, I pushed him farther about his vagueness. He said that his Africanized stock was constantly absconding and swarming and that at any given time he really didn't know exactly how many he had.

Last Spring, I bought 10 packages. In reality, what I actually bought was 30 pounds of bees and 10 queens. They just came boxed in 3# packages each with a new queen. I released the package bees and introduced the queens. One queen was not accepted – or whatever. I will never know what really happened to her. She just disappeared. Due to several of the realities described above, I did not discover this shortage until about a week later. To buy another queen would require a two-hour drive and about $40. Or (and it's a big "*or*") I could combine the queenless bees with another package. That is the path I took. I have, as of yet, been unable to check to determine if the queen in the combined packages was allowed to continue her reign. Using colony management theory, the six-pound package should build up much faster and, in a month, or so, I can split it out, install a new queen and be back to 10 new colonies.

But you see, my 10-colony count is relative. My immediate situation was that I now had thirty pounds of bees but only nine queens. Primarily based on monetary reasons and equipment availability, *"10"* was a number that I chose. If the packages build up and if I am so inclined, I could conceivably split some of the packages and have 15 new colonies – or 16 or 12. The number, like my Venezuelan beekeeper friend, is relative. I essentially have a pool of bees and queens. My apiary is my bee pool. From that pool, I can mix and match.

Much of bee colony management is vague

As is so often the case, bee management is essentially a series of best guesses. As your experience accumulates, your guesses generally improve. But we all sometimes lose. There are always variables that are beyond our control. Personally, weather is a variable that torments me. In an effort to reassure both you and me, I have discussed some of those bee management and bee biology vague realities that challenge us. True honey bee management will never be precise for any of us. Is that uncertainty one of the aspects of beekeeping that keeps us both entertained and challenged?

What is that *thing* that you sometimes use in your articles?

At the end of each of my monthly articles and sometimes within the body of my articles, I embed a "Quick Read" Code or a QR Code. This crossword-looking square uses an app (of your choosing) on your mobile device that can read an address, show a photo, or direct you to a site where a file is located in the "cloud". While new mobile electronic devices are already equipped to read these codes, there are many downloadable apps for older mobile devices.

My primary reason for using these codes is to help you load the directions to the cloud storage site for the file that I have posted without you having to key in the complex URL address. I feel a need to reassure those of you who have no interest in this technology that I have not lost my way. My fundamental interest is still only in "all things" bees.

QR codes are commonly used on mobile devices like smart phones or pad readers. While they can be used from a desktop computer, the process is a bit more challenging. I would ask that you find local assistance for that use.

For instance, this QR code at the end of this article will, when scanned, send you directly to the video clip that I have posted on my YouTube Channel.

My YouTube Channel

Additionally, quite some time ago, I began to produce a short video – rarely more than ten minutes – to support each of my articles. I post these on my YouTube channel named **James Tew**. Through the years, I have posted many other videos, of varying quality, on eclectic subjects and topics that were available to me at the time. Presently, I have about thirty-five short videos that I have listed there.

One way to find my posted videos is, in the *YouTube* search bar, key in the wording "*James Tew Channel*". Since nothing can be simple, you will have the option of selecting from several James Tews. As you would expect, I am the beekeeping one.

For those of you who subscribe to the electronic version, obviously the links are active and only require a keystroke to send you to the sources that I have posted.

I am not an IT guy

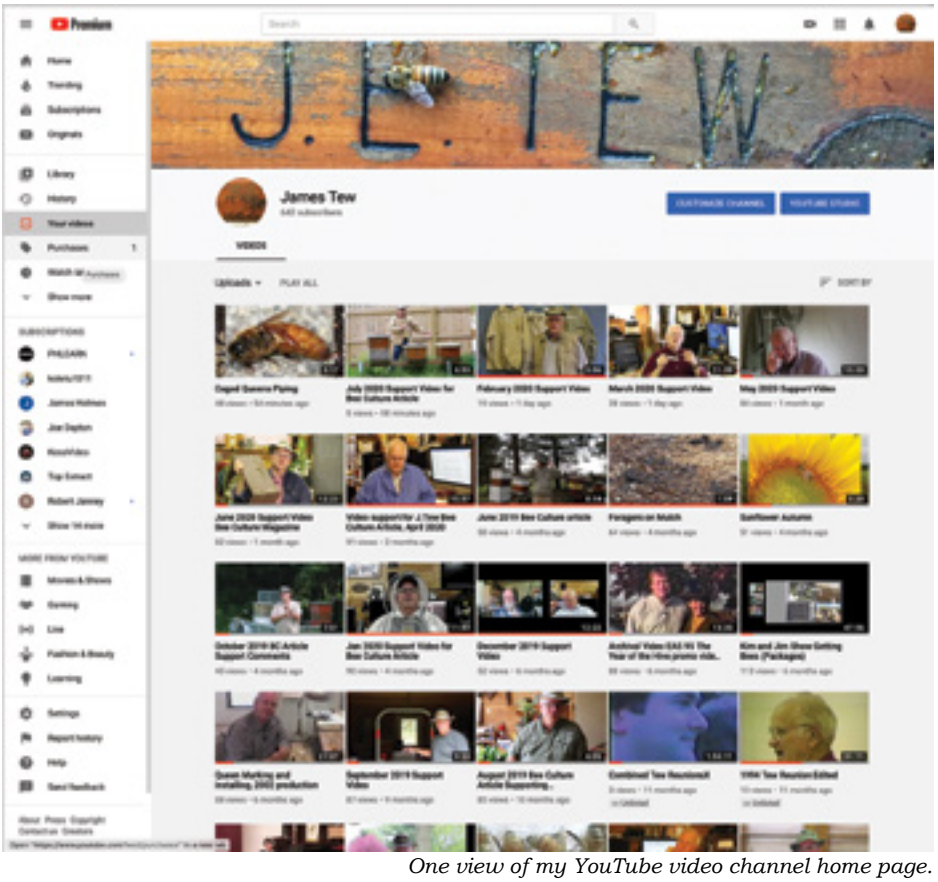
It is not my intention, nor am I qualified to teach you how to use these resources. Nearly, every day, I too, struggle with updates, software, and apps. If you have issues with your devices, I would suggest that you find a local computerphile who is savvy enough to get you into the cloud.

Alternatively, if you find that I am promoting a post with a defective link, I would certainly appreciate a *"heads up"* comment so I can make changes. Additionally, if I have made either typographical or factual mistakes, I would appreciate knowing that, too.

You are one tough person

At this point, if you are still reading, you are one tough, inquisitive person. You should know how much I appreciate your perseverance. You and I are only using these electronic resources to further our beekeeping knowledge. This technology is crazy powerful and, at times, frightening to use, but ultimately, these new techniques make us better beekeepers.

Thank you. BC



One view of my YouTube video channel home page.

Dr. James E. Tew, Emeritus Faculty, Entomology, The Ohio State University and, One Tew Bee, LLC; **tewbee2@gmail.com; http://www.onetew.com**

To view the video, you have three options. Key in the following URL address or visit the YouTube channel ***James Tew***. Lastly, use a QR code scanner to send you to the video.

https://youtu.be/_Is-DHflhqk

Honey . . . Quality And Quantity

The Biggest Part Of Producing Quality Honey Is Simply Not Messing Up The Good Work The Bees Do.

Mid-Summer tends to bring up thoughts of the honey harvest. Although in some parts of the country the harvest is over by July, in others it has yet to get started. The harvest is part of the payoff for all the work you and your bees have put in over the past year or so.

Most folks focus on the quantity of honey produced. Average number of pounds per hive and total number of pounds produced tend to be how we measure the harvest. While the amount of honey harvested from our hives is important, I prefer to focus my attention on the quality of the honey that is being harvested. This means paying attention to how and when the honey is harvested, and how the honey is processed.

The best tasting honey ever!

I have been surprised at the number of people who have told me over the years that my honey is the absolute best honey they have ever had. My first instinct is to question whether they have been exposed to many types and varieties of honey and are simply too inexperienced for their statement to have real meaning. It is also a little embarrassing, and I have to admit that I never quite know how to best reply when my customers tell me that my honey is the best they have ever tasted. Other beekeepers in my area that have similar strains of bees as mine, keep their bees using similar management techniques, and allow their bees to forage on similar plants as mine. So why should my honey be special? One possible explanation why people feel that my honey is different from my neighbors is because I tend to handle it differently. Here are some of the factors I consider when trying to produce the highest quality honey possible.

Hive conditions

The first place to start is with strong healthy hives. Weak hives can suffer from numerous issues that can negatively impact the quality of the honey to be harvested. Problems can range from pest and disease issues where treatments prevent the harvesting of the honey due to contamination concerns, to moldy combs in colonies that don't have a large enough population of bees to maintain their hive properly.

Another factor that affects honey quality is the age and color of the honey combs. Old beeswax comb has a tendency to absorb pesticide residues and environmental toxins like a sponge. These chemicals can potentially migrate into nectar and honey that is stored in them. The pigment of old comb that is created from pupae cocoons, propolis and pollen can also migrate into honey over time altering its natural color. The darker the comb the greater the potential impact on the hue of the honey. The current recommendation to allow no comb more than three to five years old in hives is not just beneficial for reducing the impacts of *Varroa* mites and diseases, but for helping to ensure you harvest the highest quality honey possible.

Timing

Depending on the blossom sources and environmental factors, the nectar collected by foragers can consist of as much as 95 percent water. The bees use more than one method to remove much of the water in the nectar and turn it into honey. When a forager returns to the hive it will pass the nectar she collected to a house bee. The house bee will move to a quiet area of the hive and regurgitate the nectar so that it forms a droplet on the end of its proboscis (tongue). The bee will hold the droplet there for some time allowing the warm dry air of the hive to begin the process of removing the water from the nectar. After awhile, the bee will deposit the partially ripened nectar into an empty cell. Other house bees will align themselves so that they create an air conditioner within the hive allowing them to move the air in the hive around by fanning with their wings. Once the moisture content of the nectar is below about 18 percent, the ripened-nectar which is now honey is consolidated in cells in order to fill them up before they are capped with wax until needed.

The low moisture level of the honey helps prevent it from fermenting. Fermented honey is still edible, but the quality is effected and it will tast tangy and have a fruity odor. In extreme cases, bottled honey that has a high moisture content may become frothy causing it to bubble up and overflow when the jar is opened. This is why it is important to be patient and wait until no more than 25 percent of the comb being extracted is uncapped containing honey that is

not fully ripened. If excess amounts of uncapped high-moisture honey are harvested, it is best to keep it separate from the fully ripened. While some folks like fermented honey and the added beneficial bacteria and yeast it contains, most will use it for cooking or making mead if they don't consume it quickly before it can ferment. Another use for uncapped frames of honey is to feed it back to the bees by placing supers of it above the inner cover late in the year after the honey flow is over. If there is room below, the bees will move the unripe honey down below the inner cover, further ripening it in the process and use it as part of their winter food supply.

The higher the moisture content of the nectar and honey stored in comb, the more likely pigments from the comb will leach out. Old dark comb is much more likely to impact the color of nectar and honey stored in it than new light colored comb.

The Harvest

The quality of honey can also be affected during the process of harvesting the honey supers from the hive. If too much smoke is used on the hives when removing the honey, it can make the honey taste smoky. While some enterprising beekeepers have marketed such honey as "smoked" honey, it's not typically considered to be of the highest quality, especially when one considers that not all smoker fuels are created equal and some may leave disagreeable odors, tastes and even toxins in the honey.

Extracting and Filtering

Once the honey is in the honey house, it should not sit around too long before it is extracted. The longer you wait the more likely it is that wax moths and small hive beetles will find it. These scavengers can negatively affect the quality of the honey by contaminating it with their feces.

During the process of removing the wax cappings from the honey combs and using modern tangential and radial extractors that utilize centrifugal force to remove honey from the combs, a lot of pollen, propolis and beeswax are introduced into the honey. These impurities are typically removed by filtering despite the fact that the pollen and propolis in particular provide additional medicinal and nutritional benefits and I find that they subtly improve the flavor of the honey. Since most people don't want a lot of stuff floating in their honey, the benefits small amounts of pollen and propolis bring to honey can be maintained by allowing the honey to settle in a tank and allowing most of the impurities to float to the top before drawing off the cleaner honey from below. Alternatively, gravity can be used to run the honey through a strainer.

The settling and straining process is made easier when 10-frame honey supers are filled with only eight frames of evenly spaced drawn comb for the bees to fill instead of ten. Not only does this free up room in the super for the bees to store more honey than they would otherwise, but the bees draw the cells of the honey combs out farther than they do in the brood combs, so the cappings extend past the wooden parts of the frame making the task of uncapping much easier. When the cappings are cut off cleanly and neatly, such as with a knife, a lot less beeswax, pollen and propolis is introduced into the honey. Uncapping systems that rely on chain uncappers, an uncapping fork or capping scratcher greatly increase the amount of material that needs to be removed from the honey prior to bottling.

Although both settling and straining allow the smallest of the pollen and propolis particles to remain in the honey, they remove enough extracting debris to please the palate of most honey consumers even if it won't win you a blue ribbon in your typical honey contest that use a polariscope to see how clean the honey is. However, high quality raw unheated and unfiltered honey can win you first prize and bragging rights in a contest if you collect the drippings from cut comb honey production and use it for competition. This will allow you to take advantage of all the improved flavor and color of raw unfiltered honey while introducing very little, if any pollen, propolis and beeswax into the final product.

Heating

Most honey is heated after it is extracted. Not only does heating honey make the process of filtering easier, but it delays the natural crystallization process that raw honey typically undergoes. Unfortunately, heating can also change honey's flavor, darken its color, and destroy the natural enzymes that naturally occur in honey. Heating honey also accelerates the production of hydroxymethylfurfural (HMF) in the honey, a compound that is toxic to bees and mildly toxic to humans. Unlike Americans, most of the world prefers their honey unheated and crystallized. Not only is it easier to spread with a knife, but the texture of crystallized honey augments its flavor, and crystallization allows consumers to more easily identify honey that has been adulterated with sweeteners that do not harden over time.

For the most part the quality of honey is impacted by the work of the bees and the plants that they forage on. However, honey quality is also determined by a beekeeper's relationship to the bees, how they manage their hives, and what they do or do not do to the honey they harvest. While my extracted honey processing techniques may not win me a first place or best of show ribbon in a honey judging contest, as long as it continues to win the favor of my customers, that's good enough for me. BC

Ross Conrad is author of Natural Beekeeping: Organic approaches to modern apiculture, *Revised and Expanded, 2nd Edition.*

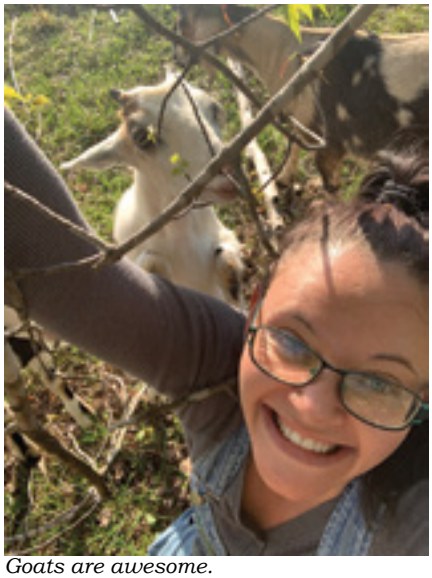
BIGGER PICTURE

Jessica **Louque**

Long Term Prepper Skills

I don't know how many of you went without toilet paper after the month of February, but I'd bet some of you had problems finding it. I'd say we were lucky to not run out, but honestly luck didn't have a lot to do with it. Most anyone you asked would have said they didn't see a toilet paper shortage coming with the pandemic, so it's not something you could have prepared for specifically. This would be one of the strangest emergency situations to have: home, with electricity and internet, no actual, physical warfare or imminent danger of attack, and government orders to avoid other people at all costs with threats of uncontrollable illness and hospitalization or death for noncompliance. In some ways, this is a prepper situational dream, because you don't have to leave your supplies or try to leave, and people aren't likely to try to make contact with you and your family. For a homesteader, it's basically just another day. Normally, these types of people are shooting for self-reliance as much as possible, or finding ways to procure items they can't produce on their own.

Sometimes, you have to make deals with the devil to get what you need. I am not a fan in the least of Amazon or their business design, but I have a particular weakness for unlimited shopping options and two day shipping. The Subscribe & Save has been particularly useful to me and to my family. I can order most of our heavy "grocery" items and get them delivered to the house on a schedule I would normally buy them anyway and have the delivery guy do most of the heavy lifting. This would be groceries like laundry detergent, paper plates, paper towels, toilet paper, toothpaste, etc. Having six adult-sized humans in the house means I order everything in massive bulk. I also learned my lesson the hard way about stocking up on toilet paper during a Louque family norovirus outbreak during a snowstorm power outage where we couldn't leave the house. I typically buy most common items in a way that I have about a six month supply on hand at all times, just because you never know what's going to happen. This might be my opinion of what would last six months, and then we use it all in a month or few weeks, but it's still a surplus.



Goats are awesome.

Food is harder to deal with on a long-term scale because most people don't want to eat stored food continuously. There are ways to work around it, like freezing or canning your food, but sometimes you just want a ham and cheese sandwich. You can also buy MREs, although I've seen a lot of reviews that you might rather starve to death than eat them continuously. Planning out long-term solutions isn't easy. A lot of people were made aware of the need to plan ahead at the exact wrong moment of when the toilet paper ran out and they didn't have any more. As I've said many times before, preppers get a bad name but the thought process is just like the Depression-Era generation that saves everything because they learned the hard way. As beekeepers, you already have a good handle on a few things that put you at an advantage, even if you were behind on your stockpiling.

If you installed packages this year for the first time, it was probably an exciting and stressful situation. Having a mentor or someone experienced can make the entire ordeal a lot easier and more manageable. For more experienced beekeepers, you now have knowledge that is valuable and can be used for bartering or sale. A lot of beekeepers have been making a good profit off of providing mentorship to new or inexperienced beekeepers in an on-demand way that goes above and beyond most bee clubs. Normally, in a situation where EAS is coming up, and Kim is asking you to come do a presentation on your area of expertise, whether it be disease ID, Pysanky eggs, or warre hives, we all say "yessir" because Kim asked. Now, maybe you should think about making these presentations in a way that highlights the difficult parts or

Catching swarms can be rewarding.

the areas that have to be learned through experience in a way to sell your abilities, if you want to consider such a job. Queen rearing workshops could be lucrative, but if you rear your own queens to sell, consider that you may flood your market if you teach too many local beekeepers to rear queens, who will then be competing against you (assuming you taught them correctly). Finding a person who is interested in your services or products should be relatively easy through the beekeeping network, but reaching out past that could be extremely helpful. Pollination services to local farmers in exchange for either cash or produce could be a good barter, especially because it supports your local food supply chain. You could trade honey for cheese or milk from cow or goat farmers, if you didn't already have your own farm animals.

If you are a beekeeper that has a little land, it would probably be a good time to think about expanding your self sufficiency. I know a lot of beekeepers are older, and maintaining something like orchards or farm animals can be a lot if you're not used to it – or even if you are. Having bees is great because it gives you a source of expertise and various products for selling to the public, plus a high-calorie food source that can store extremely well. Having other options puts you on the path to being independent of others for your survival if it comes down to it.

This is what a community used to be – working with and supporting neighbors who can supply different aspects of daily life needs. Now, it's good if you know someone who has something you want or need, but it's better if you can do the minimum yourself. If you can handle raising your own meat, I would suggest starting with rabbits. They are a fairly low maintenance animal, but still need some research on your part to determine what breed is best for your climate, how you're going to set up a hutch or handle overpopulation or processing the meat. It doesn't take a lot to cross the line from inexperience to animal cruelty in the case of harvesting meat.

I would also recommend goats if you have the land, because if you can learn how to castrate, you can keep your goat stock to a lower level and have milk and cheese ready to go. Goat milk is obviously different from cow's milk in a lot of ways, but it's still milk. Goats are a bit too smart to not understand when you murder their friends though, so you might have to be careful about the meat part of goat herds.

Gardening is always a great option, because vegetables can be stored in a variety of ways and are a lot easier to harvest than a cute little bunny. It is very easy to can your own food incorrectly, so this is another learning opportunity, or class opportunity if you are the expert and know someone who needs a teacher. This could also be set up as a community-wide event if you had an organized group to offer classes on a semi-regular basis for needed skills, and charge a small fee, or a can or two from each person of the finished product.

Setting up a long-term food production area takes a lot of patience, and more learning, but has a higher reward later in the future. Apple trees would be most people's first thought for fruit trees, but they can be awful for a home grower to maintain without disease. Look into what grows in your area and what needs to have two different varieties to pollinate. Even if you live in a small urban area, well maintained thornless blackberry bushes can be extremely productive. Mulberry trees and paw paw trees are both easily grown here, and extremely hard to come by if you don't have your own. The fruits of both are easily bruised or ruined in shipping, and rot quickly if not properly stored. Asparagus is also a long-term delicious option, but it also takes planning to have enough to eat and to not get out of hand.

Ethnobotany can also be a useful knowledge set if you have a preference for that sort of knowledge. Knowing local forage plants is always beneficial, especially knowing if they are edible, medicinal, or poisonous. If you can find morels, you are basically a goldmine waiting to happen. Growing useful medicinal plants in part of your space is never a bad thing, as long as you've done your homework. Make sure you're growing it because it actually has medicinal properties, not just because somebody used to think that daisy fleabane would get rid of fleas in your house (it does not). Also be aware that a lot of people train a long time for medicinal uses, as

Package installation experts.

a lot of people don't take medicinal properties seriously since it comes from a plant. One of the first things in botany that you learn is that the dose makes the poison. There's a fine line between medicine and poison, and you should tread lightly on the area if you're not comfortable with it or you'll wind up killing someone. If you ever need it though, it might make your life a whole lot better.

Overall, the point here is to make yourself a valuable member of your community, starting with your bees. Learn as much as you can from your beekeeping peers while it is offered, if it is offered. Utilize free sources like YouTube or various internet options, but learn to differentiate garbage from knowledge. Order books from websites if you can't get to/in a bookstore. Make sure you are ready to learn if you take on a new endeavor. Some people will tell you that you'll make mistakes along the way, and that's okay. I'm telling you that it's not okay, unless you're really going for a slow and steady. Mistakes in most of these wind up with injured or lame animals, or injured or dead humans. It's not going to be the life for everyone, but the more self-reliance you learn, the better off you're going to be no matter what happens. BC

Jessica Louque raises bees, goats and kids living on the land in NC.

Ships don't sink because of the water around them, ships sink because of the water that gets in them. Don't let what's happening around you get inside and weigh you down.

PRACTICAL MERGERS

Do It Soon

Zachary **Lamas**

The adage amongst beekeepers is to "take your losses in the Fall." If you are a new beekeeper and haven't been introduced to this phrase yet, don't worry. The utility and ubiquity of this adage will soon be familiar.

In short, beekeepers will often combine or "unite" two weak or mediocre colonies together into one overwintering unit. The idea is that by themselves each colony has a poor chance of surviving the Winter. When merged together we increase the likelihood of survival.

This is excellent beekeeping advice. The best beekeepers I know all merge small or weak units together by the Fall. Uniting is simply another good management tool. In this article I want to offer three thoughts on the subject. The first is a practical how to guide for those unfamiliar. The second is a twist on our attitude about unites- this should be a very positive part of our beekeeping, and I will urge anyone to stop thinking of it as "taking losses." The third is to do the unites earlier in the season, instead of waiting for the Fall.

How to

The colonies pictured in this article were united together in early August, 2019 in Myersville, Maryland. I had recently moved these hives from another beeyard that was no longer available. When I moved the colonies I put colonies of similar condition next to each other. The strong colonies were placed in the back three rows. The questionable colonies and the small nucs were placed beside each other in the front rows. My intent was to unite colonies that would not make it through Winter; this also included any colony that would need too much intervention on my behalf to be ready for Winter. I was able to reduce confusion as I was uniting in the yard by uniting weak colonies with their neighbor in a similar condition. The returning foragers would orientate to the new colony easier that way.

Here are four nucleus colonies that were made late in the season. They are all queenright, and healthy. They are small and without a lot of intervention, they would not survive the Winter. As a beekeeper, I resist taking on a "hero complex" with my colonies. A hero complex is where we will do a lot of work despite overwhelming odds to make something survive. In this case, these small nucleus colonies would need a lot of my time and energy, donations of frames of brood and comb, and a lot of feeding. Instead, I am electing to unite them into one stronger unite.

Here is an example of a small, queenright nucleus colony. There are frames of empty comb where there should be honey stores. The population is not dense nor capable of preparing a proper Winter population. The nucleus colony was made at the end of the Summer flow and never had an opportunity to build up. That is more of my fault than these bees. The queen is laying beautifully and the brood is pearly white and healthy.

As a beekeeper I am stepping back from my urge to care for everything, and to make a management decision that is good on the apiary level and good for the limited time I have. The queen will be caged and the bees united with other similar colonies.

Here I have caught the queen and am about to cage her. In the background on the left I have transferred the brood and bees into empty 10-frame equipment. To the right is the remainder of the small nucleus colony. I will place the last frame into the new home and remove all the original equipment. By working clean and removing equipment the forager bees will re-orientate to the new home instead of the old equipment. The next step is to add another colony to this setup.

In the first image (left) our new colony has brood and bees from the first nucleus colony. The open nucleus colony (front) will be combined with this after catching the queen. I keep the brood together. We do not want to create artificial spaces in our brood chamber. Despite common mantra, uniting bees like this from different hives will not cause the bees to fight. The bees will not draw out frames in Maryland at this time of the year. It is best to remove unnecessary frames like this. We want our bees to be more dense in the process of uniting. To the right, a shot of our two nucleus colonies combined into 10-frame equipment. The brood frames are together in the middle, with food and pollen frames on the outside ends. Extra and empty frames were removed. Notice that the original equipment was removed from the front so that forager bees can begin reorientating to their new home. The white and blue nuc boxes will be the last colonies united together into this unit.

The white nucleus colony is much stronger than the blue colony. The white colony will retain their queen and she will become the queen of the new colony. The blue box and its bees, without queen, are transferred to the remaining space of the bottom box. Again, brood is placed next to other brood frames and superfluous empty frames are removed at this point.

Because queens naturally supersede from top down we will place the queen we are keeping with her attendants in the top box. First we find her. This part is very important. We don't want to unite four queenless colonies!

Can you see her? She is there! She is protected by a nice population of her nest mates. We don't have to cage her, spray any odorant, drizzle sugar, etc. for successful acceptance. Instead we will place her and all her nestmates in the next box, separated by the bees underneath by a sole sheet of newspaper. Within the day the bees will cross the paper and become a united colony.

We are almost done. The uppermost box is our queenright portion with a layer of newspaper separating the bees from the other three colonies from down below. I fed 2:1 liquid syrup in an internal feeder. At this point I want to shake the remaining bees from the white box into our new unit and then remove the old equipment. All the forager bees will eventually organize to the new colony.

About five weeks later this is what our united colony looks like. They have organized themselves, the queen is laying and producing healthy looking brood and new bees. If the *Varroa* are under control, and the colony fed for Winter, I fully expect this colony to survive the Winter and be booming in the Spring.

In the final photo we are treating and feeding our colony. I understand beekeepers are torn between treating and not treating. To be honest, I am too. Ideally I effectively manage my *Varroa* via other management methods. But this year, I couldn't properly manage all my yards. I want to be a good beekeeper in terms of parasites and disease to my bees and on the landscape level. So in august, when I need a healthy intact population to rear my Winter bees, I am nipping my *Varroa* with Apivar. The red funnel is an easy way to fill a small number of internal feeders with syrup. At this point, I have a healthy population and queen creating the bees for their winter cluster. I am choosing to manage my *Varroa* by treating. With several more feedings this healthy population will be ready for the winter.

Part two: Timing matters

When we do something matters. I want to do this now, in August in my area instead of waiting for the Fall. Time and temperature are a resource which the bees still have right now. This united colony has all the resources and population to rear more Winter brood. By managing *Varroa* now, I ensure the *Varroa* population will not increase and continue to parasitize my worker bee population as they prepare for Winter. By feeding now I am allowing the bees to take the syrup down into their colony to cure and store it where they best feel fit. In short, I am allowing the bees to build in population and restructure their colony as they best see fit.

This is all possible because we still have time and warm temperatures as a resource. From the beginning of August until brood rearing dramatically slows in our area, this queen can sneak in two to three cycles. Lets imagine if I waited until mid September to unite these colonies. Well, the queens would have two cycles of brood reared by small, nutritionally stressed worker bees. That doesn't sound like a good way to rear a Winter cluster to me. Additionally, they would not rear as many bees. The *Varroa* would have ample time to continue parasitizing these small populations. If I united in September, I would have to rush to feed the colony. As outdoor temperatures decrease, it takes the bees longer to consume their liquid feed. In many ways, I would be setting myself up to work and worry harder for a poorer result.

Instead, I united in early August. I had already decided these colonies were not going to grow or survive on their own. I decided to be pro-active and unite. I did not want to take huge, heroic acts to get the individual nucs to *maybe* survive the Winter. This is not sustainable to the beekeeper, as it keeps the beekeeper in a reaction-orientated state. I also received a positive reinforcement a few weeks later. The individual unite is now growing, and looking strong for the Winter. I am relaxed with my concerns about their survival, and my management is simplified with fewer colonies.

Part 3: Focus on positive

"Taking your losses in the Fall" to me always had a tinge of failure in the comment. Although it is great advice, it echos "If you didn't miss a problem earlier, you wouldn't have to do this." I'd like to jump in here and say- that is absolutely false. We are people first, and beekeepers second. Whether you're a hobbyist, sideliner or commercial beekeeper, you still need vacations, time for family events, time to rest your aching back, or just time to relax on a rainy day. It means we won't be in every colony, every minute. Mistakes are going to pass us by. Plus, life happens. Trucks break down, equipment ordered doesn't get shipped, queens get rejected for mysterious reasons or sometimes we just misjudge our management. Unites are going to be a part of successful beekeeping.

I've shifted my focus away from fixing individual colonies in the late Summer. It leaves me scrambling with extra work as a beekeeper. I don't like that, and the results are never what I want them to be in the Spring.

Instead, in my area at this time of the year I make one of two decisions on a colony: 1. The colony needs feed and treatment only. 2. If it needs more than those two things, then I am uniting in some fashion. A majority of the colonies fall into the first group. Its only a handful of colonies that fall into the second group. By doing uniting those handful, they stop being the few colonies that take up a majority of my time. BC

Ann W. Harman
1931-2020

Dewey **Caron**

Ann Harman, 89, passed away peacefully with her daughter Joyce and sons Stewart and Art in attendance, among her cats and dog Toby at home on her hilltop farm in Flint Hill, VA on the afternoon of May 2. While still recovering from a broken hip, an operation to repair a second leg fracture led to a cascade of emergency events. She asked daughter Joyce to bring her home as her last birthday wish. Following the tradition, her five teaching colonies have been told.

Ann grew up in the Washington, DC area. She earned a degree in Chemistry from Virginia Polytechnic Institute (VA Tech). Early employment was as a research chemist at Fort Detrick Biological Warfare Laboratories in Frederick, MD and later for National Institutes of Health In suburban DC. She lived for several years near Reading, England, southwest of London. In later years she taught Chemistry and Math at the Georgetown Day School in Northwest DC. She 'retired' to the Flint Hill, VA farm, shared with daughter Joyce's large-animal veterinary practice, in 1992.

Ann loved animals, naming many for chemistry scientists. Although slight in stature, she favored large dogs (Bernese Mountain dogs were her favorite) and large-bodied cats such as Maine coon cats. She also kept horses and was an avid trail rider up until about five years ago. After taking the UMD beekeeping course in early 1970s and capturing a swarm, she became a devoted and enthusiastic beekeeper. At one point she managed around 50 colonies for honey production in suburban Montgomery Co, Maryland.

In her bee affection she volunteered as part-time manager of the University of MD bee colonies and then became assistant for the MD bee extension programs, for over 10 years. Her animal affection lead to investigations on the beneficial effects of bee venom therapy to movement of arthritic dogs and horses. She was the catalyst, along with veterinarian pharmacologists, Drs. Jürgen von Bredow and James Vick, in founding the North American Apiotherapy Society (NAAS) in 1978 at the University of MD; she would later serve as advisor for reestablishment as the American Apitherapy Society (AAS) in 1989.

Ann was a dedicated honey show judge. She greatly assisted in design and instruction of the first U.S. honey judging instructional program at the University of MD. Ann would later become one of the earliest certified Welsh Honey judges in the U.S. She joined Roger Morse to revise the EAS judging standards, further adopted by numerous other bee groups as their show standards. Her entrant show tips remain posted on the EAS honey show website. She chaired the EAS show committee and/or was show judge for over 25 years. She also helped revise the ABF honey show standards. Probably the furthest trip she took to judge was the Apimondia honey show in Daejeon Korea in 2015; she judged at 2019 Apimondia in Montreal. Her last show judging was the TX honey show in November 2019.

Ann was a Master teacher. She was one of 10 individuals certified, of 53 taking the certification tests, to become an EAS Master Beekeeper in 1981. She became a dedicated worker bee volunteer for EAS. She gave her first talk to EAS in 1980 (on her studies on bee venom on arthritic dogs and horses), then became a 'regular' on EAS programs over the next 35 years, presenting information on a wide variety of topics from artistic and practical uses of bee products to bee education and bee colony care. Her last EAS presentation was 2018 in her home state VA.

In addition to speaking and serving in various officer positions for MD and VA bee clubs she served as EAS Vice-Chair for 16 years and was EAS awards committee chair for 15 years. Probably she was most valuable, unofficially, as the EAS 'go to' and the memory of 'how we previously did it' for over 30 years. She was the driving force for VA (1996) and MD (2000) EAS conferences as Board Vice-chair. She has been invited to speak uncounted numerous times at state/local and regional bee groups across the U.S. and England.

Ann somehow found time to travel to teach others about bee care and products. She was a volunteer for a host of NGO's (Agricultural Cooperative Development, International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA), Partners of the Americas (PoA), Farmer to Farmer (FTF),Citizens Network for Foreign Affairs (CNFA), Land O'Lakes International, Citizens Democracy Corp, and Winrock International), conducting two-week to two month long foreign consulting/teaching assignments. She completed 54 in 29 countries on all continents except Antarctica. She was recognized for exceptional service at least five times.

Many will recognize Ann from her regular column in *Bee Culture* Magazine. She began in 1980 with a honey cookery column (Home Harmony). Although she occasionally still wrote about this topic, her columns over the past 40 years have covered a wide range of topics. Ann finished her last column while in the hospital. She was a regular contributor to *Beekeepers Quarterly* and wrote many articles for *Bee Craft*. She was my main proof reader of *Honey Bee Biology & Beekeeping* and served as editor for *ABC & XYZ in Beekeeping*. She produced a delightful honey cookery booklet and with Diana Sammataro a helpful guide for plants useful to bees. While recovering from her broken hip she finished chapters for *Bee Craft* books (Bee space to Bee hive and Bee Hive to Beekeeper).

Ann lived large and long and made a great impact on so many of us. Ann could be relied on to 'tell it like it is' but always in a sincerely pleasant and welcoming way. A honey bee colony has to have many worker bees to get all the tasks done. Ann Harman was the archetypical 'worker energizer bee.' Bee meetings will not be the same in her absence. I am confident she will now relish the opportunity to teach about beekeeping and humility beyond our worldly Universe.

For those so inclined, EAS would welcome contributions in memory of Ann to recognize young bee researchers.

Telling the Bees is an old-world custom to drape bee colonies at the death of their master to avoid their leaving or stopping honey production. In the1800s a similar custom, practiced in the Southeastern U.S., was to knock on each colony and whisper that the master was dead – and then invite them to the funeral. Ann's five 'teaching colonies', kept with a beekeeping neighbor, were draped and informed following her passing.

Quaker poet John Greenleaf Whittier's 1860 poem "Home Ballads" describes 'telling the bees':

Before them, under the garden wall,
Forward and back
Went, drearily singing, the chore-girl small,
Draping each hive with a shred of black.

Trembling, I listened; the summer sun
Had the chill of snow;
For I knew she was telling the bees of one
Gone on the journey we all must go!

"Stay at home, pretty bees, fly not hence!
Mistress Ann is dead and gone!"

A Closer Look

Basic Honey Bee Biology

X219

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www.beeculture.com

274 pages, color

Clarence H. Collison

Homesteaders 4-H Club

David **Edwards**

Head, Heart, Hands and Health

The HOMESTEADERS 4-H Club, based in Hartwick, New York, has members focused on fish farming, photography, gardening, alpaca raising and, for three girls, beekeeping. So in addition to the four elements of all 4-H groups – Head (for clearer thinking), Heart (to greater loyalty), Hands (to larger service), and Health (for better living), this group has added honey bees (for the environment).

The club was started in 2018 with the help of Cornell Cooperative Extension's Patti Zellmer, the Otsego County 4-H Program Leader. Tammy van Buren-Duke & Luke DenBleyker agreed to take on the positions as adult leaders. Tammy and Luke already had full time jobs, kept heritage pigs, rescue alpacas, horses, trout fry, chickens, . . . and honey bees. A handful of kids and a few more hives was a natural fit.

The Otsego County 4-H Program has a local "4-H Earn an Animal" program that helps 4-H members obtain an animal (beef and dairy cattle, goats, swine, rabbits and birds), with little if any money up front. With support from various industry partners and individuals, the program requires youngsters to plan the ongoing care of the animal, undergo a formal interview, attend an orientation class (with a parent), sign a contract, keep records, show their project at the local Otsego County Fair, and eventually sell the animal at market or keep it for breeding purposes. Any income from the sale of the animal or offspring is used to repay the costs of raising the animal and any loans through the program. After successfully completing the program the youngsters receive their cash awards from the 4-H Earn an Animal program.

Several years ago a family inquired of Zelmer if beekeeping was part of the "4-H Earn an Animal" program. Although the family did not pursue the idea, Zelmer did. She received a positive response from the local committee, but when she contacted the program's liability insurance carrier she encountered resistance. "Too dangerous" they said. "Children and bees? A major liability." The mild mannered Program Leader replied "And you are willing to insure us if we give an eight-year-old a small calf that will end up at over a thousand pounds before the year is out. You're comfortable with that but not honey bees?" She soon had bees added to the insurance policy and bees and other agribusiness ventures added to the existing list of animals.

In 2018 when the HOMESTEADERS became aware that bees were part of the "4-H Earn an Animal" program, three of their members applied and were accepted. Zelmer had arranged for Kutick's Everything Bees in Oxford, New York to be the industry sponsor, and they insisted on doing it right.

The three girls involved – Tiffany and Wendy Pagillo and Hanna Austin – ages 17, 15 and 12 respectively at the time, were all students at Cooperstown Central School in 2018. Tiffany has since graduated but is still involved in 4-H and beekeeping. Their motivation to get involved in beekeeping was a combination of their involvement in local youth environmental movements and the concept of "save the bees."

The girls took beekeeping seriously from the beginning. With support from Kutick's and their leaders they immersed themselves in learning. They are well read in beekeeping – some basic books as well as monthly issues of both *Bee Culture* and the *American Bee Journal* provided by their leaders. They spent time with their mentors learning the seasonal tasks of a beekeeper,

Tiffany Pagillo in the beeyard. Photo by Tanner Griffin

Wendy Pagillo after installing her first Nucleus colony. Photo by Tanner Griffin

researched methodology, critically viewed many YouTube videos, and attended local beekeeping meetings. As Tiffany indicated they were engaged in "networking".

After their first Leatherstocking Beekeeper's meeting the girls indicated to Tammy that everyone at the meeting seemed to be retired. What was apparently unsaid was "they haven't got much time left." The girls expressed concern was 'Who is going to take over if not us?" That experience caused them to recognize that the world needs more young beekeepers.

When the time came to start – the Spring of 2019 – they were ready. Paul and Sue Greer of Blue Merle Apiaries (a local beekeeper and a woodworker) gave each girl a hybrid Buckfast Nuc and handmade hive boxes as well as a solar melter. They continue to be available for advice or hands on assistance.

Kutick's Everything Bees supplied them with beekeeping suits, gloves, smokers, hive boxes and a Nuc of Russian hybrid bees for each girl, all on credit, that the girls are paying off over time with the income they are generating from their hives. Kutick's also took the time during Nuc pickup to give them over an hour of instruction and hands on experience with their new equipment. This allowed the girls to start with a pair of hives each so, as Hannah noted, ". . . we could observe differences in the two hives as they grew". The girls started with plastic frames, but for all the usual reasons they have some wooden frames in some hives.

The Otsego County Farm Bureau donated funds so the girls could purchase some additional hardware. The girls obtained pollinator friendly tree and shrub seedings through the New York State Department of Environmental Conservation Planting for Knowledge program and the entire group of Homesteaders helped with the planting.

Even though the girls had significant exposure at Tammy and Luke's yard, they had new experiences when they started their own hives. After picking up their Nucs, Wendy indicated "There are a lot of bees in a Nuc, especially when it is in the car with you. We really didn't expect to have a few bees flying around inside the car, but Tammy calmed us down and let the bees fly out the window." Tiffany had her Russian hive swarm twice in two weeks. Wendy and Hanna had their Russian hives each swarm once. They never caught their own swarms (they were in school), but they have watched Tammy & Luke catch and re-hive swarms. They are still a little reluctant to retrieve a swarm.

Wendy noted that at the beginning they were a little intimidated but once they got the Nucs in their new homes they were more comfortable (but, as Tiffanny said, "we still wear gloves !"). They were amazed at how fast the colony grew, and fascinated by the honey aroma that permeated the bee yard at season's end. They were also surprised when "crazy comb" appeared in their hives when there was excessive space left for one reason or another. That's when they really learned that bees are serious about "bee space."

They are not at all reluctant to help extract bees from buildings. Their leaders do bee removals from structures, so the girls were able take an active part in removals. Running the vacuum, cutting comb, and banding sections into frames were all new experiences. As might be expected of their generation, they photographed and videoed the process and presented a lively musical video on bee removals at a Leatherstocking Beekeepers Association meeting.

When the local Society for the Prevention of Cruelty to Animals (SPCA) sought help in removing a colony of bees from their building that housed dogs and cats, the girls responded along with their leaders. Their efforts made front page news in the local newspaper and praise from the SPCA leaders. As a "Thank You" to the SPCA for electing bee removal over insecticide use, the girls are planning to conduct a honey sale fund raiser, 'Pounds for Paws', to provide some funds for the no-kill shelter.

The girls are well aware of the *Varroa* mite situation and have done sticky board counts and sugar rolls. They have treated with Mite Away II and observed the mite fall and have watched oxalic acid being dribbled. They hope to encourage hygienic behavior and do drone brood removal in their own hives.

At the end of 2019 Otsego County 4-H Educator Patti Zelmer was named the recipient of a state and national 4-H Meritorious Service Award. The award recognizes innovative youth programming and leadership at the state, regional and/or national level and commitment to 4-H youth and the 4-H Program. The County is fortunate to have such a dedicated person working with these and other youngsters.

Hanna Austin after installing her first Nucleus colony. Photo by Tanner Griffin

The girls were intrigued with Tammy's extractor. They have been able to bottle a range of honeys that they display to show the light to dark options. They also learned how to "decrystalize," as they term it, honey that has crystalized.

The group has harvested wax from their frames and structure removal comb. They made candles, both molded and dipped, as well as lip balm. Selling these products of the hive is helping them pay off their startup loan.

The girls have developed a poster presentation on the steps they took to get started. From painting the hive bodies to installing the Nucs, to extracting honey, harvesting wax and making candles. The poster won First Prize at the Otsego County Fair, making it eligible for the New York State Fair in Syracuse where they again won the First Prize Blue Ribbon. In addition, the National 4-H program had a board game associated with the Importance of Pollinators program. The girls obtained one and they use it at their presentations to help the public become more aware of the importance of pollinators.

All three girls have participated in the 4-H Public Speaking program where they prepared a talk on their bee project for the public. This is a program that is encouraged but not required by 4-H, and each girl chose to participate. Hanna was a featured speaker at the Otsego County Board of Representatives monthly meeting in October, 2019 when the Board approved a resolution declaring 4-H week in the county. Program Leader Zelmer has noted that they have all polished their speaking ability with the Public Speaking program as well as their several bee related presentations (the New York State Fair itself was four days of constant public interaction).

Bee talk. Photo by Tanner Griffin

Somewhat surprisingly for youngsters from a rural area they are well aware of urban beekeeping and feel that wherever life takes them they will always be able to be involved with honey bees. Consistent with the 4-H pledge , ". . . for my club, my community, my country and my world" these girls are certainly "thinking globally and acting locally."

The girls credit local beekeeping organizations (the Leatherstocking Beekeepers Association in Cooperstown, the Bullthistle Beekeepers in Norwich), businesses (Kutick's Everything Bees in Oxford, Blue Merle Apiaries in Burlington), and various individuals (not the least their local leaders Tammy and Luke, along with Cornell Cooperative's Patti Zelmer) for help getting them started and mentoring them as they start their beekeeping journey. They are also fortunate that their peers in the Homesteaders try to incorporate non-beekeeping projects into what the beekeepers are doing.

These girls are certainly living the 4-H motto – "To Make The Best Better". BC

The Homesteaders 4-H Club - Tiffany Pagillo, Wendy Pagillo, Noah DenBleyker, Hanna Austin, Tanner Griffin. Photo by Trenton Griffin.

BEESWAX IS VALUABLE

Ed **Simon**

You have finally reached your storage limit and it is time to clean house. You need to either consolidate and/or even sell some unused equipment, supplies or inventory. One of your largest space eaters is the seven five-gallon pails of capping wax that you have been ignoring for the last umpteen years. Not enough wax to send away for processing and far too much to trash. Most were stacked in the corner with good intentions of selling it in the future. The Presto Big Kettle Multi-Cooker & Steamer™ with some modifications will allow you to process larger volumes of beeswax with greater efficiency. Possibly even to the point of asking your bee club for additional wax to process.

Objective:

Develop the equipment to process beeswax for the beekeeping hobbyist while keeping labor, space and capital investment to a minimum. Use local hardware or home improvement store parts whenever possible and keep any modification needed to a minimum. The design needs to allow for extended and higher volume usage.

Design Explanation:

Modifying a Presto Pot for processing larger volumes of dirty and cruddy raw beeswax requires a different set of design criteria than when you are melting smaller volumes of clean candle wax. You have minimum control of the raw material which can contain all sorts of impurities. From massive amounts of dead bees, small hive beetles and the ever-present honey, you need a process and equipment that can handle most if not all contingencies.

Clogging problem #1: In his "Comb and Beeswax" article published in the " December 2020 issue of *Bee Culture*, David MacFawn identified beeswax debris ("CRUD" is a highly technical term meaning everything except beeswax) clogging the spout (drain) of his "Crock Pot" melter as the biggest problem. He solved this problem by using a cloth filter inside the melter. This works but it will become a major stumbling block when processing larger volumes of beeswax. The problem is addressed by the following changes:

- The drain valve used to empty the melter has a "FULL PORT" design which has a larger opening than a non-full port drain used in most candle wax melters. The full port design has four times the flow rate of a standard size valve of the same size.
- A half inch drain valve is larger than the ¼ or ⅜ inch drain valve used for most candle wax melters.
- A reusable screen is added to the fryer basket to remove larger debris.

Clogging problem #2: MacFawn identified solidifying of wax in the drain as a possible problem that proved non-existent in his testing. This becomes a definite problem with the change to a larger, longer and heavier spout. This problem is easily solved by using a heat gun or a propane torch when needed.

Removal of the non-stick surface near the drain: The epoxy used has a 300°F maximum temperature. If a mistake is made and the pot heats to over the 300°F, all bets are off. We will remove the non-stick surface around the drain to allow for a better metal to metal adhesion of the epoxy and add a marker to the pot's temperature controller to remind you of the temperature limit.

Extended drain: The drain is slightly extended to allow for the placement of larger receiving wax containers while keeping the melter on a safe and solid support.

Locknuts added to the drain assembly: Because of the extended and heavier drain, use locknuts on the inside and outside of the pot to provide additional support.

Note: If the use of an individual item or step is not obvious, the rational for using that item will be explained.

Note: The Presto Big Kettle Multi-Cooker & Steamer™ is a product of Presto Corp. and is available in most home appliance stores.

Terms

- Valve – Plumbing term for a unit that stops the flow of a liquid in a pipe.

- Full port – A feature of a valve that defines the size of the hole inside the valve.
- A full port valve has greater flow capabilities than a non-full port of the same pipe diameter.
- Nipple – A pipe that is threaded at both ends, usually a short pipe.
- Conduit – Electrical term for a pipe that is used for holding wires.

Basic Concept:

Use a temperature-controlled crock pot to liquify the raw beeswax inside a strainer that removes the larger particles from the wax. A semi-continuous process can be developed by adding raw wax into the strainer, allowing it time to liquify and then draining it. The wax is then allowed to cool and solidify producing a solid cake of wax. This cake can then be reprocessed and filtered to remove smaller impurities and cast into sellable units.

Note: Strained vs filtered usage denotes the removal of subsequently smaller foreign particles from the wax.

Parts

1) Crock pot - Presto Big Kettle Multi-Cooker & Steamer (Presto

10 qt. Kitchen Kettle™)
2) Drain valve ½" – Brass valve (Watts – LFFBV-3C - Brass full port valve) or (Everbuilt - 869 340)
3) ½" x 3" conduit nipple (1) Optional ½" x 2" conduit nipple (1)
4) ½" Conduit locknut (2)
5) Metal epoxy (J-B Weld WaterWeld™ - epoxy putty)
6) 90° Street elbow
7) Thread seal tape (Teflon tape)
8) ½" x 2" conduit nipple (1)

Construction

A hole is drilled into the side of a crock pot and then a short pipe is epoxied into the hole. Next a drain valve will be added to control the flow of the wax. Lastly, we will add an angled deflector pipe to force the liquid down into a container.

Note: Search on the internet YouTube site for "Presto Wax Melter" to find a video for the basic construction of this style of melter. A good video is produced by Standley Handcrafted.

Note: The YouTube description adds the drain valve to the pot before the pot is assembled.

Note: Changes have been added to the pot's construction to provide additional robustness to your pot's usability.

Step 1: Position the drain hole.

Locate the position for the drain hole in the pot. Be careful. It should not be above the temperature controller or under the handles. It also needs to be far enough above the bottom of the inside of the pot to allow for applying epoxy and a locknut.

Step 2: Test the drain hole drill bit for size.

You want the drain hole to be a tight fit for the conduit nipple (part 3). The tighter the fit, the less likely it will leak. Drill a hole in a block of wood and test fit the conduit nipple.

Note: For a ½" nipple the hole opening is usually ¾".

Step 3: Drill pilot hole.

Use a center punch and mark the center of the drain hole. This will stop the drill from wandering across the surface of the pot. Then drill a small diameter hole at the mark.

Note: The pot is made of aluminum so a wood drill should work to drill the hole.

Step 4: Drill and clean the drain hole

Drill the actual drain hole. Clean the hole by removing all burrs left by the drill bit. Then use a wire brush to remove all the non-stick surface from the pot near the drain hole. This is so the epoxy can bind directly to the aluminum.

Note: Use a wire brush on an electric drill to remove the non-stick surface.

Step 5: Thread the drain assembly into the pot.

conduit nipple for the pot drain, it is less likely that wax will solidify before the valve because there is 1" less conduit pipe to dissipate the heat. But it is a little more difficult to epoxy the conduit to the pot and you may still have a wax clogging problem.

Use thread seal tape (part 7) to assemble the drain valve (part 2) and the conduit (part 3). Using this assembly, apply moderate force on the conduit to thread itself into the drain hole. Use a metal file to modify the hole as needed for a snug fit of the drain assembly. Then remove the drain assembly.

Note: If the drain valve has a loose fit, don't give up. The epoxy can usually perform miracles and still seal the hole.

Note: The valve (part 2) was used to provide some leverage to force the assembly into the pail.

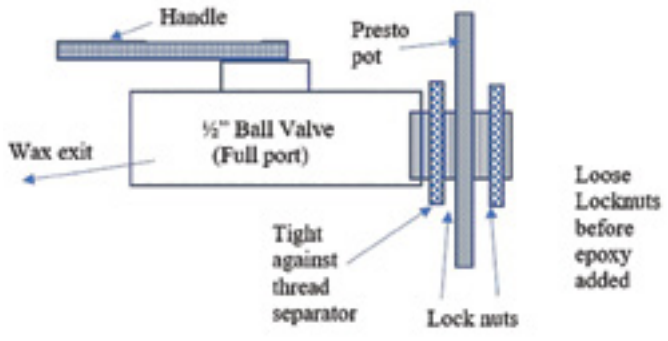
Note: The drain valve should have a slight downward slope due to the angled side of the pot. This is good as it allows the valve to drain.

Rational: By using thread seal tape and a separate conduit, the drain valve can be changed without affecting the pail integrity. Once you are satisfied that everything is working correctly, I recommend you epoxy the valve to the conduit.

Step 6: Add the locknuts and reinstall the drain assembly.

Add a locknut (part 4) to the pot side of the conduit (part 3). Then reinsert the drain assembly into the hole, add a second locknut on the inside of the pot. Be sure the handle of the assembly is in the position you need for your use. At the same time, position the threads on the drain so on the pot side of the conduit nipple there is equal space on each side of the pot. Do not and I repeat, ***DO NOT*** tighten the locknuts against the pail. Position the drain assembly so the space between the pail and the locknuts is equal distant.

Note: The locking protrusions on the locknuts should face the pail's side.



Step 7: Protect the conduit threads and the valve.

Use electrical tape or duct tape to cover the threads between the conduit thread separator and over the drain valve. This is to protect the valve and threads from being permanently attached to the conduit nipple at this time.

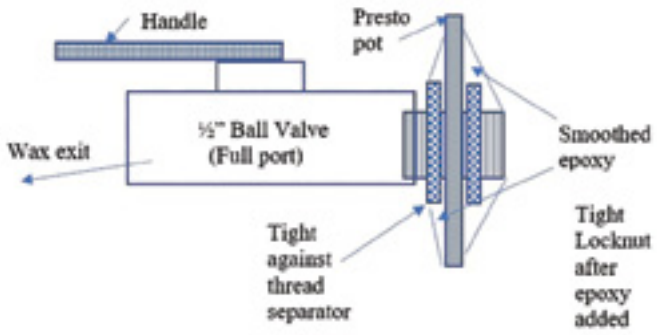
Step 8: Seal the outside and inside of the conduit nipple.

Follow the directions on the epoxy to activate it. Make rope of the epoxy and force it into the outside threads of the conduit nipple (part 3) between the outside locknut and the pot. Then tighten the locknut by turning the whole assembly one or two turns. Do *not* force all the epoxy from the connection. Leave enough so it can form a watertight seal. Make sure to position the handle of the valve so it is easy for you to use. This is usually on the top. Smooth the epoxy around the outside nut and the pot and allow it to cure.

After the epoxy on the outside cures, perform the same operation on the inside of the pot. This time tighten the inside locknut to the pot without changing the location of the handle. Again, do not tighten the locknut tight against the pot. Smooth the epoxy around the inside nut and allow it to cure.

Hint: Mix more epoxy than you think you need. If you are short of epoxy, you do not have time to mix more before the original portion starts setting up.

Warning: Do not get epoxy inside the conduit nipple. It will be almost impossible to get it out once it cures.



Hint: Stuff the conduit nipple with paper towel before adding the epoxy. Make it tight enough so any epoxy cannot get into the opening.

Warning: The working time of the epoxy is very short so do not dawdle.

Step 9: Water test.

Attach the 90° street elbow (part 6) to the drain valve. Then add an additional 2" nipple (part 8) to the street elbow. This small ¾" x 2" extension fits perfectly into the mouth opening of a gallon or half-gallon milk jug. No splashing and no wax flowing outside the jug.

Be sure to shut the valve and then add water to the pot and fix any leaks.

Note: I have used this epoxy nine times for adding taps on plastic, galvanized metal and aluminum. It has resulted in ZERO leaks.

Step 10: If needed, finish assembling the Presto Pot.

Follow the assembly directions that came with the pot to finish assembling the pot.

Step 11:

Once you like the handle position on the valve, remove it and the thread seal tape. Then reapply the tape leaving the threads not covered by the valve free of tape. Epoxy the valve in place and allow it to cure.

Not too hard was it!

Easy to make, easy to use and easy to clean, this melter will help you process the wax and at the same time make your hobby more enjoyable. Hints on how to use this wax melter effectively will be discussed in a subsequent article.

Get a copy of Ed Simon's book Bee Equipment Essentials with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from **www.wicwas.com**. *Ed can be contacted through* ***SimonEdwin41@gmail.com***. BC

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What Is Apitherapy?

Heliana **Pozzato**

Apitherapy is a complementary medicine, 100% natural, which consists in the application of stings from alive honey bees in different areas of the body to administer micro doses of Apitoxin for analgesic, anti-inflammatory, immunostimulants, vasomotors and neurostimulants purposes.

Its therapeutic action is highly effective in chronic ailments, neuralgia in general, even in cases of joint deformity. It is also an excellent treatment in autoimmune diseases such as Multiple Sclerosis, Arthritis, HIV, Lupus, Parkinson's, Diabetes, among others. Regarding the circulatory system, bee venom produces anticoagulant and vasodilator effects.

APITOXIN

Bee venom contains 88% acidic liquid, which causes pain and burning sensation, and 12% therapeutic liquid composed of peptides and enzymes. This 12% is what we call Apitoxin and which is used in Apitherapy, it is the part of bee venom that contains biological components which are use therapeutically both for ailments and for diseases, local and systemic therapy.

Therapeutic components of bee venom

Group 1: therapy facilitators. Permeates tissues and cells to the venom

1. Phospholipase: tissue regeneration
2. Histamine: powerful vasodilator
3. Hyaluroanidase: hydrolysis of hilauronic acid

Group 2: therapeutic agents

4. Adolapine: COX2 inhibitor (Cyclooxygenase 2). It works as an analgesic in inflammatory processes and pain.
5. Apamina: pain suppressing neurotoxin. Inhibits prostaglandin production. It works as an analgesic.
6. Melitin: vasomotor, antibacterial and antifungal action
7. Peptide 401: anti-inflammatory, vasodilator capacity

HOW IS APITHERAPY PERFORMED

Before starting therapy, a "tolerance test" should be performed to rule out possible allergy to apitoxin. This is a preventive action, given that between 1 and 3% of the world's population is allergic to the bee venom. Once this factor is discard, therapy will be initiated based on the nature of the disease and/or medical condition to be treated.

During sessions, micro doses of bee venom (0.2-0.3 mg) are applied in different areas of the body, as appropriate, for two to three seconds. The ideal frequency of the sessions is once a week, especially at the beginning of therapy. There may be redness, itching and local heating in the application areas. It is important to highlight that this reaction can be increased after the second and third session, as a response of the organism adapting to this antigen (adaptive phase). As from the fifth and sixth session the effectiveness of the treatment can be noticed, this is due to the blocking reaction, that is, the time it takes for the organism and the immune system to respond to the therapy. Doses should be gradual, starting with a maximum of three applications in the first session. Including the tolerance test. Reaching a maximum of 15 stings.

Apitherapy is a natural, aseptic and sterile technique. A sting is used per application, the same to say, a bee per sting. It is important to highlight that the Apitherapist must be a skilled professional with deep knowledge about the therapy, since he/she must be able to make a map of the patient's body with all the points to be stimulated with both local and systemic applications.

The duration of the treatment will depend on the nature of the disease and/or medical condition, going from eight sessions up to a year or more of treatment.

APIPHARMACOPOEIA

It is the therapeutic use of products derived from beehives, honey, pollen, propolis and royal jelly, which are adjuvants to bee venom in certain treatments.

Honey

*Power source
*Anti-inflammator
*Antioxidant source
*It favors digestion
*Antibacterial
*Soft natural laxative
*Contains protein

Pollen

*Anti-inflammatory
*Contains minerals and vitamins
*Combat physical fatigue & stress
*Normalize bowel function
*Combats anemia
*Antioxidant effect
*Stimulates mood

Propolis

*Antioxidant
*Anti-inflammatory
*Normalize bowel function
*Use in digestive tract ulcers
*Effective tissue restorative
*Use in herpes, boils, stings
*Antibacterial
*Lowers cholesterol
*Normalize blood pressure
*Healing
*Anesthetic

Royal jelly

*Regenerative properties
*Antioxidant effects
*Power source
*Natural antibiotic
*Natural anxiolytic
*Immune system stimulant
*Optimal for malnutrition or food deficiency
*Stimulates sexual function

My approach to Apitherapy

Sergio Gustavo Guarco, whom I consider my uncle, is an expert beekeeper and apitherapist, he was the one who introduced me to the wonderful world of bees. He taught me everything I know about beekeeping and beehive management and it is also thanks to him that I did the apitherapy training.

I discovered a world of opportunities and possibilities, of patients who revert their medical condition and take over their lives and bodies, thanks to apitherapy and bees. As a nurse passionate about my profession, being able to share knowledge and accompany people on this journey through apitherapy is one of my big dreams. BC

A Final Good-Bye

Last month we told you of the passing of our dear Ann Harman. We've taken one last opportunity to honor her in this issue (see Dewey Caron's article on page 81). Below are Ann's own last words dictated to her daughter Joyce just before her passing. In typical Ann style she was right on top of the details. She knew these would be her last words to us.

Thank you Ann for teaching us and expecting more from us. We'll do our best to carry on without you.

Hello beekeepers. For years I have been talking to you about many beekeeping subjects. Thank you for letting me into your homes to give bee information. You must carry on by inspring the youth who will be your scientists and solve the bee problems as we move through the years. And I give you best wishes for your beekeeping future, whatever that may be.

qwertyuiop
Ann Harman

(Note: this ending was used when newspaper writers were done. They typed that sign off so the plate setters would know it was the end of the article. If you look at your keyboard you'll see that it's the top line of the letters.)

Summer Time Recipes

Shana **Archibald**

Honey Lemonade
(this should make about 7 cups)
5 cups water, divided
1/3 - 1/2 cup honey (or other desired sweetener)
1¼ cups freshly squeezed lemon juice (about five to six large lemons)

In a small saucepan, combine 1 cup of water and 1/3 cup of honey and turn heat to medium. This is called a simple syrup, and it prevents a big clump of honey (or sugar) sitting at the bottom of the pitcher while you stir forever to get it to dissolve.

Once the honey is dissolved (this might take up to five minutes), pour it into the bottom of a pitcher or glass jar.

Add the lemon juice and remaining four cups of water and stir well.

Taste and adjust sweetener, if desired.

Serve cold or over ice.

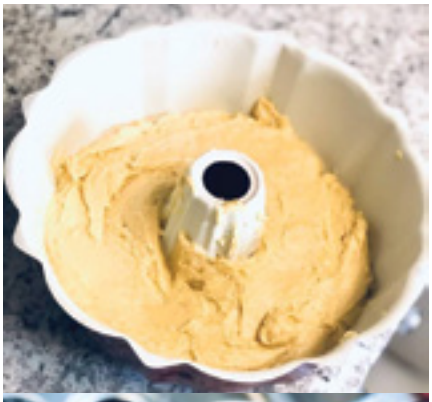
Lavender Honey Cake
1/2 cup butter
1 cup sugar
2 tbsp honey
2 eggs
1/2 tsp vanilla
2 cups flour
4 tsp baking powder
3/4 cup plain yogurt
1/4 cup cream (like half & half or heavy cream)
1 small bunch of fresh lavender flowers (remove the flowers from the stems, about 15-20)

Steeping The Lavender Flowers:

Remove the lavender flowers from the stems and chop them up into small pieces. Put the chopped flowers into 1/4 cup of cream, then place in the fridge to rest overnight.

If your garden doesn't have lavender flowers right now use six drops of Lavender essential oil.

*Note. If you want to replace the sugar and only use honey – replace 1 cup of sugar with 3/4 cup of honey, add 1/2 teaspoon of baking soda and reduce oven temperature by 25°.



Preheat your oven to 350°F.

Prepare your Bundt pan by spraying the inside of the pan with a baking spray containing flour (you can find this spray in the baking aisle at your grocery store). This step is so important if you want your cake to slide out of the pan. Set aside.

In a mixing bowl, cream together the butter, honey and sugar.

Add the eggs, one at a time.

Then add vanilla, and mix well.

In a separate bowl, whisk together the flour, and baking powder.

Remove the lavender flowers from the cream, then mix the cream with the yogurt.

Chop up the purple flowers to add to the batter (if desired. But not the stems!)

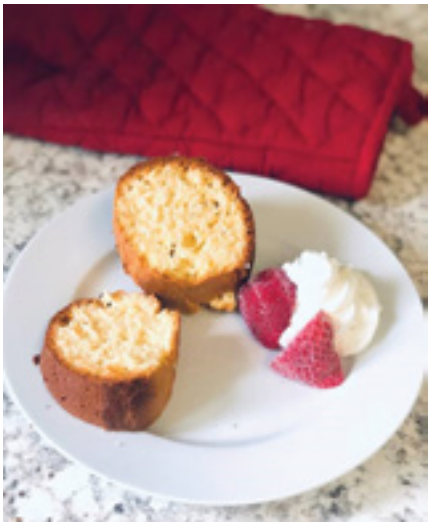
To the butter mix, add 1/3 of the flour mix, then 1/2 of the cream/yogurt mix. Repeat until all combined.

Stir in the chopped lavender flowers. (if desired)

Pour the batter into the prepared Bundt pan.

Bake at 350°F for 45 minutes, or until a toothpick inserted in the centre comes out clean.

Once the cake has baked, let it cool for about 10 minutes in the pan, then turn the cake out onto a plate, and sprinkle with powdered sugar.



CALENDAR

♦MAINE♦

EAS 2020 has that was to be held August 3-7 in Orono at the University of Maine has been cancelled.

For more information visit **www.easternapiculture.org/confereces/eas-2020.html**. Watch these pages for details.

♦MICHIGAN♦

The following Michiana Beekeepers monthly meetings for 2020 will be held at the Nappenee Public Library, on date shown from 9 a.m. to 12 noon.

July 18th - Speaker TBA

August 15th - Speaker Sam Comfort

September 19th - Speaker Dr. Jeff Pettis

October 17th - Speaker Dr. Jim Tew

For more information and to register contact Debbie, 574.277.0152.

♦VIRGINIA♦

August 22

Principles & Practices of Biodynamic Beekeeping - Part IV: Fall & Winter Learn about successful overwintering, including how to consolidate hive space, wrapping, feeding and more. Classes take place at Spikenard Honeybee Sanctuary in Floyd, VA. website: **www.spikenardfarm.org** contact: **info@spikenardfarm.org** or 540-745-2153

October 10-11

Sun Hive Workshop: Learn how to build the Sun Hive! This exciting hands-on hive building experience will be accompanied by lectures related to the importance of hive scent and warmth, wax, form and hive body materials. Classes take place at Spikenard Honeybee Sanctuary in Floyd, VA. website: **www.spikenardfarm.org** contact: **info@spikenardfarm.org** or 540-745-2153

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It's early May as I write, and I still have some five-frame hives, or "nucs," for sale. Folks stop by here all the time to buy bees. I have more bees than I know what to do with. That's a good problem to have, right? I keep telling myself that.

The other day a guy told me a story. He said there was a beekeeper over the hill in Boulder, Colorado, who refuses to sell nucs to novice beekeepers who have not taken a beekeeping course. "Bravo!" I thought.

Beekeeping is challenging. Derrick doesn't sell nucs anymore because he feels he's killing his bees when he turns them over to some beginner. I'm not that hardcore. Or maybe I just need the money.

A man recently called inquiring about bees for his mother. I said, "Put her on the line."

She sounded frail. The poor darling had utterly no idea what she was getting into. She just wanted to help save the bees. I talked her into planting pollinator-friendly flowers instead.

I *encourage* buyers to take an introductory beekeeping course. The one I'm currently recommending is the nine-hour online course from Penn State. One of my customers told me about it.

Business dealings in the time of corona can be tricky. One gentleman who stopped off to put down a deposit on a nuc practically lunged at me to shake my hand when he got out of his truck. I had to jump back. "Six feet, please!" I scolded.

He was a talker, and I had to keep backing up. When he expressed doubts about the severity of the pandemic, I told him that while he was entitled to his opinion, to please leave me out of his social distancing decisions.

He was on his way to Washington to pick up a boat but said he'd pick up the nuc on his way home in a couple of weeks. "Call before you come," I cautioned. But he never did. I was out of town when he stopped by the farm again at 2 p.m. on a warm May afternoon. Coming onto the property, he hit the steel post at the end of my row of Concord grapes.

Marilyn told him that if he waited until morning, I'd be back and could load his bees for him. But he wanted them then and there. So I told Marilyn which nucs hadn't murdered their new queens, and I offered her a commission to make the sale.

I forgot to tell her that a couple of the nucs had chalk brood left from the mother hive, and she inadvertently picked one of those for my customer. She never lit a smoker, so she got a little beat up closing off the nuc entrance. But she never complained. This gal's all gal. She put the nuc inside my customer's trailered boat, while most of the nuc's foragers were out looking for dandelions. He had four hours of driving and the Continental Divide to cross before he got home. I hope he made it without incident and that over time his new hygienic bees clean up all that chalk brood.

The deal was dicey from the get-go – from the handshake lunge, to his failure to call before he came back, to his hitting my grape post, to loading the bees in the heat of the day, to him getting that chalk brood nuc that I'd have rather kept myself to re-queen a hive that already had some chalk brood. I wish I'd told Marilyn, "We don't load bees in the heat of the day. Give him back his deposit." But there's no looking back.

About this time I received word that *Bee Culture* columnist Ann Harman unexpectedly departed Earth. This totally wrecked my day, because I still don't understand why good people have to leave us.

I met her in Kyiv, Ukraine in 2013 at the Apimondia international bee conference. Marilyn and I had just completed a Ukrainian "bee tour." We got to see how they do it in the old country. We marveled at the Ukrainians' belief in - and reliance on - bee products, including pollen, of course honey, cappings, and bee and wax moth brood, all of which they eat to cure a plethora of human health complaints. When I relayed this to Ann, she patiently explained that in the Communist era, medical care was hard to come by, so people looked for health solutions where they could find them.

I say Ann "patiently" explained this to us, because "patient" is how I remember this gentle soul. She seemed somehow above the fray, an angel bent by the ravages of time, yet still pursuing her passion for writing and the keeping of *apis mellifera*. If you asked her a question, her face would brighten, and she'd give a little start and stand just a bit straighter.

When I ran into her last year in Montreal, I tucked her under my arm and held her close. I didn't want to let her go. She gave me a bemused look. There is goodness in this cruel world, and Ann Harman personified it.

I hardly knew her. But she touched me. If she did the same for you, count yourself lucky.

Ed **Colby**

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