APR 2006

Bee Culture

WWW.BEECULTURE.COM

Pollen, like honey, is as varied in taste, color and exotic appeal as are the flowers it is gathered from.
(photo by Kirsten Traynor)

800.289.7668 • www.BeeCulture.com

Publisher – John Root

Editor – Kim Flottum, Ext. 3214, Kim@BeeCulture.com

Production Coordinator – Kathy Summers, Ext. 3215, Kathy@BeeCulture.com

Circulation & Advertising – Dawn Feagan, Ext. 3220, Dawn@BeeCulture.com

Publication Assistant – Sharon Garceau, Ext. 3255, Sharon@BeeCulture.com

Contributors

Clarence Collison • James E. Tew • Ann Harman
Malcolm T. Sanford • Steve Sheppard
Larry Connor • Connie Krochmal

Subscription Information

U.S., one year, $23.50; two years, $44. Newsstand price: $4.99. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), April 2006, Volume 134, Issue 4, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Contact Information

V800.289.7668 • V330.725.6677 • F330.725.5624 • www.BeeCulture.com • email: info@BeeCulture.com

Advertising

For information on advertising contact Dawn Feagan at 800.289.7668, Ext. 3220

POSTMASTER: Send address changes to BEE CULTURE, The A.I. Root Co., 623 W. Liberty St., Medina, OH 44256

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

APRIL 2006 VOLUME 134 NUMBER 4

FEATURES

DEPARTMENTS & COLUMNS

Bees In The Tree

I was doing some yard work about four or five years ago when one of my boys told me to look at this big white oak tree in front of our chain link fence. He said it had a whole lot of bugs flying around it. So when I went to look at it, I knew right away what they were. We had some new neighbors. Honey bees, and lots of them. This tree is about four feet thick at the bottom. I thought the whole time that the bees were going in and making their nests going up into the tree about five feet up. The more I watched them over the years, they seemed to be going further and further up. After they left the hive I realized they were actually going downward. This hive put off several swarms through the four or five years I knew it was there. I'd like to say somewhere between four or five swarms. During the Summer of 2005 they either flew off or died off. I'm not real sure which one. So when I realized they were gone, I broke off a piece of the dead wood from the front of the tree. And what I found is what you see in the photo.

I have been interested in bees for a long time. It is fascinating to me how such small insects can do so much. I have read the book *Beekeeping For Dummies*. It is a very good book and has helped me learn many things on how to care for bees. I didn't know much about the little giants until I read it. My wife actually got me a hive for Father's Day 2005 and I am planning on getting two or three more hives real soon.

Chester Brassfield
Houston, MS

Comments
Suggestions
Criticisms
Kudos, and
anything else

Thanks & Kudos

First, thank you for the calendar. It has great pictures and the ads are also close at hand when needed. My son, Bryce is nine years young and like his father, loves the honey bees. I am returning to this great gift from God, after being wiped out from *Varroa destructor* in the 90s. I want to introduce him to the calmest, gentlest bees possible. What breed do you and the subscribers to *Bee Culture* suggest? My email is batjeffers@yahoo..com. Please send me your opinions.

I know in my County, Scott in Tennessee, of no young people who are into beekeeping of any form. Who will take over when we all pass on? If anybody has had success give me some ideas so that we can try to get kids started out in beekeeping.

Brian Jeffers
Oneida, TN

Editor's Note: *My first recommendation is always Carniolans. Their reputation for gentleness is universal. There are many good producers of these fine bees that advertise in all of the journals.*

Yellow Jacket Names ...

I was fascinated by Charles Martin Simon's informative article on Yellow Jackets in the February, 2006 issue. Having read this first installment of a three-part series, I have already gotten the answers to many of my questions arising from answering "swarm" calls that ended up being Yellow Jacket activity. However, in discussing three forms of Yellow Jackets, which he refers to as *sub-species*, he does refer to three separate binomial (genus species) names for the three. This would indicate that his three sub-species are considered to be three separate species by many.

Nonetheless, they form a fascinating group of insects, regardless how classified.

Bill Huser
South Sioux City, NE

... and Simon Answers

In my February 2006 article, I stated there are three subspecies of Yellow Jacket. I meant to say three *main* subspecies. Now, thanks to Bill Huser, I see I should have meant three main *species*. Upon further research, it appears there are four genera and more than seven Yellow Jacket species.

Whosoever delves into Yellow Jacket nomenclature delves into a real can of worms. So, here we go:

According to the University of California IPM Program: there are more than seven types of ground-dwelling Yellow Jackets alone, including a number of different species in the genera *Vespula* and *Dolichovespula*. In this group are the Western Yellow Jacket, *Vespula pensylvanica* (also called the Eastern Yellow Jacket — and also described as making their nests in cavities, hollow trees, walls, etc. Ohio State University also identifies this type as a ground dweller) and seven other species. I have also found ground dwellers identified as *Paravespula germanica*— German Yellow Jackets. But

Editor, 623 W. Liberty St.,
Medina, OH 44256
KIM@BEECULTURE.COM

University of California at Davis states *Paravespula germanica* is a cavity dweller and nests most often in houses. (Cavity Dwellers are described also as *Paravespula maculifrons*) There is agreement, however, that ground and cavity dwellers are the most common Yellow Jacket types, forage for practically anything, and the ones most likely to cause trouble when you try to eat outdoors later in the season.

Dolichovespula arenaria and *Dolichovespula maculata* are the aerial Yellow Jackets. These have been described as significantly different from the other species in that they are diet specific and eat only mosquitoes. I have also read that this type does not forage for sweets later in the year, and so isn't responsible for disrupting outside eating events. UCDavis says this: "These aerial nesters do not become scavengers at the end of the season...." Doesn't make sense to me, because I would think they would run short of carbohydrates late in the season, just like any of the others; but there it is, in black and white. So, with the multiplying threats of very serious mosquito-born diseases, if the information is correct, aerial Yellow Jackets should be very seriously protected.

Clemson University of South Carolina's Extension Program identifies three species of Yellow Jacket: *Vespula*, *Vespa* and *Dolichovespula*. But these classifications should be called genera not species; they need the second names to designate species.

According to UCDavis, there are 7 species. Ohio State University identifies three. The El Dorado County, California, Environmental Management Department describes four, including the Common Yellow Jacket *Paravespula vulgaris*, and states that it inhabits tree stumps at high altitudes. Others say this one builds in the ground. Ohio State implies but does not outright state that *Paravespula vulgaris* is the aerial species. The way it achieves this implication is by identifying the other three species as ground and cavity dwellers, mentioning *vulgaris* as a fourth species but not citing it's dwelling characteristic, and not specifying the aerials at all.

The El Dorado County, California, Environmental Management Department identifies also the Prairie Yellow Jacket, *Vesoyka atropilosa*. They say it is not a pest, that it feeds on live insects and nests in the ground in open meadow lands. But this has to be incorrect, because adults don't eat protein, they bring it back to feed to larvae. The adults, like other Yellow Jackets, would have to eat carbohydrates secreted by the larvae, until later in the season when there would not be enough larvae to meet their needs; then they would have to go looking for carbohydrates. So how could they not be a nuisance at picnics?

Some expert sources say the ground dwellers always live in the ground, cavity dwellers always live in cavities, aerials always live in exposed hanging nests. Other just as expert sources, say the ground dwellers might also live in cavities and the cavity dwellers might also build aerial nests.

I do the work, so I haven't needed to know what they are called – before now. I can tell you with 100% authority what they are and how they behave and how to deal with them. But as for what to call them, I have to defer to higher authorities, as above.

Charles Martin Simon
Soquel, CA

Germany Grant

I just wanted to let you know my grant application for the German Chancellor Scholarship Program was accepted. I will be studying German beekeeping, the cultural history, honey marketing and the medicinal benefits of beehive products. I will be working with Dr. Boecking of the Bee Institute in Celle, Germany for one year starting in September, 2006.

I am very excited about this grant, as to the best of my knowledge, it has never before been awarded to a beekeeper. It is reserved for applicants who show great leadership potential. I believe this will be an excellent opportunity to open a greater dialogue between German and American beekeepers. I welcome any suggestions from the American beekeeping industry for lines of inquiry about their German counterparts. Also I would welcome any contact names American beekeepers have with German beekeepers. I am fluent in German, so communication will not prove a difficulty.

Kirsten Traynor
Middletown, MD

Editor's Note: *Kristen is the author of the article, "Beyond Honey," published this month, and the photographer of this month's cover and can be reached at kstraynor@adelphia.net.*

Brooklyn Bees & Honey

There are a number of beekeepers in NYC, though less than a dozen I would imagine. Four come to mind immediately. The bees are kept on rooftops, community gardens and public parks. I keep them on the roof. There's plenty of floral sources. Street and park trees such as linden and black locust form part of their diet plus there are flowers galore in private and public places. I have seen my bees avidly working the white clover in my local park. Plus their is the Brooklyn Botanic Garden a mile or two away. Because the flowers generally aren't sprayed and because I don't have any diseases (no Varrroa thank you God, but I do have wax moths) and don't treat with chemicals, I like to think of my honey as "close to" organic. (I do use fume boards however.)

Why don't you look at my website? www.thebroklynbee.com.

I subscribe to Bee Culture magazine and have found it very helpful and interesting.

John Howe
Brooklyn, NY

Katrina Help Update

This letter serves to thank you for your donations to assist beekeepers in Mississippi who suffered losses from Hurricane Katrina. I also wish to inform you of how your donation is being utilized. We have received $900 in donations from several sources.

Three beekeepers are being assisted as follows:

Mr. Doug Lowery, Vancleave, MS, lost 30 colonies and equipment. We will provide a beekeeper $500 to produce 12 nucs as replacements.

Alice Huffman, Gulfport, MS was a beginner and lost both hives. We provided $200 to help replace bees and equipment she lost.

Mrs. Judith Redwhaw, Kiln, MS was also a beginner and will be credited $200 to her account with Dadant and Sons to help her get started again.

Again we thank you for your generosity.

Harry Fulton
Mississippi State, MS

The Heart of the Hive

I'm quite new at beekeeping, not even a full year at it. However, I've found a useful bee tool that I've never heard mentioned in any of my studies. So I thought it would be good to pass on the discovery.

This tool is a stethoscope. As it turns out a stethoscope fitted with an infant bell makes it rather easy to hear through the walls of the hive box. This provides an easy way to get some feel for the activity in the hive when weather does not allow actually opening the hive. It's comforting to hear their pleasant buzz even during cold and strong wind. Also I've been able to track the movement of the cluster, as well as expansion and contraction with temperature changes. I don't know what different buzzes and sounds really mean yet, but for the experienced ear this unintrusive listening could be very helpful.

Daniel Jacobs
Crow Agency, MT

Reconsidered

Originally I had intended to stop my subscription. I was not impressed with the number of what I considered "applicable to me" articles. It seems since December, your magazine is putting out better features. I am a hobbyist – 10-15 hives. I lost two nucleus hives and two older hives last Fall. The two nucs swarmed after two applications of sucracide. The older hives were my fault (failure to requeen quick enough). I had the same problem as other beekeepers last year – failure of hives to accept new queens – new queens which failed. I also blame my losses on a local beekeeper who sold me older queens – I won't make that mistake again!

Anyway, I am resubscribing – any comments on my problems are appreciated. Thanks.

Bob Limbird
Knoxville, AR

Understanding Science

In the January, 2006 issue of *Bee Culture*, Dr. Sheppard reports on certain apicultural research about breeding mite resistance and the results obtained. In the same issue Dr. Sanford reports the status of bee science as being still in flux. As laymen are we to assume that the expenditure of efforts and funds for bee research is for naught or are we missing being told of some points that justify what we have come to expect from research? We would like desperately to be reassured.

In nearly every field of science research they can lay claim to having advanced the knowledge of mankind. However, the application of such knowledge or intelligence seems to sometimes be sporadic or disregarded. Perhaps it is political or social strictures that impeded implementation of advances in science research.

We are told that a society founded on material largess cannot survive a denial of the privileged state, which may be true if there is also an accompanying weakening of the "moral fiber." Another question. Has the advancement of certain science posed a threat to our future welfare by giving us the means of over-exploiting our natural resources and harming our air, water and earth components? We hope that the future shows that there is justification for our devotion to making life better through our accomplishments in science. Are we missing something in our striving to become a world-wide society of material abundance while neglecting the need to strengthen and advance our civility?

Larry Goltz
Redding, CA

INNER COVER

We receive an avalanche of farm magazines here every month. Regional issues (SE, SW, MW, NE, NW), crop specific issues (citrus, cotton, corn and soybeans, wheat), or general crops (fruit, vegetables, berries, nuts) or equipment (tractors, sprayers, plows, cutters, balers).

Some are general, covering all of the above in an issue, while others focus not on plants, but farm animals (chickens, horses, alpacas, turkeys, or pigs). By the end of each month I've received a Master's degree in agriculture production, marketing, economics, science, politics and technology.

In a recent issue of *Good Fruit Grower,* published by the Washington State Fruit Commission, there was a piece by columnist Dr. Thomas Wahl on selling food in China. He commented on Chinese consumers' concern for food safety, and how the perception was that food bought in super centers (think WalMart) was safer than food purchased in small, open-air markets. Of course, these Super Food Sellers are predominately located in large urban areas, and not in the rural parts of the country. Safety concerns run primarily to problems with pesticide and heavy metal contamination.

According to Dr. Wahl, China has implemented a (food safety) grading system that includes normal, no-harm, green, and organic classifications. Because of the concerns about pesticides and heavy metal contamination, those foods in the no-harm, green and organic classifications have become increasingly popular, and are the fastest-growing segment of the market. One wonders how bad 'normal' would be.

This begs the question, says Dr. Wahl, of why don't more Chinese producers produce more crops in those fast-growing categories. Why? Because the past sins of overuse and industrial pollution have contaminated much of the suitable growing areas of the country. That's why.

Which, Dr. Wahl contends, opens a door to that market for uncontaminated, pure, natural imports – from, yes, you guessed it, the U.S.

I don't know if China will ever be a market for U.S. honey exports, but that comment about the past sins of overuse and industrial pollution certainly should cause an alarm to go off somewhere, don't you think?

If those sins have ruled out crop production in those areas, what of honey production?

Good Fruit Grower magazine is an excellent publication if you do anything agricultural in the north west. You can reach them at 800.487.9946, or www.goodfruit.com

•

Most of us aren't affected by those honey prices printed on page 15, or by the report back in the *Gleanings* section. International, even National politics, economics and crop conditions just don't filter down as far as we are.

What does, however, is the information on our Honey Report this month. Where do people sell honey, and how much do they sell at each place?

Home is still king, since 69% of our reporters sell on average 33% of their honey from there. Interestingly, while the percent of our reporters selling from home has remained relatively steady, the amount of honey sold there is decreasing. Same is true for farm markets, except the short term. I suspect that these are fairly lucrative sales, since 13% of our reporters sell half of their honey there. The health food market is difficult to understand when looking to our figures. Maybe somebody has an idea they could share about these outlets.

Take a close look at our Honey Report this month. It will give you some ideas on where else to sell your honey.

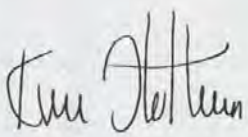
•

Heard here and there. Speaking of honey prices, world sugar prices are moving up pretty fast because of government intervention, recent storms, and cane products going to more profitable ethanol production. Expensive sugar means replacement products sell better, like corn syrup. And, with syrup and sugar prices up, beekeepers in many countries find it's easier, and cheaper, to feed bees honey. Thus, less honey on the world market.

But then, there's those two+ billion bushels of corn carried over from 2004 to 2005, plus another two+ billion from 2005 to 2006. Last year's drought kept that number in check. Good weather and 80 million planted acres this year might bring lots more corn online – so maybe those syrup prices won't go completely through the roof.

But corn is more expensive to grow – more so than soybeans, so maybe there'll be some switching by cash strapped farmers. Where will the corn market be, come Fall? Fewer acres, maybe? Better production, maybe? Demands for syrup to replace sugar, maybe? More into ethanol, maybe?

And suddenly, we hear, there's a shortage of available, already-imported Chinese honey in the U.S. 233 million pounds came in last year, and, it seems, what's left may have had more problems than some importers thought. If you don't look, you won't find anything, that's for sure.



Chinese Honey

APRIL - REGIONAL HONEY PRICE REPORT

Where is honey sold? Lots of places, it seems, and finding out how many people sell how much where is the goal of each April Survey. We've got three year's worth of data now, and it's interesting to look at the similarities, the differences, the trends, and the changes over these three years.

Weekend farm market sales are becoming popular, while gift stores are less so. Interestingly, small franchise outlets are expanding, while sales at work (make sure that's O.K. with the powers that be) are expanding, too. See what other folks are doing and calculate how well some of these may do for you this season.

% of Reporters Selling at these locations			% of Their Honey Sales at these locations			Locations Honey Sold at
2004	2005	2006	2004	2005	2006	
68	78	69	40	35	33	Home (inside or roadside stand)
17	14	13	23	41	49	Local community - sponsored farm market (i.e. Saturday & Sunday sales)
24	21	30	23	14	17	Local Farm Market business that's seasonal (Fall only, for instance)
19	18	16	32	34	17	Local Farm Market business that's year-round
5	6	18	6	23	5	Flea Market
28	41	28	28	14	20	Health Food/Organic store
15	17	10	23	9	7	Gift Store
8	11	10	9	11	14	Specialty Outlet (salons, tourist outlets, airports)
23	29	23	22	16	16	Bakeries/Food Establishments
14	11	5	18	23	5	Local High-End Retail Outlets (gourmet stores)
26	25	36	24	18	19	Local, Small 'Mom & Pop' Retail Outlets (grocery & gas)
4	6	10	22	12	21	Local, Small, Franchise Outlets (7-11, Dairy Mart, Stop & Go)
15	25	10	40	31	12	Local Small Packer or Producer/Packer
6	10	5	66	68	45	Huge Packer, they pick up
17	25	16	40	35	43	Wholesale only to medium retail outlets (small chains) you deliver
4	6	3	44	29	40	Wholesale only to larger stores, you deliver to warehouse
3	10	10	5	3	15	Breweries/Beer or Mead makers
8	11	8	31	12	15	Internet, direct retail, mail order
17	11	25	19	6	28	Work, direct retail
5	6	8	27	33	17	Local/State Fair, with club

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

	Reporting Regions												Summary		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last	Last
Extracted honey sold bulk to Packers or Processors													**Range**	**Avg.**	**Month**	**Yr.**
Wholesale Bulk																
55 gal. Light	0.94	0.95	0.94	1.10	0.95	0.71	0.86	0.90	0.94	0.79	1.10	1.14	0.71-1.14	0.94	0.93	0.99
55 gal. Amber	0.90	0.95	0.90	0.95	0.75	0.65	0.75	0.90	0.70	0.90	1.20	1.15	0.65-1.20	0.89	0.96	0.93
60# Light (retail)	102.50	101.20	103.21	97.00	82.00	100.00	93.13	102.70	125.00	103.21	125.00	90.00	82.00-125.00	102.08	99.37	102.76
60# Amber (retail)	106.67	97.15	100.60	95.53	78.00	71.00	87.31	105.00	110.00	100.60	100.00	90.00	71.00-110.00	95.16	101.40	94.50
Wholesale - Case Lots																
1/2# 24's	40.08	39.95	37.65	39.60	37.65	32.50	37.48	37.65	37.65	35.76	27.50	37.65	27.50-40.08	36.76	42.78	47.26
1# 24's	62.24	56.58	65.85	58.00	63.00	56.00	62.34	62.53	51.25	77.76	68.50	72.60	51.25-77.76	63.05	65.58	62.68
2# 12's	60.48	54.92	57.87	53.00	58.50	48.00	56.63	56.50	46.50	57.84	44.00	61.80	44.00-61.80	54.67	54.20	56.54
12 oz. Plas. 24's	60.00	55.10	59.63	56.90	45.70	48.00	49.77	49.25	56.60	47.64	58.80	55.20	45.70-60.00	53.55	52.24	50.34
5# 6's	53.47	60.29	63.74	57.25	63.74	63.74	59.05	50.00	57.00	56.43	43.19	65.00	43.19-65.00	57.74	60.70	56.40
Quarts 12's	79.50	110.18	87.07	81.88	72.00	77.50	82.06	75.45	72.00	95.50	76.20	84.00	72.00-110.18	82.78	84.18	81.60
Pints 12's	48.00	54.98	53.88	55.50	52.00	53.50	49.65	42.57	48.00	49.50	42.00	51.00	42.00-55.50	50.05	47.58	51.26
Retail Honey Prices																
1/2#	2.43	2.40	2.49	2.86	1.89	3.19	2.39	1.84	2.29	2.44	2.52	2.75	1.84-3.19	2.46	2.42	2.37
12 oz. Plastic	2.98	3.05	2.49	3.45	3.26	3.79	2.83	3.15	3.44	2.98	3.15	3.38	2.49-3.79	3.16	3.15	3.25
1 lb. Glass	3.86	3.67	3.96	4.25	3.75	3.99	3.45	3.96	4.00	4.25	4.06	3.95	3.45-4.25	3.93	3.90	3.91
2 lb. Glass	6.95	5.95	6.99	5.97	6.82	6.99	5.88	7.14	6.33	5.94	6.24	6.95	5.88-7.14	6.51	6.32	6.36
Pint	5.00	6.95	5.90	6.00	5.77	4.75	4.87	5.17	5.00	6.75	5.00	6.00	4.75-6.95	5.60	5.81	5.78
Quart	9.00	10.37	10.27	8.30	7.92	8.88	7.68	8.81	8.88	10.50	8.16	7.85	7.68-10.50	8.89	9.64	9.23
5 lb. Glass	13.78	12.66	13.86	13.13	15.00	13.86	13.49	15.99	15.00	13.51	11.93	14.49	11.93-15.99	13.89	13.39	13.68
1# Cream	4.25	4.98	5.32	4.36	3.79	4.10	5.08	4.32	5.32	5.14	4.63	4.51	3.79-5.32	4.65	4.73	4.76
1# Comb	6.00	4.83	6.97	5.13	6.97	4.50	6.29	4.50	6.97	6.00	4.95	5.75	4.50-6.97	5.74	5.87	5.84
Ross Round	5.60	4.25	5.17	5.95	5.17	5.17	4.50	5.00	5.17	5.63	6.00	4.75	4.25-6.00	5.19	4.61	4.93
Wax (Light)	2.50	2.20	2.50	2.45	2.44	1.25	2.55	2.38	3.10	2.45	1.40	2.65	1.25-3.10	2.32	2.15	2.27
Wax (Dark)	2.42	1.90	2.45	2.17	2.20	1.10	2.39	2.00	3.45	2.10	1.50	2.38	1.10-3.45	2.17	2.34	2.00
Poll. Fee/Col.	50.00	70.67	83.57	36.67	40.00	40.00	47.17	60.00	45.75	83.57	115.00	142.50	36.67-142.50	67.91	49.71	47.62

HONEY PRODUCTION – 2005

Honey production in 2005 from producers with five or more colonies totaled 175 million pounds, down five percent from 2004. There were 2.41 million colonies producing honey in2005, down six percent from 2004. Yield per colony averaged 72.5 pounds, up one percent from the 71.8 pounds in 2004. Colonies which produced honey in more than one State were counted in each State where the honey was produced, therefore yields per colony may be understated. Colonies were not included if honey was not harvested. Producer honey stocks were 62.4 million pounds on December 15, 2005, up two percent from a year earlier. Stocks held by producers exclude stocks held under the commodity loan program, which totaled 20.0 million pounds at year-end.

Honey Prices Down 15 Percent

Honey prices decreased during 2005 to 90.4 cents, down 15% from 106.9 cents in 2004, and 65% from the 2003 price of 138.7¢/lb. Prices are based on retail sales by producers and sales to private processors and cooperatives. State level honey prices reflect the portions of honey sold through retail, co-op and private channels. Honey prices for each color class are derived by weighing quantities sold for each marketing channel. Honey prices for 2005 were lower than the previous year for all color class totals.

Several items bear noting for 2005 as significantly changed from 2004. Of course a six percent drop in the number of colonies is scary, but where they dropped is even more telling. Look at the Top 10 Table. These 10 states support 71% of the nation's colonies, and produce 75.3% of 2005's honey (down 3.5% from 2004). But Florida and Texas both report a drop in colonies greater than 20%, and Minnesota's down 12%. Fortunately, Michigan

Per Capita Consumption

Plusses	Mil. Lbs.
Production	174.6
Stocks In	61.2
Imports	233.3
Total	**469.1**

Minuses	Mil. Lbs.
Loans	20
Stocks Left	62.4
Exports	7.6
Import Stocks left (Est. at 15% of imports)	35
Total	**125**

To Calculate Per Capita Consumption

Consumption	Mil. Lbs.
Production	469.1
- Removed	125.0
= Consumed	344.1
÷ Population	296.4
Per Capita	**1.16 lbs/person**

Per capita is 1.16 lbs., which is 18.6 ounces. In 2001 it was 18.9 ounces and in 2003 it was 19.7, and 17.6 ounces in 2004.

Honey: Number of Colonies, Yield, Production, Stocks, Price, and Value by State and United States, 2005[1]

State	Honey Producing Colonies	Yield per Colony	Production	Stocks Dec 15[2]	Average Price per Pound[3]	Value of Production
	x 1,000	Pounds	x 1,000	Pounds	Cents	1,000 Dollars
AL	13	66	858	266	128	1,098
AZ	36	50	1,800	720	97	1,746
AR	36	69	2,484	571	95	2,360
CA	400	75	30,000	9,300	84	25,200
CO	26	70	1,820	837	104	1,893
FL	160	86	13,760	2,477	87	11,971
GA	59	49	2,891	434	84	2,428
HI	9	131	1,179	283	134	1,580
ID	95	37	3,515	1,793	80	2,812
IL	8	85	680	408	162	1,102
IN	8	64	512	189	119	609
IA	28	88	2,464	1,232	98	2,415
KS	16	50	800	328	124	992
KY	5	50	250	40	212	530
LA	35	97	3,395	611	71	2,410
ME	8	26	208	193	187	389
MI	65	68	4,420	2,519	99	4,376
MN	120	74	8,880	1,598	83	7,370
MS	16	80	1,280	346	66	845
MO	15	50	750	180	121	908
MT	130	67	8,710	3,136	80	6,968
NE	40	68	2,720	2,530	89	2,421
NV	12	46	552	442	209	1,154
NJ	12	32	384	104	118	453
NM	7	49	343	113	102	350
NY	60	73	4,380	2,321	122	5,344
NC	10	54	540	146	194	1,048
ND	370	91	33,670	8,418	81	27,273
OH	15	69	1,035	580	141	1,459
OR	39	42	1,638	557	108	1,769
PA	28	56	1,568	800	105	1,646
SD	220	79	17,380	11,818	76	13,209
TN	7	55	385	92	164	631
TX	84	71	5,964	954	85	5,069
UT	23	45	1,035	331	103	1,066
VT	6	91	546	169	106	579
VA	8	37	296	59	221	654
WA	51	55	2,805	1,935	106	2,973
WV	8	51	408	102	124	506
WI	64	83	5,312	2,922	114	6,056
WY	40	56	2,240	291	87	1,949
Oth Sts[4,5]	18	44	786	261	278	2,184
US[5]	**2,410**	**72.5**	**174,643**	**62,406**	**90.4**	**157,795**

[1]For producers with 5 or more colonies. Colonies which produced honey in more than one State were counted in each State.
[2]Stocks held by producers.
[3]Prices weighted by sales.
[4]CT, DE, MD, MA, NH, OK, RI and SC not published separately to avoid disclosing data for individual operations.
[5]Total colonies multiplied by total yield may not exactly equal production.

remained steady and South Dakota and California actually showed an increase in colony numbers.

75% of the nation's honey is produced in these 10 states, with more than 50% coming from the top four – North and South Dakota, California and Florida. California actually saved our collective bacon this year by getting back to the 30 million pound range. That's 40% more than 2004, and even 11% above its past six year average of 27 million pounds.

Of the 174.6 million total pounds produced last year, 82.4 million pounds, or 47%, still sits in producer warehouses, either unsold, or under loan. Compare that to the 233.3 million pounds of imported honey, 23% more than in 2004, and, in fact more than any year, *ever*. It's amazing more isn't left in those warehouses.

Imports, or course, are almost always preceded by the word cheap. When all the colors, varieties, kinds and styles of imported honey are totaled (233.3 million pounds), and all the money paid ($140.2 million), the average price/pound comes out right at $0.60/pound.

The People's Republic Of China sent over 51.1 million pounds (22% of these imports), at an average value of $0.50.5/pound. Argentina, another big exporter, sent along 49.8 million pounds, (21% of those imports) at an average value of $0.65/pound. Other major players include Canada, India, Uruguay, Hungary, Vietnam, Korea and Taiwan.

These prices – $0.60 overall, and as low as $0.50.5 certainly must have had an effect on the overall average offering to domestic producers. However, these low prices do not include the anti-dumping tariff, and pursuing those who seek to evade payment (and many Chinese exporters did evade paying the additional cost), kept the overall U.S. honey price reasonable, but certainly lower than 2004.

But once again, there is that disparity between the price that producers are paid and the retail store shelf price. For instance, The Honey Price Table shows a 202.8% markup between farm gate and store shelf. That's up from the 170.8% markup in 2003 – somebody's making good money on this stuff it seems.

Look now at The Per Capita Consumption Table. Let's examine that just a bit. The computation is pretty straight forward, honey in, honey out, honey left over, number of people – pounds of honey per person consumed. But that's every person. My guess is that half of the people in the U.S. never, ever eat a drop of the stuff. You know some of them, right? They do, I'd guess, eat some honey in those products that advertise honey on the label, and actually have some inside. So, to take this next step, those who actually eat honey probably eat, what, a pound and a bear a year? Close?

Finally, our prediction in November last year missed the mark. Missed it way wide. Our summary came out with a per colony average of 59 pounds per colony average. It was as you can see 72.5 pounds – 13.5 pounds off. That made a U.S. crop of 153.4 million pounds, which missed the mark by 21 million pounds. And it was California that threw the curve by returning to normal, instead of repeating 2004's disaster crop. Oh, well, it's a good mistake to make.

Two more things. The numbers in the USDA report are chronically flawed due to sampling error and producer's reluctance to participate. We are confident, however, that when compared to the previous year's reports, accurate trends become apparent. Prices and colony numbers, up or down here, may not be exact but they are consistent. That counts.

For more than a decade's worth of data check out usda.mannlib.cornell.edu/reports/nassr/other/zho-bb/ and see for yourself how your state has done over time, compared to nearby states, and how your operation compares to others in your state. It's an enlightening experience.

Top Ten Producing States Each Year

2000			2001			2002			2003			2004			2005			
State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	X1000 Col.	% Chg. From 2004	X1000 Prod lbs
ND	300	34.5	CA	425	27.6	ND	320	24.0	CA	480	32.1	ND	390	30.4	ND	370	-5%	33.7
CA	440	30.8	ND	280	26.9	CA	470	23.5	ND	340	29.6	SD	215	22.6	CA	400	+3%	30.0
SD	235	28.4	FL	220	22.0	FL	220	20.4	FL	210	14.9	FL	205	20.1	SD	220	+1%	17.4
FL	232	24.4	SD	235	15.3	SD	225	11.5	SD	215	14.0	CA	390	17.6	FL	160	-22%	13.8
MN	150	13.5	MT	136	13.9	MN	117	8.5	MN	120	10.0	MT	140	10.8	MN	120	-12%	8.9
MT	124	10.9	MN	135	10.9	MT	134	8.4	MT	145	9.6	MN	135	10.1	MT	130	-9%	8.7
TX	105	8.3	TX	97	7.7	TX	114	7.6	TX	140	9.4	TX	116	8.8	TX	84	-22%	6.0
WI	84	7.6	WI	67	5.4	WI	70	6.7	WI	74	5.7	ID	100	6.3	WI	64	-6%	5.3
MI	58	5.4	MI	76	4.6	NY	60	5.8	NY	67	4.8	WI	68	5.8	MI	65	0%	4.4
NY	58	4.6	NY	53	3.7	MI	72	5.5	MI	65	4.8	MI	65	4.3	ID	95	-5%	3.5
Total	**1800**	**168.4**		**1724**	**138.9**		**1802**	**121.9**		**1856**	**134.7**		**1824**	**136.8**		**1708**	**-6.4%**	**131.7**
All States	**2620**	**220.3**		**2506**	**185.5**		**2574**	**171.7**		**2590**	**181.1**		**2599**	**181.7**		**2410**	**-6%**	**175.0**
% of Total	**69%**	**76%**		**69%**	**75%**		**70%**	**71%**		**72%**	**74%**		**71%**	**75%**		**71%**		**75.3%**

*Percent difference reflects retail mark up price over bulk honey price.
**2004 prices revised by USDA in 2005.

Honey Prices 1993-2005

Cents/lb.	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004**	2005
All Honey	53.9	52.8	68.5	87.8	75.7	65.5	60.1	59.7	70.4	132.7	138.7	108.5	90.4
Retail Shelf	81.3	89.1	100.0	117.3	125.7	114.7	126.6	130.4	142.2	152.5	188.5	188.7	183.3
%Difference*	151%	169%	146%	134%	166%	175%	211%	218%	202%	115%	136%	174%	202.8%

RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

Evaluation of tracheal mite infestation and overwintering survival in "Russian" honey bee colonies.

In the last 20 years, U.S. honey bees and beekeepers have become quite familiar with two introduced species of parasitic mites: *Acarapis woodi* and *Varroa destructor*. The initial response of the U.S. beekeeping industry, which to a large extent continues to this day, was to seek chemical control measures to ameliorate major losses often associated with these mites.

With the *Varroa* mite (*V. destructor*), the results have been mixed, with the mites rapidly developing resistance to the highly effective compounds that were initially available (fluvalinate, coumaphos, amitraz). The chemicals registered or available for use more recently in the U.S. (formic acid, thymol, sucrose octanoate, oxalic acid) appear to have the potential for longer effective "lifespans" as control agents, due to their mode of action. However, the downside is that these latter compounds are often less effective or more difficult to use and, consequently, less well-suited to management strategies traditionally employed in large beekeeping operations. This issue will be revisited as the major topic of an upcoming column.

With the tracheal mite, there appears to have been a reduction in the occurrence of nation- or region-wide losses, such as those that were attributed to this mite as recently as a decade ago. Although menthol as a treatment for tracheal mites continues to be effectively used in some geographic regions, many beekeepers in both northern and southern climates have stopped treating. There are probably multiple reasons for this. First, in colder northern climates, it is difficult to fit the treatment timing and temperature requirements for the proper use of menthol into the season. In warm southern locales – the almost continuous brood rearing that occurs throughout the year and the corresponding absence of a long-lived population of overwintering adult bees may reduce the potential for the mite population to reach highly damaging levels. In addition, the U.S. honey bee population itself may have changed over the past 20 years, as populations of honey bees that were most highly susceptible to tracheal mites were lost. One reason that this genetic response may have occurred with tracheal mites to some extent, but not *Varroa* mites, is that beekeepers continue to chemically treat almost all managed honey bees in the U.S. for *Varroa*. Such actions assure that varroa-susceptible honey bees remain as major genetic contributors to the overall honey bee population.

Various researchers have presented evidence of tracheal mite resistance in honey bee populations or evaluated differential resistance of specific honey bee strains to tracheal mites. Recently, de Guzman and colleagues compared tracheal mite infestation levels and overwintering survival between strains of "Russian" breeder queen lines and commercial lines of "Italian" honey bees (de Guzman et al, 2005). "Russian" honey bees are descended from importations made from Russian source populations within the last decade, while the "Italian" strain is a current representation of honey bees that were imported into the U.S. from Italy as early as 1859. The experiments were carried out over two Winter seasons. In the first Winter, 26 Russian and 33 Italian colonies were overwintered in Iowa. They were equalized for honey levels and treated with antibiotics and Apistan prior to winterizing the hives with carton wraps and a styrofoam top cover. The change in weight and adult bee population size were measured after the experiment. Tracheal mite prevalence (proportion of adult bees infested) and intensity (number of mites per infested bee) was estimated periodically between September and April by dissecting and examining 30 honey bees per colony. In the second Winter, the experiment was expanded to include locations in Louisiana and Mississippi, although only Russian or supercedure Russian queens were evaluated and mite levels were examined from August through May. The total number of colonies used in the second year by location was: IA - 63, LA - 57 and MS - 56.

In the comparison between the Russian and Italian honey bees, the authors reported significant differences in mite prevalence. Across the five sampling dates, the mean proportion of bees infested within the

Italian group was around 28% and for the Russian group it was 11%. For both groups, the highest infestations were found in the month of April, when 37% of the dissected Italian honey bees were infested with mites compared to 15% of the Russian bees. The mite intensity was significantly different among months, but not between the two honey bee groups. De Guzman and colleagues also reported major differences in the changes in adult honey bee population size between the two groups. The colonies of the Italian honey bee group contained a mean of 18,000+ workers at the start of the experiment, compared to 11,000+ for the Russians. By April, the Italian colonies contained approx. 7000 workers while the Russians averaged about 5,800. Thus, the Italian honey bees lost approximately 66% of their workers over the Winter, while the Russians lost about 45%. These differences were also reflected in significant differences in weight change through the Winter, with the Italians losing about seven kg through the Winter compared to four kg for the Russian group. A total of five colonies died over the Winter, four Italian and one Russian.

The results of the second year of the experiment indicated that the evaluation of tracheal mite tolerance in the Russian lines was best carried out in the location with a colder climate (IA in this case) and that colonies in locations more exposed to Winter conditions experienced the highest mortality. In the second year, colony mortality in Iowa appeared associated with those lines that were most susceptible to mites or that starved for other reasons.

Overall, the authors concluded that the Russian lines they tested had the ability to overwinter under harsh northern conditions. They cite prior work demonstrating that Russian bees express traits, such as frugality and good clustering, important to good wintering in cold climates and then warn us, "...without tracheal mite resistance these traits are insufficient to assure successful overwintering." The paper by De Guzman and colleagues is part of a growing body of evidence suggesting that the solution to the U.S. "tracheal mite problem" lies within the honey bee itself, rather than in products applied to hives for mite control. Whether through the conscious efforts of beekeepers to distribute and maintain tracheal mite resistant stocks or the action of natural selection to eliminate susceptible genetic lines of honey bees (such as probably occurred early in the 20th century in Europe), there is reason to be optimistic that the next 20 years will find these mites much less cited on the pages of this column. BC

Dr. W. Steve Sheppard, Thurber Chair, Department of Entomology, WA State University, Pullman, WA 99164-6382, shepp@mail.wsu.edu; www.apis.wsu.edu.

De Guzman, L.I., T.E. Rinderer, M. Bigalk, H. Tubbs and S.J. Bernard. 2005. *Russian honey bee (Hymenoptera: Apidae) colonies*: Acarapis woodi *(Acari: Tarsonemidae) infestations and overwintering survival.* Journal of Economic Entomology. 98: 1796-1801.

Malcolm T. Sanford

New Generation Honey Cooperatives: Has Their Time Come?

"Recently, an NGC initiative has been formed that is in part a collaboration between the division of Marketing, Florida Department of Agriculture and Consumer Services (Fresh From Florida) and the Florida State Beekeepers Association."

The American agricultural cooperative has a long and interesting history. The movement's philosophy sprang from religious roots in the early twentieth century. Later it took on a more pragmatic posture, characterized by advocates as a uniquely American "middle way" between Facism and Communism after World War II.[1]

A quintessential part of American agriculture, the cooperative model makes a lot of sense for many reasons. It would appear to be a "slam dunk" idea for beekeepers. After all, these individuals are involved with one of nature's most social and, therefore, cooperative critters. So why is it that many beekeeping cooperatives are short lived; few surviving to maturity? Contributary is that the cooperation engendered by the bust side of the "boom and bust" cycle of agricultural commodities often breaks down with the next price boom, and cooperators take it upon themselves to go their own way, to the detriment of the cooperative.

The structure of traditional agricultural cooperatives often contributed to their demise. Although "owned" by members, many didn't have much equity tied up in their ownership. The membership was also fluid (members could easily come and go); returns were modest because they were tied to selling low-priced commodities; and marketing programs were not well defined nor enforced.

Not all failed of course. In the beekeeping industry, some stand out as unqualified successes. Two come to mind, one in the United States and another in Canada. Who has not seen Sue Bee® honey on the shelf at their local grocery store?

"With $200 and 3,000 pounds of honey, five beekeepers located near Sioux City, Iowa, formed a cooperative marketing organization in 1921. It was named Sioux Honey Association after the city of its founding.

"Members formed the association so that they could market their honey at greater profit through sharing services and equipment, processing and packing facilities, and complete marketing and sales organizations.

"The association is a cooperative in every sense of the word. Members own the association and control its operations through an elected Board of Directors. The management of the association is responsible to the directors. Membership grew over the years to a peak of 1,200 but currently includes about 315 members as apiaries have grown, consolidated, and modernized like other agricultural businesses. Most of the membership hails from the western two-thirds of the United States plus Florida and Georgia. Each member is responsible for supplying the organization with honey extracted from the honeycomb. This liquid product is usually shipped to our processing plants in 55-gallon drums that hold approximately 650 pounds of honey. Collectively, our membership produces around 40 million pounds of honey annually (62,000 of these drums).

"Prior to 1964, honey was delivered to one of the associations six packing facilities located in Sioux City, Iowa; Anaheim, California; Waycross, Georgia; Temple, Texas; Umatilla, Florida; or Lima, Ohio. Sioux Honey absorbed Bradshaw Honey Company of Wendell, Idaho, in 1964 and maintained that facility as well. As transportation improved, honey-producing areas moved westward and the business streamlined. Today only the Sioux City, Waycross, and Anaheim plants have remained to serve the association.

"In the early days, honey was marketed under the "Sioux Bee" label, but the name was changed in 1964 to "Sue Bee" to reflect the correct pronunciation more clearly. Over time, other lines of honey were added, including Clover Maid, Aunt Sue, Natural Pure and North American brands.

"Sioux Honey Association has become a worldwide marketing organization. Its global presence extends to the Middle East, Far East, Europe, and South and Central America, and it continues to be a leader in the honey industry with state-of-the-art facilities, which include labor and developmental research." [2]

Not as well known in the U.S. is Bee Maid:

"In 1950 a few beekeepers had a dream – a vision – that a major portion of the Canadian honey production could be marketed through one organization, completely owned and controlled by and for the benefit of the beekeepers.

"To pursue this vision, a meeting was held in Winnipeg with the representatives of the Alberta, Saskatchewan, and Manitoba Co-Operatives. They agreed to study a plan whereby their total honey intake would be sold as a national brand over a single sales desk while each organization would preserve its individual identity.

"After thorough study, Interprovincial Honey Sales Co-Operative

Limited – later known as BeeMaid Honey Limited – was incorporated to act as the honey marketing agency if, as, and when two or more Co-Operatives might so desire.

"BeeMaid Honey finally commenced operation in 1959 when the Manitoba and Saskatchewan Co-Operatives agreed to market all their honey jointly. In 1961, the Alberta Honey Co-op participated with the Manitoba and Saskatchewan Co-Ops through BeeMaid Honey in developing the export market, and in 1962 began full participation in both the domestic and export markets.

"Thus, by 1976, the principle of Co-Operative Honey Marketing was fully extended beyond provincial borders and BeeMaid Honey was marketing over one desk the entire volume of the Honey Co-Ops of Western Canada, with plants in Edmonton, Bassano, Tisdale, and Winnipeg. As time moved on the packing plant in Edmonton needed to be expanded so in 1993 the plant was moved to a new facility in Spruce Grove, Alberta.

"This large volume – the major portion of the Canadian crop – has enabled BeeMaid Honey to:

- Explore and successfully develop new markets for Canadian honey, especially in the export markets.
- Reduce marketing costs through the elimination of expensive duplication of selling and promotional expenses.
- Prevent private packers, who have little interest in the well-being of the beekeepers, from dominating the market.
- Pool the intake of each plant, thus avoiding the potentially disastrous problems of local over or under supply.
- Supply any brand to any market from the plant which can supply most economically and thus maximize return to beekeepers.
- Progress towards the establishment of a single national brand marketed from coast to coast with national advertising and promotion.

"Indirectly, all Canadian beekeepers benefit through the stabilization of markets. Directly, the greatest benefit accrues to the Co-Operative member through increased returns due to the more efficient and economical marketing of his honey crop.

"BeeMaid – truly a dream come true."[3]

I have not done a rigorous study on both these outfits, but from casual conversation and observation, these cooperatives appear to have survived principally because of a committed membership and professional management. It is particularly noteworthy that both have changed over time from simply marketing a commodity to distributing more value-added products. This process, called "vertical integration," seeks to take advantage of increased profit margins available through marketing products directly to consumers. With this concept in mind, another kind of agricultural cooperative has taken root in the Canadian prairies, and now being adopted across the United States.

This entity, known as the "New Generation Cooperative" (NGC), seeks to take advantage of the modern marketing environment. Unlike traditional cooperatives, in which start-up expenses are minimal and growth is financed through members' retained earnings, permanent equity to fund NGC start-up and growth is financed through the sale of delivery rights. There are several primary characteristics of NGCs: [4]

1. Defined membership: Sometimes referred to as "closed," the membership size is determined at the outset of the enterprise.

2. Delivery rights: A right and an obligation to deliver. This is a legal contract and as such carries penalties if broken.

3. Up-front equity required from producers. Potential members fund the cooperative startup costs. They may enter into partnerships with similar enterprises to reduce expenses.

4. Delivery rights are transferable and may fluctuate in value. They can be bought and sold under specific federal trading regulations.

5. Marketing agreement entered into between member and cooperative. This can include how the product is delivered and includes such things as lab tests and lot traceability.

Recently, an NGC initiative has been formed that is in part a collaboration between the division of Marketing, Florida Department of Agriculture and Consumer Services (Fresh From Florida) and the Florida State Beekeepers Association. Its goal is to provide members with an alternative market for quality Florida-produced honeys at above cost of production.

Guiding principles include marketing only "top of the line" table-grade honey produced in Florida (both varietals and seasonals) using niche marketing to outlets like farmers markets and specialty stores. The following scenario has been distributed for guidance:

1. Co-op buys 500 barrels of honey from the membership (300,000 lbs) for $375,000 (estimated $1.25/pound).
2. Producer members commit 80% of their production (5,000 colonies from 40 producers at 75 lb = 375,000 X .80 or 300,000 lbs as delivery rights) to the cooperative under specified conditions.
3. Co-op purchases all members' committed honey at 10% above USDA published price.
4. Coop packs, sells and makes a net profit of 50% on honey purchased. (estimated $187,000 returned to the membership or retained for growth).
5. Co-op raises initial capitalization of $290,000 from members and applies for $150,000 assistance in kind from the Florida Department of Agriculture (grants, marketing assistance), total initial equity = $440,000.
6. Possible membership consists of: 40 producer beekeepers (delivery rights for an aggregate of 5,000 colonies yielding 75 lbs per colony) $4,000 each; 30 associate investing members, $2000 each ; 10 allied industry members, $2000 each, 100 friends and wannabees $500 each.

Funds are being solicited from interested potential members to support a feasibility study for this potential NGC. There is a good level of excitement and interest in the project at the moment, however, it is wise to keep in mind the remarks of Randall E. Torgerson at a recent meeting on cooperatives:

"There is a lot of momentum and energy in the value-added arena

as farmers seek to strengthen income and keep themselves in the driver's seat at a time of rapid consolidation and concentration in the food industry. How will it all turn out? Are these efforts too late? Or, are they on the cutting edge of new institutional market development? The outcome will be determined by the strength of leadership offered, careful development of business plans and marketing strategy, and proper capitalization."[5] BC

Dr. Sanford is a former Extension Specialist in apiculture at the University of Florida.

References:

1. Lawless, Greg, 2003. Historic Foundations of Cooperative Philosophy. Bulletin 3, University of Wisconsin, Center for Cooperatives, Bulletin 3, accessed February 20, 2006 http://www.wisc.edu/uwcc/info/uwcc_bulletins/bulletin_09_03.pdf.
2. History of Sue Bee Honey Cooperative, accessed February 20, 2006, http://www.suebee.com/history.asp.
3. History of Bee Maid Honey Cooperative, accessed February 20, 2006 http://www.beemaid.com/BeeMaid/Company/history.htm.
4. Hackman, Dean. 2001 "What is a New Generation Cooperative?" Nov./Dec. 2001, newsletter of the Ag Innovation Center, Jefferson, MO 65102, accessed February 20, 2006 http://www.extension.iastate.edu/agdm/wholefarm/html/c5-112.html.
5. Torgerson, Randal. "A Critical Look at New Generation Cooperatives," accessed February 20, 2006 http://www.rurdev.usda.gov/rbs/pub/jan01/critical.htm.

The African Honey Bee

A Case Study Of A Biological Invasion

Stan Schneider, Gloria DeGrandi-Hoffman, Deborah Smith, David Tarpy

One of the most amazing biological phenomena that has occurred in our life time is the introduction and spread of the African honey bee (AHB) in the western hemisphere. Within 50 years of its initial introduction into Brazil, the AHB has colonized much of the New World, giving rise to one of the most rapid and spectacular biological invasions humans have ever witnessed. A remarkable feature of the AHB is its ability to displace resident European honey bees (EHB). As the AHB migrated northward from Brazil, it largely or entirely replaced feral European honey bees in almost every area where it became established, often with dramatic consequences for apiculture, agriculture, and public safety. Indeed, a project that began 50 years ago as a means to improve honey production in Brazil ultimately changed beekeeping in 17 countries over two continents. The African bee arrived in the U.S. in 1990. It is now permanently established throughout the southwestern states and parts of California, where it is displacing feral EHB populations and creating public safety concerns in many regions. Recent reports of the AHB from Louisiana and Florida raise the possibility that the southeastern states will also be colonized by this highly invasive insect.

Learning to control and cope with the African bee (and with the media attention that invariably follows it) requires knowledge of its biology, history, how it interacts with European bees, and the effects it is likely to have as it spreads in the U.S. To this end, we present a series of three articles that discuss the major aspects of the AHB in the Americas. The first article compares the biology and survival strategies of African and European bees and summarizes the history of the AHB in the western hemisphere, beginning with the initial introductions into Brazil. The second article discusses the different factors that influence the AHB's ability to displace European honey bees in the western hemisphere. In the final article, we examine the spread and economic impacts of the AHB in the U.S. and speculate about its possible future movements.

Stan Schneider received his PhD in Animal Behavior from the University of California at Davis and is now at the University of North Carolina at Charlotte. His main areas of research are honey bee communication and the biology and behavior of the African honey bee.

Gloria DeGrandi-Hoffman received her PhD from Michigan State and is now Research Leader at the USDA Bee Lab in Tucson. Studies include pollination, African honey bee genetics and biology.

Deborah Smith received her PhD in Neurobiology and Behavior from Cornell University and post-doctoral training in molecular biology at the Laboratory for Molecular Systematics at the University of Michigan. She is now at the University of Kansas, studying mitochondrial DNA analysis, honey bee biogeography and honey bee population biology.

David Tarpy received his PhD in Entomology from the University of California at Davis and is now the Extension Apiculturist in the Department of Entomology at North Carolina State University. His research interests address the biology and behavior of honey bee queens – using techniques including field manipulations, behavioral observation, instrumental insemination, and molecular genetics.

The Biology of African and European Honey Bees

The honey bee, *Apis mellifera*, is native to the Old World and occurs naturally from the southern tip of Africa to Russia. Within this enormous geographic range, populations have adapted to different environmental conditions giving rise to more than 20 different subspecies, or races. These races can be divided into two main groups, based on the type of environment they have evolved to inhabit. Temperate climate races occur in Europe and are collectively referred to as European honey bees. The primary factor shaping the survival strategy of these races is Winter. To survive Winter, colonies must amass huge honey stores, which require that they occupy large, well insulated cavities, build large amounts of comb, maintain large worker populations and foraging forces, and emphasize nectar over pollen collection (Fig. 1).

European honey bees swarm primarily in the Spring and early Summer, to provide new colonies with sufficient time to amass large food reserves, and typically produce only 1-3 swarms per year. In addition, European colonies tend to "stay put." They rarely abandon nest sites and never migrate to escape Winter conditions.

Figure 1. *Unlike European bees, which must occupy large, insulated nest cavities for Winter survival, AHB colonies can occupy smaller cavities and are more likely to build exposed-comb nests.*

In contrast, tropical races of honey bees occur in Africa. They do not experience such cold Winters and can often forage year round. This reduces the benefit of amassing large food reserves and allows colonies to construct smaller amounts of comb and occupy smaller nest cavities. A major sur-

vival challenge faced by African races is a high level of predation, which selects for increased stinging responses and high rates of colony reproduction. African races are often more defensive than European races (Fig. 2). Also, they typically produce three to four times as many swarms (3-12 per year) and, because of the prolonged foraging season, often have several swarming periods throughout the year. High rates of swarming require increased brood production. African

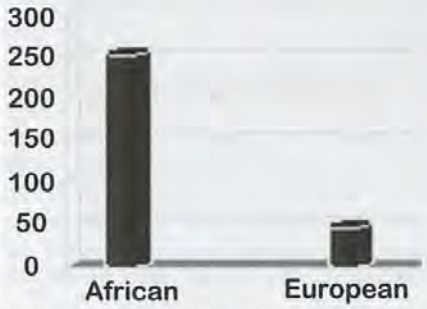


Figure 2. *The African honey bee race,* Apis mellifera scutellata, *is well known for its high degree of nest defense. Here are data comparing the number of bees captured while defending their colony in the first 30 seconds after a disturbance. About five times more African bees leave the colony than European bees in the same time interval. AHB workers also produce more alarm pheromone than EHB workers, which excites other workers to sting, and further contributes to greater colony defensiveness.*

bees devote two to four times more comb space to brood rearing than European bees and emphasize pollen over nectar collection to provide the proteins needed for increased brood production. Also, AHB workers have a shorter development time than EHB workers (18.5 versus 21 days, respectively), which further promotes the rapid build up of colony size and frequent swarming. Another challenge facing African colonies is the shifting pattern of floral resources that arises from the shifting, and often unpredictable patterns of rainfall of the African continent. Rather than hoard large amounts of food to survive dearth periods, African colonies often migrate long distances to follow seasonal changes in forage availability. African colonies will also readily abscond in response to disturbance and predation. As a result, African bees are much more mobile and more inclined to abandon nest cavities than are European honey bees.

Figure 3. *An AHB worker (left) and EHB worker (right). African and European bees look virtually identical, although African workers develop faster in the larval stage. AHBs sometimes have a darker color than EHBs, but color is too variable in both races to be used as a reliable identification mechanism. The two races differ more in how they behave rather than how they look.*

Thus, even though European and African honey bees belong to the same species, look virtually identical (Fig. 3), and have the same social structure, they have emphasized different aspects of their nesting biology, comb usage, foraging behavior, reproduction and movement patterns to adapt to their different environments.

The European races of honey bees are the most familiar to us. Their large population sizes, along with their emphasis on honey production, low swarming rates and reluctance to abscond make them ideal for beekeeping and agriculture. Starting in the 1600s or earlier, European honey bees were introduced repeatedly into North America by the first settlers that came from Europe. The bees thrived and quickly established large wild populations throughout the country.

European races were also continually introduced into Central and South America. Although some countries developed sizable beekeeping industries, European bees did not thrive in tropical habitats. They required extensive human management and never established large feral populations. Some nations therefore began to explore the possibility of importing African races of honey bees. Although the increased defensiveness, high swarming rates, absconding and migration behavior of African bees were recognized as detriments to beekeeping, it was thought that selective breeding could modify these undesirable traits, resulting in a gentle, tropically-adapted bee that would improve beekeeping and honey production in the Neotropics.

The differences in the biology of African and European bees that evolved over millennia therefore set the stage for the AHB invasion, and no one could have foreseen the enormous consequences that would arise from the subtle behavioral differences between these subspecies of honey bees.

The History of the AHB in the Americas

The story of African honey bees in the New World begins in Brazil (Fig. 4). From 1954-1955, beekeeping agencies, government departments and private beekeeping cooperatives initiated projects in Brazil to increase the low honey production of the European colonies kept by commercial beekeepers. The best subspecies to introduce into Brazil was determined to be *A. m. adansonii* from southern Africa, a population now re-classified as *A. m. scutellata*. In 1956, Dr. W. E. Kerr traveled to Africa to select queens of the best stocks. Queens were selected from Angola, Mozambique and Bloemfontein, and Republic of South Africa, but none survived. Six queens were collected in Tanganyika, of which one survived introduction to Brazil. Of 132 queens collected from Pretoria, South Africa, 46 survived introduction into Brazil. These few surviving colonies are often viewed as the *only* colonies that gave rise to the African population in the New World. However, we now know that there were other introductions of AHB into South America, as well as human-assisted distributions of AHB queens to beekeepers. In combination, these colonies and queens formed the nucleus of the African population that would eventually colonize much of the western hemisphere.

Initially, it was thought that interbreeding between African and European bees would genetically dilute the undesirable AHB traits.

Although the EHB had never established wild populations in the Neotropics, many countries maintained large (sometimes enormous) populations of managed colonies. As the comparatively small African population interacted with the much larger managed EHB populations, it seemed logical that the AHB would become less-and-less "African like" as it spread northward. Early in the invasion process, it was widely believed that there was unrestricted mating and genetic exchange between the EHB and AHB populations. As a result, the feral bee in the Neotropics was given the common name, the *Africanized* honey bee, because it was thought to be a hybrid that arose largely from European queens mating with African drones. The population advancing northward was considered to be a "hybrid swarm" that consisted primarily of swarms escaping from managed European apiaries in which the queens had mated to some extent with African drones.

The development of molecular techniques allowed for increasingly detailed studies of the genetic structure of the African population. As these studies progressed, it became clear that the hybrid-swarm and genetic dilution concepts were incorrect. Studies of mitochondrial DNA were particularly important in this research. Unlike the DNA in the nucleus of cells, which is inherited 50/50 from the mother and father, mitochondrial DNA is inherited solely from the mother. Thus, if the feral honey bees in the Neotropics were Africanized (hybrids of European queens and Afri- ➢

TOOLS OF THE TRADE

Deborah Smith

Genetic Tools Used to Study Honey Bees

Allozymes are slightly different forms of the same protein, caused by mutations in the genes that produce them. This technique, the first used in honey bee genetic studies, is relatively cheap and provides high quality information: it is possible to detect whether individuals have inherited the same form of a protein gene from each parent (in which case they are called "homozygotes"), or a different one from each parent ("heterozygotes"). Unfortunately, honey bees show very little variation in allozymes. Just two, called MDH and HK for short, show pronounced differences between African and European honey bees. For more than 20 years, these have been the "work horses" of honey bee population genetic studies. However, proteins are relatively delicate molecules, so it is necessary to use fresh or well frozen tissues. This means that samples collected into alcohol and samples in poor condition cannot be analyzed, and dry ice, liquid nitrogen and -80°C freezers are not always easy to come by.

The DNA molecule is tougher than protein, so useable DNA can be extracted from samples that have been frozen, stored in alcohol, or freeze dried, making collection of samples much easier, and a variety of rapid and simple methods to extract DNA from tissues are available. Many genetic techniques detect differences in DNA sequence directly. These techniques reveal much more detail about the genome than allozymes can, but require specialized, and sometimes expensive, chemicals and equipment.

Restriction enzymes: Many different restriction enzymes are commercially available, each recognizing a different sequence of 4, 5 or 6 nucleotides in a strand of DNA. A DNA sample is incubated with a restriction enzyme; if the restriction enzyme detects its specific recognition sequence of 4-6 nucleotides, it will bind to the DNA strand and cut it in two at that point. If samples of DNA from two individuals are compared, one may possess a recognition sequence (e.g., GAATTC) and the other may have a different sequence not recognized by the enzyme (e.g., GGATTC). If these samples are incubated with the restriction enzyme, fragments of different length will be produced: **restriction fragment length polymorphisms**, or **RFLPs**.

RFLPs are used extensively to compare and classify honey bee mitochondrial DNAs, which are relatively small. African, west European and east European mitochondrial DNA are each characterized by unique patterns of presence or absence of particular restriction enzyme recognition sites.

Microsatellites are a form of what is loosely called junk DNA. A microsatellite "gene" contains many repeats of short, simple sequences, such as AATAATAAT, or GCGCGC. These repeats are a sort of "tongue-twister" for the cellular machinery that replicates DNA in the living cell—it is easy to accidentally delete or duplicate copies. Thus, different individuals in a population may have, for example, 90, 100, 101, 102 or more copies of a short sequence strung end to end. Although they do not code for any product, microsatellites are useful to a population biologist because they are abundant, highly variable, and rapidly evolving, and can be used as markers to distinguish populations or even individuals. A typical animal genome may contain thousands or even millions of microsatellites "genes" scattered around the chromosomes. In a population of organisms, there may be dozens or more variants or alleles for each microsatellite "gene," each consisting of different numbers of repeats (a microsatellite "gene" is more properly called a locus, or place, on the chromosome, since genes code for a product or function; each copy number variant is a different allele). Unlike allozymes, with only two genes loci that show differences between African and European bees, hundreds of microsatellite loci have been identified in honey bees, many of which show differences between African and European populations in the type and frequency of alleles. It is expensive and time consuming to develop a system to detect microsatellite loci in a new study organism, but once developed they are relatively quick and cheap to use (assuming one has invested in the appropriate lab equipment).

DNA sequencing determines the actual sequence of nucleotides in a particular gene or other piece of DNA. This provides the most detailed information, but within a single species most nucleotides in a gene will be the same and differences will be few. It is also too expensive and time consuming to carry out on the large numbers of individuals typically used in population studies. However, a new technique is on the horizon that will make it possible to screen large numbers of individuals for a polymorphism revealed by sequencing studies.

Single nucleotide polymorphisms, or SNPs. The recently completed Honey Bee Genome Project (HBGP, carried out at Baylor College of Medicine) sequenced the entire genome of a U.S. "Italian" honey bee. Parts of the genome of the European bee were compared with DNA sequences from Africanized honey bees from Texas, and more than 1500 places were found where the European and African sequences differed by a single nucleotide – SNPs (pronounced "Snips"). Thus SNPs represent just variable nucleotides, distillated out of the vast volume of DNA sequence data generated by the HBGP. These markers will provide a valuable set of markers for analysis of the Africanization process, detecting genes associated with desirable traits, and many other studies.

Figure 4. *Introduction of* Apis mellifera scutellata *into Brazil began in 1956. Within 50 years this tropically adapted race of bee colonized most of South America and all of Central America. It entered the U.S. in 1990 through south Texas and is now permanently established throughout the southwestern states and southern California. Throughout its range in the New World, the AHB shows a remarkable ability to displace resident EHB colonies.*

can drones), then their cells should contain only European mitochondrial DNA. However, in the late 1980s Dr. Deborah Smith of the University of Kansas and Dr. H. Glenn Hall of the University of Florida independently discovered that 97% of all colonies sampled in many regions of Latin America contained only African mitochondrial DNA. There was only one possible explanation: Rather than expanding northward as European-matriline hybrids, the feral honey bees in Central and South America were composed almost entirely of colonies that arose from African queens. Colonies arising from European queens were virtually absent. Although EHB queens in managed colonies were mating with African drones, European-matriline (Africanized) swarms escaping from apiaries were clearly not surviving in the wild.

This phenomenon is particularly striking in areas such as the Yucatán, Mexico and southern Texas, where the invading front encountered huge populations of European colonies. When the AHB arrived in Mexico in 1985-86, the Yucatán Peninsula supported one of the highest densities of European apiaries in the world. Yet, within 12 years, only about 20% of the managed colonies were still European and today wild European-matriline colonies are virtually nonexistent in the area. Recently, Dr. Alice Pinto, working at Texas A&M University, found a similar situation in southern Texas. When the AHB arrived in 1990, southern Texas contained large populations of both managed and feral European honey bee colonies. But, by 2001 only about 10% of feral colonies were of European maternity, suggesting that colonies arising from AHB queens had displaced most of the wild European population. Interpreting the results from Texas is complicated, because at the time of the AHB's arrival *Varroa* mites and tracheal mites had eliminated much of the feral European population. Thus, it is difficult to know the extent to which the loss of EHB colonies resulted from parasitic mites or displacement by African bees. Dr. Pinto's work also revealed that about 30% of newly established colonies in southern Texas are of European maternity, suggesting that managed European colonies are producing a sizable number of swarms that move into the wild. However, the evidence suggests that these colonies do not survive over time, resulting in a largely African population.

Although studies of mitochondrial DNA have taught us a great deal about the genetics of the African honey bee, they do not give us a complete picture. Because mitochondrial DNA is inherited solely from the mother, it can only tell us about the contributions of African and European queens to a honey bee population. To fully understand the genetic structure of a population, we must also examine the DNA of the nucleus of cells, which contains genetic material from both the queen and drones. A large number of genetic techniques have been used to determine the degree to which honey bee populations contain African and European nuclear genes (see Box). Each approach provides slightly different information, but all have revealed a consistent pattern: relatively little EHB genetic material moves into the African population and even less persists over time. Throughout Latin America and southern Texas, EHB nuclear genes rarely account for more than 30-35% of the genome (i.e. the bee's set of chromosomes containing all of its genes) of wild colonies, and the percentage is typically far less. Furthermore, the frequencies of these genes decline over time. After several decades, EHB genes usually account for only 10-20% of the feral genome, suggesting that hybrid colonies do not survive in the wild. Thus, feral honey bee populations in invaded areas are composed almost entirely of AHB matrilines, with predominantly African nuclear genomes.

African and European honey bees do hybridize and some European genes have become incorporated into the feral AHB population. It is now unarguable that the introduced bee in the western hemisphere is no longer genetically identical to the ancestral *Apis mellifera scutellata* population in Africa from which is was derived. The fact that AHB will interbreed with the EHB and produce hybrid colonies is not surprising, because they are races of the same species. What is much more surprising is how *little* European genetic material has become permanently incorporated into the African population, given the initially small size of the introduced African population, the large European population, and nearly 50 years of interbreeding.

Thus, studies of both mitochondrial and nuclear DNA have given the same results: The AHB has retained a largely African genome as it colonized the western hemisphere, despite continued interbreeding with European bees. Indeed, throughout much of its range in the New World, the invading honey bee has remained essentially African in its nesting biology, foraging, swarming and absconding behavior. For these reasons, we refer to the descendents of *Apis mellifera scutellata* in the Americas as African bees. We reserve the terms "Africanized bee" and the "Africanization process" to refer specifically to colonies that arise from European queens mated with African drones. The ability of the AHB to retain its African nature and displace European honey bees is one of the most amazing and mysterious aspects of the invasion process. In the next article, we explore a variety of factors that may contribute to this phenomenon. BC

Pesticide Safety

Nicholas Calderone

What follows is not intended to be a comprehensive review of pesticide safety; but, given the number of new pesticides on the market and the rapidly approaching field season, I thought it would be a good idea to put the focus on pesticide safety. Always read the product label before using a pesticide to get complete and up-to-date instructions for proper use.

Over the past two decades, beekeeping has become more and more like the rest of commercial agriculture. In the early 80s, we used a handful of chemicals to manage pests in our hives. Today, we use over a dozen (Table 1). While chemicals provide short-term relief for our pest problems, they also present significant risks. Best management practices dictate that you understand these risks and that you know how to minimize them.

Pesticides pose risks to applicators, non-applicators, and consumers of hive products. The primary risk to the consumer is in the form of chemical residues in honey and wax. Those risks can be minimized by using chemicals only when needed and only according to label instructions. Non-applicators are at risk when hive chemicals are improperly used or stored and when posting regulations are not followed. Non-applicators include apiary inspectors, employees not involved in pesticide application, family members of beekeepers, especially small children, and visitors to your operation. Applicators are at risk whenever they are handling hive chemicals.

To prevent unwanted exposure, you must secure each of the routes by which chemicals can enter your body: inhalation (the lungs), contact (skin, eyes, mouth) and ingestion (mouth). For the applicator, this is accomplished by using the proper personal protection equipment (PPE) listed on the label. You can find dozens of PPE suppliers on line. Purchase the appropriate disposable gloves in bulk for a big savings.

CONTACT (skin, eyes, and mouth): Some chemicals like thymol can cause contact dermatitis and serious eye damage; others, like formic acid can cause severe burns, especially to your eyes and lungs; while others, like coumaphos or permethrin, can be absorbed through the skin and enter the bloodstream, causing damage to nerves and other internal organs. There are several precautions you can take to prevent contact exposure.

Standard beekeeping clothing: Your bee suit is an important part of your PPE. It provides good protection from chemicals in solid, granular or dust form and limited protection from pesticides in liquid form such as Gard-Star®, Mite-Away II™, Sucrocide™, wood preservatives, and bee repellants. If you spill a pesticide on your bee suit, remove it immediately and put on a clean one. Be sure to wash any contaminated part of your body with soap and water. Launder the contaminated clothing in detergent and hot water several times, separately from other laundry, before reusing. Afterwards, clean your washing machine by cycling it once with detergent but without clothes. You can increase your protection by wearing a Tyvek® suit over your bee suit (see insert A). This type of suit is especially useful when dipping large quantities of woodenware in a wood preservative.

Eye protection: a face shield or a pair of safety goggles will protect your eyes from exposure to liquids

Table 1. Chemicals registered for the management of honey bee pests, parasites and pathogens in 2006. Always check the expiration date with the seller before purchasing it. Never purchase more than you can use before the expiration date. Check the date when the product arrives.

Product	Chemical(s)	Pest
Fumidil-B® or Fumigilin-B®	fumigillin dicyclohexylammonium	Nosema
Apistan®	tau-fluvalinate	Varroa mites
CheckMite+®	coumaphos	Varroa mites
Api-Life VAR®	thymol, eucalyptus oil, menthol and camphor	Varroa mites
Sucrocide™	sucrose octonoate	Varroa mites
Api-Guard®	thymol	Varroa mites
Mite-Away II™	formic acid	Varroa mites and tracheal mites
Mite-A-thol®	menthol	Tracheal mites
Fumigator® or Para-moth®	para-dichlorobenzene (PDB)	Wax moths
GardStar® 40% EC	permethrin	Small hive beetle
Terramycin®	oxytetracycline HCl	AFB and EFB
Tylan®	tylosin tartrate	AFB
Bee-Go®	butyric anhydride	Honey bees

Uncoated Tyvek® is used when handling granules or powdered formulations and dilute or less toxic pesticides. **Polyethylene-coated Tyvek®** is water repellent and has better chemical resistance than uncoated Tyvek. It should not be used with chlorinated hydrocarbons or organophosphates. **Saranex-23-coated Tyvek®** provides the most protection and is appropriate for longer exposure periods and for more toxic pesticides. Tyvek® garments are disposable. Do not wash and reuse if contaminated. Garments should be cut prior to disposal to prevent reuse. Dispose of garments according to local regulations. In New York State, contaminated garments must be placed in trash bags and taken to landfills.

Breakthrough time refers to the time it takes a chemical to migrate from the outside of a glove to the inside and make contact with your skin. Every combination of chemical, glove material and glove thickness has a unique breakthrough time.

Ready for bear. A beekeeper wearing eye protection and respirator required for handling Mite-Away II.

and dusts (**Fig. 1**). Eye protection is especially critical when mixing pesticides, whether in liquid or powder form. Wash your eye protection after each use.

Gloves: Gloves are an essential piece of your PPE. However, you must pay attention to the material used to make the glove, the thickness of the glove and the breakthrough time (see insert B). Each pesticide requires the user to wear gloves made of a specific material. Nitrile rubber is good for Apistan®, CheckMite+® and Mite-Away II™. However, disposable nitrile gloves have a fairly short breakthrough time and must be replaced frequently. A nitrile glove with a thickness of 14 mils or more has a much longer breakthrough time and can be used for a longer period of time.

A little planning can reduce the frequency with which you need to change gloves and help prevent contact with pesticides. Use disposable nitrile gloves to separate Apistan® and CheckMite+® strips before going to the field. Change gloves every five minutes. After separating the strips, return them to their original package. When you get to the field, wear either disposable nitrile gloves or heavier 14 mil nitrile gloves. Use a pair of pliers to remove the strips from the package (**Fig. 2**) and to insert them in between the combs (**Fig. 3**). That way, your field gloves never contact the chemicals. If you use the 14 mil gloves, wash and dry them afterwards, and store them securely for future use in a re-sealable plastic bag. Label them "For Pesticides Only" and replace them every year. If you spill chemicals on them, dispose of them and put on a new pair. When handling Fumigator®, Para-moth® or Mite-A-thol®, wear the proper glove and use a scoop to distribute the chemical. Never handle pesticides barehanded or with canvas or leather (bee) gloves. Never rub any part of your face with your gloves. Never stop to relieve yourself in the field without first removing your gloves and washing your hands.

Using pliers to remove CheckMite+ strip from package.

Using pliers to insert CheckMite+ strip in between combs.

INHALATION (lungs): Your lungs are extremely susceptible to damage from fumigants and particulates, and several newly-registered pesticides pose an inhalation danger. The pesticide label for Mite-Away II™ requires the user to wear an approved respirator with the proper filter cartridges (see insert C and Fig. 1). To function effectively, a respirator must fit properly. That means no beards or at least a good clean shave wherever the mask contacts your face. Gas- and vapor-removing cartridges should be replaced: if damaged; if there is increased resistance to breathing; at the first indication of odor, taste, or irritation; as recommended

"Handler Personal Protection Equipment (PPE): Applicators or handlers must wear standard beekeeping equipment: beekeeping gloves, bee veil with goggles (or safety glasses). Applicators and other handlers must wear coveralls over a long-sleeved shirt, long pants, socks and shoes, acid resistant gloves (PVC, neoprene, or nitrile), and protective eyewear. Wear a respirator with an organic-vapor removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix TC-14G), or a NIOSH approved respirator with an organic vapor (OV) cartridge or canister with any N, R, P or HE prefilter. Clean or replace PPE at the end of each day's work. Rinse off pesticides at rest breaks. Follow the manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry." – from Mite-Away II Label.

by the manufacturer or as required by state-specific labor regulations. At a minimum, install new cartridges at the start of each field season. Store respirator cartridges in a labeled, airtight container, away from dust, sunlight, extreme temperatures, moisture, and other chemicals. Inspect and test before reuse. Mite-Away II™ also requires that apiaries be posted with a Re-entry Sign indicating the appropriate re-entry period. This is done to warn persons – like an inspector – not to open a hive when there is a chance of exposure. Api-Life VAR® also requires the user to wear an approved dust/mist filtering respirator (see insert D).

Terramycin Soluble Powder®, Tylan® and the confectioner sugar in which they are mixed are dusts that can be inhaled into the lungs. Dusts can cause inflammation and may contribute to lung disease. A properly fitted dust mask will prevent inhalation of particulates and protect your lungs.

INGESTION (mouth): Always wash your hands with soap and water after handling pesticides, even though you were wearing gloves. Never eat, drink, chew gum or use tobacco products when handling pesticides.

Pesticide Label: a legal document that accompanies any EPA registered pesticide – the only kind you should use. The label provides instruction for the legal use of the product. Always read the label thoroughly before opening the package. Make sure you understand the label, that you understand how to formulate the product if required to do so, that you use all required PPE, that you follow all of the instructions, that you store pesticides properly, and that you dispose of used or excess pesticides legally.

MSDS (material safety data sheet): a document that describes the physical properties and characteristics of a chemical as well as any known health risks. It is not the same as the pesticide label, but it does provide more information about the chemicals in your pesticides. You can access these documents online by searching 'MSDS'.

Storage: Improperly stored chemicals pose a danger via inhalation, contact and ingestion, especially to animals and small children. Store all hive chemicals in a secure and posted location, preferably under lock and key. The storage area should be relatively cool, dry and out of the sun. Never store your hive chemicals with other pesticides, food, water jugs, foundation or comb. Pesticide strips, plastics and wax all absorb chemicals from the air and can become contaminated with chemicals you do not want to put in your body or your hive.

Liability: If you have employees who apply pesticides, check with government agencies charged with regulating workplace safety to obtain all applicable regulations. Be absolutely sure that employees are properly trained in the use of all chemicals and pesticides they will be required to use, and be certain that they are provided with and use the proper PPE at all times. Check with your appropriate local, state and federal agencies for full details. In New York, pesticides are regulated by the Department of Environmental Conservation. Most states have similar agencies. They are a good source of information.

Resources: There are lots of good online sources of information on pesticide safety. Some good links to get you started are: www.btny.purdue.edu/pubs/PPP/PPP38.html; msucares.com/pubs/publications/p2006.htm; txnc170.human.cornell.edu/ BC

Nick Calderone is the Extension Apiculturist at Cornell University, Ithaca, NY and a frequent contributor to these pages.

BEYOND HONEY

Kirsten Traynor

A primer on products from the hive – including honey!

As beekeepers, we tend to focus on honey production, viewing other products of the hive as mere byproducts. However, these so-called byproducts, including pollen, beeswax, and propolis, contain medicinal properties that may be more valuable than the honey we strive to harvest.

Bee Pollen

Bee pollen has been consumed by humans for millennia. It is the richest protein food available. At 20-40% protein, bee pollen contains more protein than any animal product.

Ancient Egyptian papyri refer to bee pollen as "life-giving dust." Forefathers of modern medicine Hippocrates and Pliny the Elder both prescribed pollen. The Bible, Talmud, Torah, and Koran all mention bee pollen for its healing and nutritive properties.

In addition to protein, pollen is also rich in vitamins, minerals, enzymes, amino acids, and essential fatty acids. Considered a complete food, pollen provides all the nutrients essential to life when taken with water. Pollen is often ingested by athletes and fed to racehorses as an energy stimulant to make them run faster.

Women undergoing radiation treatment for inoperable uterine cancer who consumed measured doses of bee pollen suffered fewer side effects such as nausea, loss of appetite and sleep disorders, along with stronger immune system responses.[1]

As far back as 1948, Dr. William Robinson of the Bureau of Entomology, Agriculture Research Administration tested bee pollen on mice bred specifically to develop tumors. The test group of mice fed bee pollen along with their traditional diet lived 1/3 longer than the control group who ate a standard diet without pollen supplements. At the time the test concluded, 100% of the control mice had expired, while some of the pollen fed mice were miraculously still alive, even though the strain of mice used in the experiment had been specifically bred to develop fatal tumors. Only the addition of pollen to their diet kept some of these mice alive.

"Pollen is also rich in vitamins, minerals, enzymes, amino acids, and essential fatty acids."

Members of my husband's family suffered horrendously from hay fever every Spring. After reading the book "Wonderful World of Bee Pollen" by Joe Parkhill, my husband suggested they might want to try taking small daily doses of local bee pollen. By ingesting a small amount of pollen, which quickly enters the blood stream, "one induces the system to build defense or immunities against the foreign substance."[2]

When the relatives started taking a daily teaspoon of pollen, they stopped suffering from spring allergies within two weeks. After a few years of no symptoms they believed themselves to be cured, and so stopped taking the teaspoon of pollen. Without their daily bee pollen dose, their allergies unfortunately snuck back up on them.

Please be aware that every individual may react differently to bee pollen. The book "Healing from the Hive" by Rita Elkins recommends starting with a single small pollen grain and building up from there. However, if you wish to start taking bee pollen, you should consult your doctor.

Bee pollen may even be a key ingredient to a long and active life. Many locations in eastern Europe noted for the longevity of their people have a diet rich in bee products including honey and bee pollen.

If you're having trouble sleeping, try the following combination: two Tbsp. honey, one tsp. pollen, two tsp. apple-cider vinegar in eight ounces freshly boiled water. This drink supposedly has you drifting off in no time.

I have seen beekeepers sell fresh bee pollen for as little as $6.00 per lb., but consumers are willing to pay much more. A fast sweep of

[1] Elkins, Rita. *Healing from the Hive: Bee Pollen, Royal Jelly, Propolis, and Honey*. Woodland Publishing, Pleasant Grove, UT, 1996.

[2] Parkhill, Joe. *Wonderful World of Bee Pollen*. Country Bazaar Publishing Co., Berryville AR 1982, p. 21.

"Beeswax has a natural SPF factor of 15."

the internet reveals prices averaging around $20.00 for one pound of fresh pollen granules, although someone was audacious enough to offer it at $5.99 per ounce, a mind boggling $95.84 per pound. So maybe it's time to invest in a pollen trap and try marketing it for yourself.

Beeswax

When we extract our honey we often end up with a supply of beeswax from the cappings. Beeswax cappings are the highest grade of beeswax. Made during the honey flow when no chemicals are present in the hive, the cappings contain the least amount of contaminants.

The church used to be the highest consumer of beeswax. Much early beekeeping research comes from monasteries and abbeys, because they kept large apiaries to fulfill their need for beeswax candles. Before electricity, beeswax was prized for producing the finest candles, slow-burning and non-smoldering. In the past Europeans could even pay their taxes with beeswax and honey. (Too bad the IRS doesn't value our products the same way!)

Now the cosmetic industry and pharmaceutical companies use approximately 60% of the world's annual beeswax production. Beeswax has a natural SPF factor of 15, and blends well with oils, making it highly prized by the cosmetic industry.

If you are a small-scale beekeeper, you might not have enough wax to produce your own candles, but don't throw your handful of cappings away. You need very little beeswax to make your own soothing hand creams, lip balms and shoe polish. For great recipes, glance at the book "Super Formulas" by Elaine C. White or browse the recipes offered online by Majestic Mountain Sage (www.the-sage.com).

I've seen two ounce beeswax hand creams sell for $3.50 to $24. Higher priced creams have a fancy package and maybe additional moisturizing oils such as lanolin, mango butter or shea butter.

Even if you have no intention of selling your beeswax products, your skin will thank you if you whip up a small batch for yourself. Before I started making my own lotions, my knuckles always cracked and bled in the Winter. Now, protected by my beeswax lotions they stay silky smooth all Winter long.

Propolis

If you're guilty of throwing away scrapings of propolis that glued down your frames, raise your hand high. I can see you reaching for the sky. We've all done it! Tossing away one of the most overlooked products of the hive. For years we have bred bees to stop producing this gummy mess that makes harvesting honey difficult. Perhaps we have been too hasty in our disdain for the sticky stuff.

"Propolis is highly regarded for its anti-viral, anti-bacterial, and anti-fungal properties."

In eastern Europe and South America propolis is widely used in folk medicine. It's often called Russian penicillin, because it is so prized there as a natural antibiotic, helping to treat ailments from the common flu and sore throat to gum disease.

But what is propolis? It starts as a sticky resin gathered by the bees from the leaf buds and bark of various trees. The bees mix honey, wax and saliva into the resin to form the sticky superglue we call propolis.

Some say the name propolis was coined by Aristotle. "Pro" means before or in front of and "polis" means city. I imagine the name derives from the bees' habit of lining their entrance with this sticky substance, an anti-bacterial doormat that helps to keep their home sanitized and protected.

If an invader such as a mouse enters a beehive, the bees will sting it to death. Too large to remove from their home, the bees will mummify the corpse in propolis. This stops the cadaver from decaying. One of the reasons Egyptian mummies are so well preserved is because the Egyptians used a mixture of honey, wax and propolis in their embalming techniques.

Music lovers must also give thanks to propolis, for a propolis varnish was used on Stradivarius's famous instruments.

Propolis is highly regarded for its anti-viral, anti-bacterial, and anti-fungal properties. Propolis contains 500 more bioflavenoids (vitamin P) than found in oranges.[3] These bioflavenoids are antioxidants that scavenge for free-radicals, supporting the body's natural immune system.

New research shows that propolis might pack quite a healing punch, even against destructive HIV. This discovery might not have occurred if Dr. Genya Gekker, a scientist working on lab trials with various substances against HIV, had not come down with a cold. Originally from the Ukraine, she treated herself with a propolis tincture. When her cold cleared up, she decided to try the tincture on the HIV she was testing. It killed the HIV in lab cultures, as did subsequent trials of various propolis samples from Minessota, China and Brazil provided by Dr. Marla Spivak of the University of Minnesota.

The Bulgarian Academy of Sciences searching for the "active inhibitory viral component of propolis found an ingredient that appears to be effective against the flu. Their research indicated that isopentyl ferulate, an ester of cinnamic acid, was able to successfully suppress the reproduction of an influenza virus (A/Hong Kong)."[4]

Maybe we should be saving our propolis scrapings, especially in light of the fact that we are overdue for a flu epidemic. Our government has admitted we can not stockpile enough flu vaccines within the next 10 years should a wide spread influenza hit our shores. Turkey lost three children to the deadly H5N1 strain bird flu. Another 14 Turks are infected, causing anxiety throughout Europe and the Middle East.

[3] Elkins, Rita.

[4] Wade, Carlson with Joan A. Friedrick, Ph.D., *Propolis Power ... Plus*. Keats Good Health Guide, New Caanan, CT, 1996. p. 23.

With anecdotal and scientific evidence demonstrating the flu fighting properties of propolis, we can all hold on to our propolis scrapings. You never know when our private stockpiles might come in handy.

To make your own propolis tincture, gather clean pieces of propolis. To avoid bits of wood and other debris, harvest propolis using a plastic propolis trap. Dissolve propolis in medical alcohol (70%). Let stand at least two days in a dark place, shaking daily. Filter the alcohol/propolis mix. A fine film will remain in the filter. Store the propolis tincture in a well sealed dark glass bottle. Write down the amounts of material used, so you can figure out the concentration of your product. (i.e. 100g propolis to 400 g alcohol = 20/100g solution = 20%.) The longer the Propolis is left to extract in the alcohol solution, the higher the content of active agents.[5] From listserv discussions online, most Europeans let it stand in a dark, warm place for at least one to two months.

The most common purchasers of raw propolis are Eastern Europeans and Asians, because they are familiar with the product and understand how to use it. Raw propolis sells for approximately $3.00 to 5.00 per oz, which translates into $48.00 to $80.00 per pound.

With growing dismay in the high cost of pills and a desire for natural remedies, many health conscious Americans are searching for alternatives. Some have heard of the benefits of propolis, but are more familiar with the tincture or powder form. A propolis tincture sells for $10.00-24.00 per ounce.

By adding these other bee products to our wares, we supplement our beekeeping endeavors with another source of income. At garden clubs, county and state fairs and in schools I have frequently spoken on the myriad benefits of bees, from pollination to the products mentioned above. Each time the public clamors to learn about the health benefits available from a bee hive. After my talk a large group encircles me, posing additional questions. The most common response I hear is "I had no idea!"

The more we can teach people about what honey bees provide, the more likely they are to appreciate all the products of the hive, including honey. We sell our most common product short by marketing honey as only a sweetener, where we have to compete against cheap sugar and a plethora of other delicacies.

I always inform people that bees must visit more than two million flowers and travel over 55,000 miles to make a single pound of honey.[6] I explain that honey is man's very first sweetener, for which he risked his life in ancient times. A cave painting, located in the Cave of the Spider, in Valencia, Spain, depicts an androgynous figure trusting his life to three grass ropes in order to rob honey from a feral hive perched high on a cliff.

Due to limited supplies in the past, honey was reserved for medicinal use. When applied to the skin the sugars in honey combine with the salts in our skin to produce minute amounts of hydrogen peroxide, making it an ideal slow release anti-microbial product for treating wounds and burns.[7] I scar easily, but when I recently cut myself with a sharp knife, I washed the cut, added a drop of honey, then wound it up in a band-aid. It healed within three days, with no trace of a scar. When I mentioned this fact to a nurse, she informed me that the cosmetic surgeon she worked for used honey on his recovering patients to minimize scar tissue.

Our bodies can better digest honey because it is composed of glucose and fructose, while table sugar is solely sucrose. The body uses glucose immediately, while fructose must first be converted to glucose, thus acting as a slow release form of energy. For a small pick-me-up, combine one tablespoon of unheated honey with one tablespoon of raw apple cider vinegar in an eight oz. glass of room temperature water. Once the honey dissolves, you may chill the drink with ice, if desired. The honey provides an instant energy burst, while the apple cider vinegar cleans your internal system. This drink supposedly helps men avoid prostrate problems.

Honey is a humectant, which is a fancy way of saying it draws and retains moisture. Combined with its anti-bacterial properties, honey makes an excellent skin conditioner, helping to reduce acne flare-ups without drying the skin. For a special treat, combine one Tbsp. warm water with one Tbsp. honey and massage into face. Rinse after 10 minutes for sparkling, fresh skin.

When honey is presented to the public in such a manner, it becomes difficult for a potential customer to resist. The first step in appealing to the public is knowledge. The more informed you are about the benefits of bees, the more people will want to stop and listen to what you have to say. The longer they stay, the more likely they will spend money on your products. The more they learn from you, the more you can charge for your products, because, after all, what each of us is really selling is our knowledge. We know how to keep bees. Isn't it time we learned how to make more money from our efforts? BC

[5] The above recipe is translated from the Swiss PDF document "Propolis" by Stefan Bogdanov from the Swiss Center for Bee Research, Agroscope Liebefeld-Posieux, Zentrum für Bienenforschung.
[6] According to information available of the National Honey Board website, www.honey.com
[7] Traynor, Joe. *Honey: The Gourmet Medicine*, Kovak Books,Bakersfield, CA, 2002, p. 10-12.

And Yet A Few (More) Comments On Honey Bee Swarm Biology And Management

Part II – The swarm in transition to becoming a colony.

James E. Tew

A prime swarm in my apple tree.

In the hive

Last month, I used this space to discuss some aspects of elementary honey bee swarm biology of ***before*** they leave the parent colony. As I ended that piece, I left the hypothetical swarm roaring from the hive and organizing itself in the air near the hive. I suppose a discussion of honey bee swarming could be divided into sections: (1) the swarm in the parent hive, (2) the swarm in the air, (3) the swarm at the bivouac site also called the hanging swarm, and (4) the swarm at the new home site. At this point, my swarm is at step two – in the air.

Outside the hive

When the swarm departs, what a ruckus goes on and how quickly it happens. Thousands of bees everywhere – flying, crawling, running, crashing into each other – organized chaos. To the human observer, it looks random. How could there be any order to this confusion? Though flying honey bees can hover, they seem to only do it for a short while. For instance, when they pack pollen they will briefly hover near the blossoms being pollinated. Or when they are challenging you, they will sometime hover near your face seemingly trying to intimidate you. So here's the situation – in short order, thousands of bees must exit a reasonably small nest entrance. They can't all do it at once so what are the first bees already outside to do? Sit on the ground or surrounding foliage? Some do, but most don't. Amass on the hive? Some do, but not all. Hover in a holding pattern for several minutes? No, bees don't seem to hover very long. How do waiting bees outside the hive keep themselves busy as they await the word to depart? They randomly fly near the hive until all are outside and the bee word is pheromonally given to move out. All that confusion outside the hive is just a holding pattern until all the departing bees can queue up in preparation for the short trip to the temporary site.

But wait, the mission is aborted

After describing all this process and its seemingly related confusion, something goes wrong. Sometimes it happens. The queen didn't leave? The swarm issued too late in the afternoon? I really don't know the bees' reasons, but it is not all that uncommon for the departing swarm to call off the mission and return to the hive. Many has been the beekeeper, frantically getting equipment together in preparation for hiving the swarm, only to watch the swarm return to the parent hive. It's a confusing moment. Bees everywhere, the humming cloud slowly drifting away from the hive, when nearly imperceptibly, the swarming bees seem – ever so slowly – to begin to drift back to the parent hive. The bees changed their collective minds. It is the very rare human who knows why. The bees literally roar back into the hive, clustering on the front. As quickly as it started, it stops. *All swarming procedures are not successful.*

You're not home free

But you are not home free. This colony is primed and loaded to swarm. Something went wrong today, but tomorrow – or someday soon – this colony will try again. If ever a beekeeper was given notice that a swarm was about to go, this aborted swarm is that notice. And yet, what to do at this point? If I, the beekeeper, make a typical colony split, there is an excellent chance the parent colony will still swarm. If I make heavy splits or divide the colony in halves, I may very well only get multiple smaller swarms. Destroying queen cells or caging queens will not necessarily stop the advanced swarming impulse. While there may be radical procedures I could try, such as removing all the brood[1], simple procedures are probably just as effective. I suppose I would make three to four splits; making sure that each split had

[1] I am not saying that removing all the brood would solve the problem. Indeed, it may only create other problems. My point here is that the swarm, though still in the hive, is already very nearly lost to the beekeeper. Doing the simple things may not stop the swarm from leaving, but simple things are about all that can be done at this point.

queen cells. There is a great chance that I will get several small swarms from this procedure, but otherwise, I am nearly certain to get one large swarm. This is one of those situations in life where one tries to do what is least wrong rather than what is exactly right.

Now back the swarm

The next day, sometime in early May, dawns bright, warm and blue. Just after lunch, roughly following the events outlined in last month's BC swarm article, the colony again tries the swarming behavior. This time, they get it right. Bees pour from the hive. Somewhere in the mass, the weight-reduced queen is pushed along. Outside the hive, her pheromones are perceived and nearby flying bees expose their Nasanov glands. The queen is out! All systems are go! About half of the bees leave during the excitement. Even though she is now much lighter, the queen is still a rather clumsy flier. She zooms around – probably taking orientation flights. Her pheromone field is perceived by other flying worker bees and they expose their Nasanov glands in flight. The swarming bees assume a generalized form and slowly move away from the parent hive. At some point, usually within 50 yards of the parent colony, the queen settles on something – something seemingly random. She may actually drop all the way to the ground or she may gain altitude until she is high in a nearby tree. No rhyme. No reason. Surrounding worker bees put the notice out by exposing their scent glands that the queen is at this location. At first only a few bees scent, but increasingly more and more bees scent at the location the queen has selected. More and more bees accumulate. Within only a few minutes, the cluster forms with the queen somewhere in or on the mass. So long as her chemical presence is known, the cluster is content. Everything at both the swarm site and the site of the parent colony settles down and things look as though nothing had happened.

The primary swarm

This nice, big, first swarm is called the primary swarm. It doesn't get any better than this. This is the swarm that beekeepers want to

The bees' idea of a good home site. Note the comb on the side of the tree.

hive. This is the swarm that makes beekeeper stories. This is the swarm that beekeepers fall from ladders while gathering. With even an average nectar season, a five-pound swarm will develop into a prosperous colony that should easily survive the upcoming Winter.

This primary swarm will hang at this temporary site anywhere from a few hours to several days before taking flight to the new home site. While hanging at this temporary site, nectar foragers will make collecting trips, but mainly scout bees are searching for a suitable home site. Commonly, bees with pollen loads are seen in the swarm cluster, but these bees are only converts to the swarm event. Hanging swarms, with its powerful chemical allure, will attract returning foragers from the parent colony or even other colonies. Oppositely, some of the original bees to leave with the swarm will lose the urge and will return the parent colony. I have seen colonies nearly empty of bees after a large swarm has just departed, but mystically the parent colony would repopulate itself within a few minutes with enough bees to maintain the original colony. So some foragers simply returning home from an unexciting foraging trip, change their mind and decide to "run off with the circus" while other bees that left with the swarm, give up the project and return the parent colony. Not wanting to be left out, drones are on the swarm trip, too. I don't really know what purpose they serve in the new colony, but they are always in the swarm population. No doubt, there is some need they are meeting, but I have no clue what those needs might be.

Scout bees

Scout bees fly from the surface of the swarm and search for a cavity having:

1. A cavity size of about one cubic foot
2. Dark inside
3. A defendable entrance
4. Nothing else living there (no birds, no ants, no squirrels)
5. Dry

As hollow trees have become fewer and fewer, scout bees have increasingly adapted themselves to human urbanization by finding cavities in the walls of our buildings. It must be a good deal for the bees. Warm and protected, but it drives homeowners crazy.

So scout bees do their scouting thing and return to the swarm surface where they dance giving information about the quality and direction to the prospective new home site they have found. Scouts must campaign for their particular finding. Other scouts are recruited to visit the new digs and they come back and add their dance comments to the mix.

At some point – hours or even days pass – the majority rules and a swarm decision is made concerning the new home site. Just as they did within the parent colony, the swarm becomes "flighty." It begins to lose it compactness and more and more bees take flight[2]. A bit like a helicopter slowly rising in the air, the swarm will become airborne, position itself, and suddenly take off - vanishing. At that point, it is lost to the beekeeper.

Strange as it may seem

As strange as it may seem, the following events frequently happen. A beekeeper gets the call to come for a swarm which she/he dutifully does. The swarm seems to move in nicely and all surrounding observ-

[2] If the beekeeper shows up at this point to hive the swarm, his chances of getting it are slim. Certainly, the queen would need to be found and caged to help hold this departing swarm in place, but even then some of the bees might move to the new home site. Upon finding they had no queen in residence; they may or may not stay there. *All swarming procedures are not successful.*

ers are impressed with the beekeeper's Pied Piper ability to handle bees. Arrangements are made to return late in the afternoon to retrieve the newly filled swarm box – only to find it empty upon the return. I feel comfortable in guessing that what has happened in this case is that – even though the swarm was given a nice bee box – after settling within the box, the site recruitment dances began again and the swarm decided to go with the dancers' suggested site – not with the new swarm box. It makes no sense to us, as beekeeping humans, to leave a perfectly good beehive and move to a cavity in the wall of a house or a hollow tree, but bee swarms decide to do it all the time. It is always a good idea to have a queen cage on the swarm-collection-run....just in case you happen to see her; but you should know that I have had a few swarms leave a caged queen to go to the new home site. (I don't know if they stayed there without her or if they sheepishly returned to the parent colony.) *All swarming procedures are not successful.*

All swarms are not successful.

At the new site

At the new site, everything will soon change. Frequently a beekeeper will get a call that, "a bunch of bees have landed on the side of my house, near the chimney." That's probably bad news. If the swarm has landed and the queen has moved into the wall cavity, things are pretty much over. The beekeeper simply scraping bees from the house wall into the swarm box will not entice the queen to come out of the new cavity into the nest box. To get this swarm out of the house, the beekeeper will need to go to the chapter on removing bees from dwellings rather than hiving swarms.

Inside the new nest cavity

The swarm busily goes about setting up bee housekeeping. With no brood to feed, comb construction and honey collection goes quickly. Natural swarms do seem to have a maniacal work ethic. Under the same conditions, a natural three-pound swarm will produce more than a three-pound package. Neither have brood to feed so I am again guessing that it must have something to do with harder work.

New comb is rapidly built (depending on the size of the swarm and the goodness of the nectar flow) and honey is stored. Upon leaving the parent colony, the swarm members take full honey stomachs of food, but that temporary food source is quickly used up. Fresh food must be gathered. The queen's food rations are again much improved. She gains weight and expectation of her egg-laying capacity increases – greatly. Much must be done before winter, which is only a few months away.

More discussion on #3, the hanging swarm

If the beekeeper could have arrived on the scene when the swarm had been settled for only a few hours, the bees could have been easily hived with little concern for stings. However, if days pass, the bees will use up the reserves they took along and they become cranky, sometimes very cranky. This "primary" swarm becomes "dry." Dry swarms are prone to sting more than we like. Misting the dry swarm with sugar water – abundantly – may help improve their attitude before shaking them into your swarm box.

Some descriptive swarm names

A primary swarm may also be called a prime swarm or a hanging swarm. A hungry prime swarm is a dry swarm. Secondary swarms (occasionally called after-swarms) are small swarms that leave after the primary swarm and may or may not be mating swarms. Small mating swarms are difficult to hive. A swarm that is unsuccessful at finding a nest cavity and nests outside is an exposed swarm that becomes an exposed colony. Invariably, this exposed swarm dies.

All swarming is not successful

All swarming is not successful – not for the beekeeper nor for the bees. There are clearly complex rules to swarming behavior, but we, as beekeepers, don't always know what they are. Give space before the colony needs it and keep young queens at the colony's helm; otherwise respond to whatever the colony does during swarming season. It will pass. BC

Dr. James E. Tew, State Specialist, Beekeeping, The Ohio State University, Wooster, OH 44691, 330.263.3684, Tew.1@osu.edu, www2.oardc.ohio-state.edu/agnic/bee/; beelab.osu.edu/

The Ideal Nucleus

Larry Connor

Brood frame number and queen types

A queen's egg laying in a colony and her effect on colony population are important concepts, as the number of eggs a queen lays is linked to her own genetic and physical abilities. Yet the number of eggs a queen lays each day is also determined by the number of cells the worker bees prepare for her to lay into. This number is related to the colony's strength, especially its population of nurse and house bees. For the beekeeper who makes nuclei for his or her own use, or for the beekeeper who buys nuclei for new colonies, we need to evaluate the impact of the start-up bee population of a nucleus and the number of frames of brood used to establish a new colony, and how these factors impact on colony growth in adult bee population. This is important for the many beekeepers that are making increase colonies and trying to determine what strength they should make these new colonies.

A standard Langstroth deep frame has space for about 6,400 worker cells when both sides of the frame are added together. (The usable space on a frame is about 16.5 x 7.75 inches. There are roughly 25 cells per square inch, and two sides to each good frame.) It is highly unlikely that any colony will have completely filled frames, so we will use an adjustment for our discussion. At 75% adult bee emergence, we will have about 4,800 workers emerging from a frame. This allows for spotty brood, *Varroa* loss, diseased cells removed by hygienic behavior, untouched corners filled with pollen and nectar, drone brood, and physically unusable areas on the comb. Fig 1 shows a frame with about 70% sealed cells. Since nothing is precise in beekeeping, we must keep an eye on bee population and brood comb area as we evaluate colonies we assemble or purchase. I try to visualize frames in 1/10th frame increments, and estimate the brood area to the closest 10%. While my .6 and my .7 may at times overlap, I am confident that my .8 is roughly double the brood area of a .4 brood frame.

Colonies of different genetic stocks have different buildup rates. A strong Italian colony may have very full frames early in the season, while Russian and other stocks will have much smaller brood areas.

We will discuss two important factors in developing colony populations: The number of frames of brood an increase colony (split, nuc, nook, divide, etc.) receives when it is made up, and the stage of a queens' development – day-old larva, ripe queen cell, sexually ready virgin, mated queen or parent queen. A laying queen removed from the parent hive will have little delay in production of brood, while forcing a new increase colony to raise a queen from brood is the least satisfactory means of making increase because it takes seven weeks for the first new brood to emerge. This is due to the time the bees must spend to raise the queen plus the time for the queen to emerge, sexually mature, mate and lay eggs. Also, the queen's quality is suspect considering the possibility of poor rearing conditions in a small nuclei. It will be three more weeks before the new queen's eggs are transformed into emerging bees and contribute to the growth of the new colony.

While there are various software programs for modeling honey bee colonies, for this discussion I used simple Excel spreadsheets to illustrate several key points about bee populations. Let's explore this vital area of beekeeping.

Number of brood frames used in a nucleus colony

I projected the number of bees that will emerge in colonies made up with one to eight brood frames. These are the guidelines I used in developing the model in the spreadsheet:

- Each frame has an average of 75% emerging workers, or 4,800 bees/frame. Not all nuclei colonies are identical, so there will be a lot of variation based on the colonies you use to remove brood for nuclei.
- For each frame of brood moved, I estimated there is a half pound of adult nurse bees on the comb needed to warm the brood and keep it alive until sealed brood emerges. I allowed for 1,600 bees for each half pound of bees. This too is highly variable. The key is to use nurse bees, not foragers, an assumption I made in my mortality figures.
- Adult bees constantly die in a colony, so I adjusted the adult bee population as the spring season developed. Brood mortality was figured into the 75% emergence figure.
- Diseases, mite infestations, and wild weather are not part of spreadsheet, but cannot be ignored: a severe chalk brood attack may reduces adult bee emergence by 50% or more in badly infected colonies. (Fig 2). This can be pretty unnerving when checking the hive two weeks after it is assembled.
- Since this is theoretical, I decided to make all these nuclei colonies on April 15, and follow them until June 15 when nectar flows are underway for much of the northeastern quadrant of North America. Clearly these are approximations, and represent a healthy amount of wishful thinking.

As one would expect, the stronger you make a nucleus the stronger the final colony (Fig 3). The model shows why a single frame of brood and half pound of bees is not enough to develop a productive colony in two months – there just are not enough bees. After a month, the colony has just 5,800 adult bees, less than the adult bee population of a two-pound package. This is not adequate for full colony growth, but may meet some beekeeper's needs for mating queens or where the nectar flow is very late in the season – like goldenrod.

Compare that with a colony developed from eight frames of brood and about four pounds of bees. One month after being established the colony will have about 46,000 bees, and two months after set up the colony will have nearly 70,000 bees. Unless such a colony is managed for swarming, a major portion of the beekeeper's efforts may end up in a tree somewhere in a nearby woodlot. Such a large colony is rarely made up by beekeepers, but could be made just before a nectar flow to produce a great deal of honey, especially comb honey.

Note: a colony with eight frames

Figure 1. *Frame with about 70% sealed cells.*

of brood and bees is much stronger than a colony with eight frames of bees. The former counts frames of stored honey and pollen as well as brood, and reflects the size of the entire brood nest.

Figure 2. *A severe chalkbrood attack in a nuc can slow, or stop growth.*

Some beekeepers remove bees, brood, honey and pollen from a single colony to make up multiple nucleus colonies. Commercial beekeepers like Richard Adee and family (the largest beekeeping operation in the universe at present) have developed a method of dividing the resources of one full colony into four increase nuclei, dividing the brood, honey, pollen and empty frames into four units. Each new nucleus then receives a queen cell for production. Once the queen is mated, the colony is put on a truck along with thousands of other increase colonies and moved to pollination or honey production locations. Some beekeepers call these Mississippi Splits, because of the original location the Adee family used as a winter bee operation. Like all beekeepers, the Adee's methods constantly evolve – apparently well enough to grow to 100,000 colonies.

Look at the possibilities nuclei colonies create. If you have a three-brood frame nucleus, in two months it will have about 34,000 bees; a four-brood frame nucleus will have about 41,500 bees, and a five-brood frame nucleus will have about 48,200 bees. For me, a two-month old colony with a population range of 34,000 to 48,200 bees is growing well and should collect a good honey crop or provide good pollination services. If forage is present, the colony will continue to grow, while the urge to swarm should be minimal. As a bonus, there has been a break in the brood cycle, which restricts *Varroa* mite population growth.

In the northeastern corner of the country many beekeepers use a deep frame hive body divided into two five-frame nuclei, often called a double nuc. (Figs. 4-5). This provides room for two or three frames of brood, a frame of honey and one or two empty combs for the queen to lay into. Adding bees attached to the frames and maybe a shake more will give you about 3,200 or more bees, or roughly a pound. The combined heat from the two colonies growing side-by-side stimulates growth in each five-frame nuc. These bees will keep the brood warm and care for the queen before and after she is released from the queen cage or emerges from the queen cell. In about a month each colony will be so strong that it will need to be moved into regular eight- or ten-frame equipment. Left in the small quarters, the nucleus will not expand further because there is not enough room. The colony will slow development, and may swarm. Some beekeepers add supers to nucleus colonies to keep them growing and to prevent swarming.

Figure 3. *A strong start (eight) makes a significant difference in the size of the colony eight weeks later.*

Impact of the queen status used in increase colonies

A laying queen is best; letting the bees raise a queen from worker brood is the worst. The latter includes queen failures when the queen dies and the bees must replace her from brood in the colony (if they have it). Let's discuss this effect, using these guidelines in a spreadsheet (Fig 6):

- Each nucleus was made with standard frames with an average of 75% emerging workers, or 4,800 bees/frame. I used three frames of brood for this model, which is on the strong side.
- For each frame of brood, I added one half pound of adult nurse bees to warm the brood and keep it alive until the sealed brood emerges. Thus, I allowed 4800 bees with three frames of brood.
- Each queen will lay an average 1,200 eggs per day after being installed and up and running full speed. Some days she will lay fewer eggs because there is no place for her to put them. Even queens have bad days and labor problems.
- When the beekeeper assembles the nucleus, it contains primarily sealed worker brood, and little open brood (eggs and larvae). This affects the colony age distri-

Figure 4. *A double nuc, with four frames on each side of a divider board.*

Figure 5. Lids with feeder holes for each nuc.

bution in all colonies as they develop, and is not a recommendation.

• Various queen types, based on stage of development, were used in the spreadsheet. They are:

Mother queen – Time for brood emergence is 21 days. Here the nucleus colony receives the queen from the parent hive, and there is no interruption in egg laying. As a result, you will have new bee emergence in about 21 days. In four weeks we expect to see about 27,000 bees in this three-frame nucleus; in seven weeks the population will approach 50,000 bees.

Laying queen – Time for brood emergence is 28 days. Here you must purchase or raise your own queen and introduce her into the nuc. Allow seven days for her to be released and start laying (to be conservative), add 21 days for her first adult daughter workers to emerge and join her in the hive. This is 28 days. In four weeks we expect to see about 18,500 bees in the hive, in seven weeks the population will be around 42,000 workers.

Virgin queen – Time for brood emergence is 31 days. Overproduction of queen cells often leads to a supply of caged sexually mature, ready-to-mate virgin queens. Allowing 10 days for release from an introduction cage and mating and 21 days for first brood emergence, virgin queens will provide bees in just a few more days than a mated queen. Expect 17,400 bees at 28 days from the founder bees and brood; expect 37,700 bees at seven weeks. This is just a bit less than a mated queen, which makes me wonder why sexually ready virgins are not used more often, especially since the queen is emerged and can be inspected for color, size and even behavioral screening.

Queen cell – Time for brood emergence is 37 days. Many beekeepers put a mature or "ripe" queen cell into mating nuclei. In fact, most commercial beekeepers use queen cells. Allow 16 days for a ripe queen pupa to emerge, mate and start laying, plus 21 days for the first worker bees. This is a total of 37 days for first emergence. At seven weeks expect 31,200 bees.

Queen raised from brood – Time for brood emergence is 49 days. There is a full seven-week delay when you expect a colony to raise its own queen. This may provide good *Varroa* control by providing a break in the brood rearing, but it is very costly in terms of lost buildup. I count it this way: the queen will be raised from a young larvae, so add 13 days for her to emerge from a queen cell. To this add 15 or 16 days for the queen's maturation, mating and egg laying. Then, of course, you still must wait 21 days for worker emergence. This puts the first emergence at 49 or 50 days. For seven weeks, the colony has not yet added any new bees. The population has been stuck at 17,400 bees since the last of the brood emerged. Of course, during hive inspections you have seen the formation of queen cells, bees preparing for the queen to mate and start laying, and then the new queen's brood appear. It's a fun and educational process to watch, but the 28-day lack of open brood messes up colony balance, severely reduces the stimulus to forage for pollen usually needed for royal and worker jelly production, and reduces comb construction and food reserve storage.

Colonies with queens that fail fall into this last category. While the worker bees do not age as fast when not rearing brood, they are older and will be poorer nurse bees. Either make the decision to requeen, or combine these bees with a growing unit so the bees will be of some benefit to the recipient colony

The beekeeper effect

As beekeepers work they consciously and subconsciously impact the colonies they manipulate. A beekeeper creating a single frame nuc may pick the one frame with 95% sealed brood found during inspection. Likewise, a larger nuc may be made from a number of frames containing less than 70% future worker bees. There are always frames with a combination of brood, pollen and honey. How do these compute into this discussion? The largest variable in increase production is the beekeeper's decisions.

Addition of a frame of brood before worker bees emerge. One clear advantage a beekeeper can give a nucleus colony is to add a frame of sealed brood during the buildup time before a queen's daughter workers have emerged. This corrects the age imbalance created by adding only sealed brood to the nucleus and it will serve as a boost to bee population. Removal of bees from a strong colony is one swarm management tool beekeepers have, especially if done in the late April/early May time period. Beekeepers can also add a shake of bees to the entrance of a weak hive and add the bees from a brood frame from another colony. Small swarms may be used in the same manner, if not in an area where there is a risk of catching African honey bees, however remote.

The Connecticut nucleus colony

This allows us to reach a compromise, in order to find an optimal plan for a nucleus. What is the per-

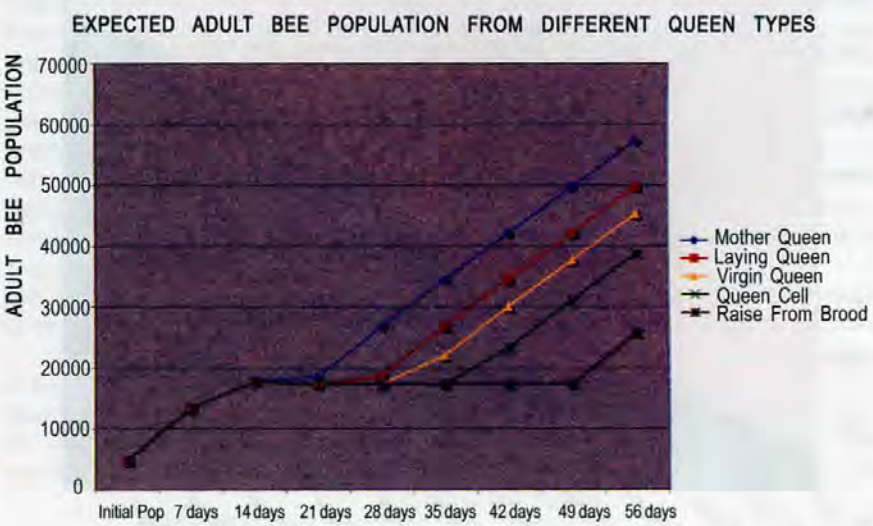


Figure 6. Growth rates based on queen type.

Figure 7. Marked frames in the Connecticut double nuc.

Figure 8. Worker comb filled with honey.

fect nuc? Is there a perfect nucleus colony for a large number of beekeepers? One way to find out is to look at what successful beekeepers are doing for nucleus production.

Ted and Becky Jones are Connecticut sideline beekeepers keeping bees full time in early retirement. They produce between 100 and 150 nuc colonies a year for sale and for their own colony replacement and growth. They operate a nuc making operation that many would be wise to study. They have learned from other Connecticut beekeepers, and have tried to improve their process. They do not take credit for this process, but point to those who impacted their thinking, probably going back to Langstroth, and those who influenced him.

A newest part of their program is to draw out new (and dated) combs the Summer before the nucs are made, so that they have fresh, new drawn combs to use in making increase (Fig. 7). This reduces the risk of exposure to stored pesticide residues and disease spores in old combs. Another idea so old it is new again is to have surplus worker combs filled with honey and pollen, a key to their colonies' success. These combs are integrated into over-wintered colonies. The frames are dated by year, so Ted and Becky know they are using new comb in their nucs. They set aside a deep frame of honey for every nucleus they plan to make, and store the honey for use in the Spring (Fig. 8).

They give each nuc one frame of sealed brood, and one of open brood. They have pre-assembled double nuc boxes they carried to the apiary, with two empty drawn frames, two frames of foundation, and one frame of stored honey. As they work, they take turns finding brood frames while the other assembles and moves combs around. Both check each brood frame for the queen. They add enough nurse bees to cover the brood.

They carry two frames of foundation into the apiary, holding the place of the future brood frames, and these are traded with two frames of brood. The parent colonies will draw out the foundation wax quickly if conditions are suitable. This means every colony produces at least two new brood frames each season.

They schedule April queen shipments from California and Hawaii and introduce a queen to each nuc as they make them up, putting the queen cage between the two frames of brood. They estimate the queen is caged for five to seven days before emergence. They return on the 7th day to check. If the queen is not out, they walk the queen out onto the frame. Then they leave the colony alone until two weeks have passed. They then can check the queen's egg laying and how the nuc is doing. If there is a queen failure, they deal with it at that time. They do not let the nuc just sit there.

All nuclei are moved to a new holding location, and kept fed by frames of honey. Lately they have had to surround all their colonies with bear fences, part of modern life in Southern New England. Ted estimates there are 50 or 60 bears in his hometown, a suburban bedroom community adjoining Hartford. Ten years ago bears were a novelty in the state. Not anymore.

When the CT nuc is put into a spreadsheet, some of its strengths pop out (Fig. 9). Because they use two frames of brood, one emerging and one open (primarily larvae), there is continuous addition of emerging workers for 21 days. There is a minor seven-day decline in population due to the low level mortality I built into the adult bee population. At 28 days the purchased queen's daughters are emerging, and the nuc rapidly expands. Ted Jones says the nucs have brood on four frames at that time, and are ready to move into 10-frame equipment (or cardboard delivery hive boxes for the customer) at one month. At that point the population is ready to explode with new emerging bees. Ted said some years the nucs are ready for the customers at three weeks. Those were the Springs when they found brood combs with 90% or more sealed brood. In other years, they have to wait until the brood from the new queen has emerged to make up for a shortage of brood.

The Jones didn't want to say too much about the year they had to delay nuc delivery into the Summer. That was when "their" she-bear used the nucs as a snack as she moved from one apiary to the next. She was captured (by the State of CT) and released 20 miles away. She returned in three weeks to continue her repast. She was moved from the area again. Later Ted learned the bear was killed on an interstate highway. He did not say if a beekeeper was driving the truck. BC

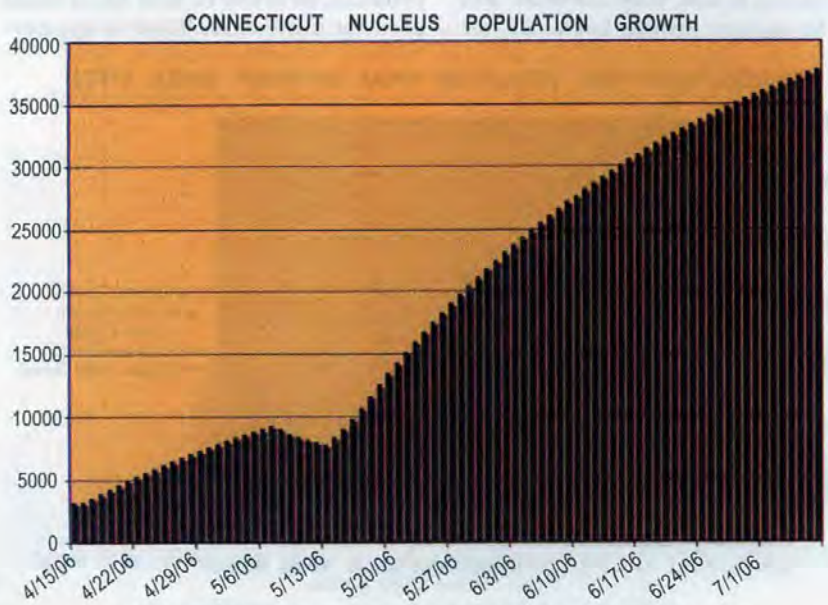


Figure 9. Population growth curve for the Connecticut nuc.

YELLOW JACKETOLOGY 101

Part 3 – Doing The Business

Charles Martin **Simon**

To quote one of my regular clients, Mike Ballou, Director of Maintenance at Cabrillo College, "Yellow Jackets must die!" Not a popular notion with the wasp huggers, but a pragmatic one around a school campus. Words on paper cannot express how dangerous yellow jackets can be, how easy it is to get stung, and how awfully virulent the stings can be. I'm 64 years old, and I have been subjected to some of the certifiably worst pain known to man, and the most extreme and longest-lasting-without-any-mitigation-whatsoever came from a single yellow jacket sting on the hand. Yellow Jackets kill more people in the U.S. per year than poisonous snakes, poisonous spiders, scorpions and bees *all put together*. Over 35 years dealing with them indicates to me that we as a species have to defend ourselves against them, even though they are beneficial, to prevent pain and death among our own kind. There is a real need, and where there is a need, you can do business.

Something to think about, though, if you're thinking about becoming a Yellow Jacket pro: What you will be doing 99% of the time is killing them, and when you're busy killing them, they're killing you. Seriously. That's the way it is whenever you kill anything. Sorry to trouble you with philosophy here in the bee magazine, but sometimes you just have to. Doctors usually die of the very diseases they specialize it; what goes around, comes around. Karma applies to Yellow Jackets, as it does to all aspects of bug business – and everything else.

I cannot recommend this business. But for some mysterious reason, some people seem to have it in them. For me it was an inescapable development out of organic farming. First I was interested in bees, and getting calls to remove swarms, which I always did free. Then I started getting calls to remove bees in walls, and I had to start charging. Then I started getting calls for Yellow Jackets and other wasps (and skunks, and raccoons, and rattlesnakes, and termites, and spiders).

For the first few years, I said no, I don't do that. You see, the people had made the connection before I did; in fact, they made the connection for me. I had to ask myself *why don't I do that*? I had the tools and the sensibility (or so I thought; came to find out, what I really had was a lot to learn). And the money is there: not so much in doing what you love and the money will follow, as they used to say in the 60s – more like in doing what the people need, whether you like it or not.

The life of a Yellow Jacket pro is fraught with peril and pain. Maybe that's what attracts certain people to it. It's certainly not what attracted me. Nothing attracted me. I just, again as they used to say in the 60s, went with the flow. It is something I would never choose, if I had a choice.

Yellow Jackets are beneficial to our species and should be protected and encouraged as much as possible. Trouble is it's usually just not possible. They are impossible to live with, unless you are a very self-effacing environmentalist. Many animals prey on Yellow Jackets (birds, reptiles, amphibians, skunks, bears, possums, spiders, preying mantids, baldfaced hornets, sand wasps), but all combined do not provide enough control from our species' point of view. Yellow Jacket nests almost always have to be dealt with. And there is the business opportunity.

ASPECTS OF THE BUSINESS

LICENSING

There is none, period. If you feel insecure without a license, email me cmsimon@pacbell.net – and I'll print one up for you, nice and official-looking on AYJA (American Yellow Jacket Association – I just made that up, which makes me the President) letterhead, for a nominal fee, after you pass the written exam of course, which you have to prepare for by buying and studying my book, *Stinging Insects: How To Live With Them – Or Not*, which I am in the process of writing, so get your pre-orders in right now while future limited supplies last!

INSURANCE

There is none, period. No carrier will write a policy for a Yellow Jacket and/or Bee remover. It is considered much too dangerous. I tried to get insurance because some entities would not hire me without

it. I contacted several companies and eventually spoke with an agent (recommended by our esteemed Editor) who specializes in beekeeper insurance and knows the field better than anybody else. His advice to me was to go out of business.

The only insurance available is your own expertise and physical and mental fitness – but then again, that is the best insurance of all.

ADVERTISING

I run a minimum ad in the yellow pages. It reads: "Bee and Yellow Jacket Removal without pesticides. Guaranteed. Charles Simon. 831-477-9221"

No bolds, no underlines, no borders, no bells or whistles of any kind, just the information. For many years I was the only one listed under Bee Removal. In fact, I was the one who initiated the category for the Yellow Pages in this area. However, in recent years, competitors have popped up, with ads like "AAA Bee and Yellow Jacket Removal" and "ABC Advanced Bee Removal." They designed their ads to get ahead of me in the listing. I considered changing mine to "AAAAAAA Bee and Yellow Jacket Removal" to give them back a dose of their own medicine, but then I reconsidered, figuring if I played their game, that would put me on their level. So I just let it go and let them go first. They can have the business they get that way; they need it more than I do.

I've been interviewed in the local papers a few times and on radio and television. Those exposures helped, as any exposure will. There are many ways to advertise. I keep it to a minimum, because I am not seeking to expand my business. But you can be as creative as you like.

DANGERS

The danger is not just from the bugs. A real threat comes from the exterminator mafia. I personally have been ratted-off by local exterminators who felt threatened by me and consequently accosted by government officials several times with the intent of citing me for alleged unlawful pesticide application. When I explained that I was a Remover not an exterminator, and that I did not use pesticides, ever, they okayed me.

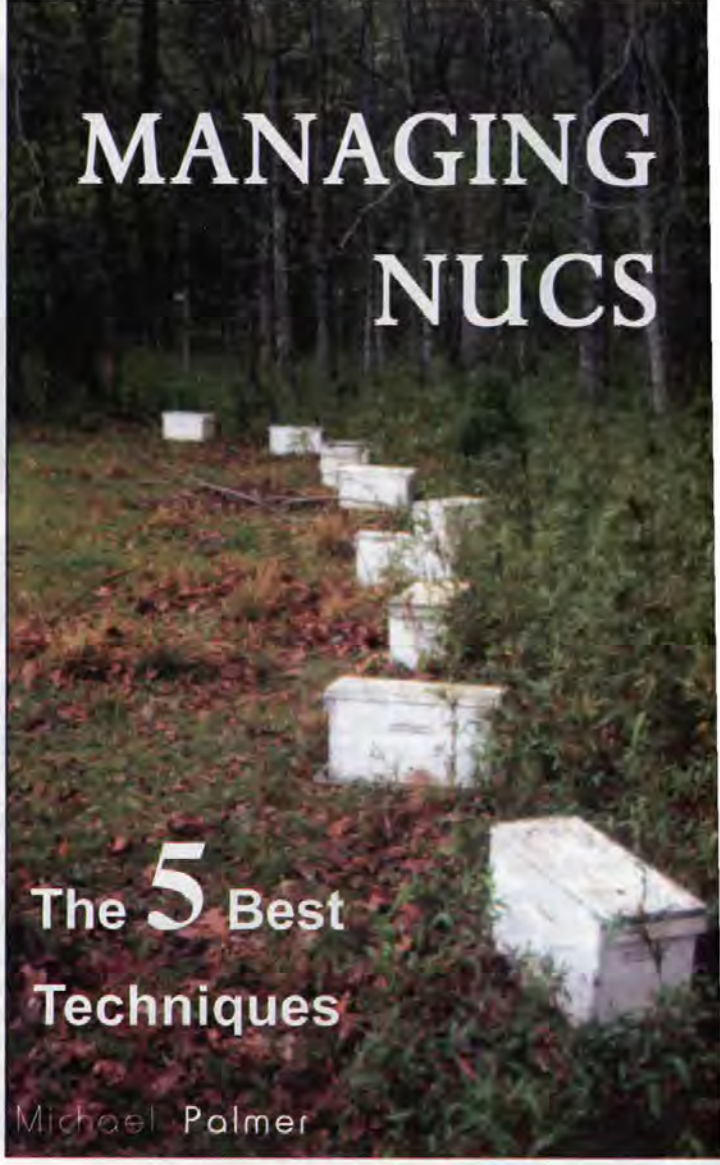
Over the years I made peace with the exterminators and now am actually even referred by a few of them for jobs they are not equipped to handle. This rapprochement might have been possible only because I live in an area that is far above the national average in organic and environmental consciousness. I might not be allowed to do this in other parts of the country. Really.

I know a remover who actually went to jail for illegal pesticide application, even though he didn't use pesticides. They were out to get him, so they did. The judgment was that since his operation resulted in the death of Yellow Jackets, a bona fide "pest," it had to be considered "pesticide," and therefore subject to licensing and therefore indictable. This judgement would have been surely overturned in a higher court, but he didn't have the wherewithal to pursue it. What they really got him for was his attitude. He was unrepentant and refused to acknowledge their authority to interfere with his righteous livelihood. That was in another State that will remain unnamed. But if you're thinking about it, think about that.

That, combined with my own brushes with the law, scared me, so I decided to get a pesticide license, even though I would never use pesticides, just to cover all my bases, which I naively thought I could do because it was a good idea. While studying for the exam, I learned that a licensed pesticide applicator was required by Law to use a certain prescribed minimum amount of duly documented pesticide every single month in order to maintain the license. Reminiscent of the old mafia protection racket, and there was no way I was going there.

I cannot recommend this business. You can get paid well, yes, but there are not enough jobs to live off entirely. Most of the time it's not bad, and you do get to work out of doors, sometimes in beautiful places, but when they go wrong, they really go wrong, and you get serious pain, or worse. Plus you have to maintain a lot of equipment even when you're not using it. The only reason I do it is because I'm already doing it. BC

MANAGING NUCS



Recently, I was asked, "How strong should a nucleus colony (Nuc) be?" How many frames of bees and brood, and how many frames of honey and pollen? Not being one to give a quick answer, I tried to think of all the possible scenarios where a beekeeper would make up nucs. I came to the conclusion that the proper strength depends on three things: When, Where, and What For.

When: When are you making up these nucs.

Where: Where are you keeping your bees.

What For: What will you be using your nucs for.

Will these nucs be made in the Spring from strong colonies, or in mid-Summer. Are you keeping your bees in the North, where the season is short and intense, or in the South where the weather is warmer and the buildup period is longer. Will the nucs be used for honey production, mating nuclei, re-queening production colonies, or perhaps for an over wintering project to help in raising your own stock.

Spring Nucs

Let's start with Spring-made nucleus colonies. Most beekeepers want to make, or purchase nucs at this time of year, that will produce at least a small crop of honey. I have found that, in my area, in Vermont, three frames of brood and a good queen will build up into a colony able to take advantage of later flows. I provide each nucleus colony with two frames of sealed brood, a frame of unsealed brood, a frame of honey/pollen, and an empty comb on the opposite side wall of the nuc box. With enough bees to cover all but the empty comb, this unit is given a laying queen or ripe queen cell. If I were buying Spring nucs from another producer, I would expect them to be at least this strong.

Should they be stronger? Why not five frames of brood, and packed with bees? Wouldn't that make a better nuc? Maybe yes, maybe no.

With five frames of brood in a five frame nuc box, just what will the bees eat? Unless there is a good frame of honey in the box, or a dependable nectar flow on, such nucleus colonies could soon starve. And, what if they didn't starve? Those frames of brood will hatch over the next 10 days or so, leading to severe overcrowding and possible swarming. Remember this when your purchased nucs aren't "Full." Between the time the producer makes up the nuc and gives it a queen, until the time you install it in your eight or 10 frame equipment, much can happen. You wouldn't be too happy if your expensive little nucleus colony starved or swarmed. Your producer keeps this in mind when making them up.

What about making them stronger, and starting them in 10 frame equipment? In my area of the northern Champlain Valley, three frames of brood and a good queen will make two or three medium supers of honey, and be heavy for Winter. Starting them in nuc boxes, and transferring them later to ten frame equipment, allows the bees to get their virgin or mated queen to establish her brood nest without danger of chilling or robbing. While we have a short growing season, compared to the rest of the country, our flows can be intense and prolonged. This allows production colonies and nucleus colonies to build into strong honey producers. I feel that making Spring nucs stronger would be a waste of my bee resource.

What about bees located in an area that has a Spring build-up, followed by an early main honey flow, followed by...nothing. Bees in an area such as this, i.e., The Middle Atlantic states, could probably benefit from stronger Spring nucs. These would build up to peak strength more quickly, taking advantage of the early, and often only, honey flows.

Mating Nucs

Other than Spring nucs, made for increase, replacing Winter kill, and honey production, what other reasons would the beekeeper have for making up nucs? Suppose you aren't trying to make honey, but rather trying to raise some queens from your own stock. In that case, you don't need, or want, a powerful nucleus colony. A frame of emerging brood, a frame of honey, and enough bees to cover both, is plenty to start a mating nucleus. Remember, when that frame of brood hatches and the newly mated queen begins to lay, there will quickly be two frames of brood. Even with harvesting the mated queens and re-celling (replacing her with another cell), the mating nucs will quickly become crowded. This will make finding and catching the queens more difficult.

A strong re-queening nuc over the inner cover. There can be no communication between the nuc and the parent colony. The nuc's entrance, in this case both an auger hole and a notch cut from the inner cover rim, is covered by the clustering bees.

The same re-queening nuc after being united with the parent. Notice the nuc's entrance is still facing to the rear of the hive.

Mid-Summer nucs ready to be moved to their new location. They are then given a caged queen or a ripe cell. It appears to me, that the nucs in the rear box were made too strong. With all those bees, they are in jeopardy of swarming, unless the strength is adjusted in a couple weeks.

Two mid-Summer nucs ready for Winter. They will need only a little feed to top off their Winter honey stores.

Re-queening nucs

And, then there are nucs made *specifically* for re-queening. In the case of re-queening nucs, I use the entire top hive body of the brood nest, provided it contains honey, pollen, and brood in all stages. The bees are shaken out, and the box and combs are placed on top of an excluder on top of the bottom hive body. The bees re-populate the nuc over night, and it is then removed and the excluder is replaced with a solid inner cover (escape hole closed). The unit is given a rear entrance, and a laying queen or ripe cell. Because all the old bees fly back to the bottom unit, acceptance of caged queens in the nuc is high, often near 100%. Three to four weeks later, the old queen below is killed and the colony united. This allows you to re-queen a colony with a nuc, arguably the most successful method, and not have any extra equipment left over. No need to find a home for the five combs removed from the re-queened colony.

Mid-Summer Nucs

Finally, and most important to my apiary, are nucleus colonies made in mid-Summer. These will be over wintered in their four or five frame nuc boxes, and be my increase or replacement bees for the following year. They are made not from the strongest of my production colonies, but rather from the weakest.

Every apiary has one or more slow colonies. They are weak coming out of Winter, and slow to build up. While they may go on to produce a super or two of surplus honey, the standard practice is to re-queen these colonies in hopes of having a strong producer the following year, or adding brood from strong colonies. This in turn reduces honey production from early flows, takes time, money, and is not always successful. I think there is a better plan.

These slow colonies are allowed to build up until mid-Summer...July in my area of the north. They are broken up into four or five frame nucs, each being given approximately one and one half frames of brood, a frame of honey/pollen, an empty comb, and just enough bees to cover the brood. get an average of four or five nucs per colony sacrificed, but yours may be more, or less. Since it is mid-Summer, and the temperatures are warmer than in the Spring, more bees are not necessary or desirable. The idea is to have the nuc build up on the Fall flow, and shut down for Winter. Adding a large population of bees will lead to swarming on the Fall flow, and loss of your bought or raised queen. They are over wintered above the inner cover of strong production colonies. When transferred to 10 frame equipment the following Spring, with their essentially new, young queen, they build quickly into good honey producers. It isn't uncommon for these over wintered nucs to produce 150 or more pounds of honey on a good flow for me. In fact, I find they out produce Spring made nucs.

Increasing Your Honey Crop

Nucs for over wintering can be made up earlier in the season, too. If they are made in mid-June, the four nucs will build up quickly, and by moving the division board feeder/nuc separator to the sidewall, the nucs are allowed to expand onto eight frames. One month later, most will need to be split up again, or they will swarm. At this time, they can be divided two or three ways, creating more over wintering nucs in mid-July. When all is said and done, by mid-July, eight to twelve nucs can be made up from the original slow colony, if they were able to build to six frames of brood by mid-June. I believe this to be a better plan than re-queening slow colonies. I also find I make better crops by using over wintered nucs. I have my Spring replacement/increase bees already made up the previous Summer, and have queen right nucs for re-queening weak colonies earlier in the season than I can raise my own queens. I no longer have to split up my production colonies, and avoid losing early honey flows while the production colonies are rebuilding to peak strength. We all know what it takes for a colony to make a good honey crop. Bees, bees, and more bees. A colony with 60,000 bees will make more honey than two colonies with 30,000 bees each.

Why not try making some mid-Summer nucleus colonies this year, and over Winter them in your apiary? You may be surprised how easy the process is, and the great results you will achieve. BC

Michael Palmer successfully manages hundreds of nucs every year, for all sorts of reasons, around his home in St. Albans, Vermont.

QUEEN EXCLUDER DEFICIENCIES

Walt Wright

Nobody asked the bees first.

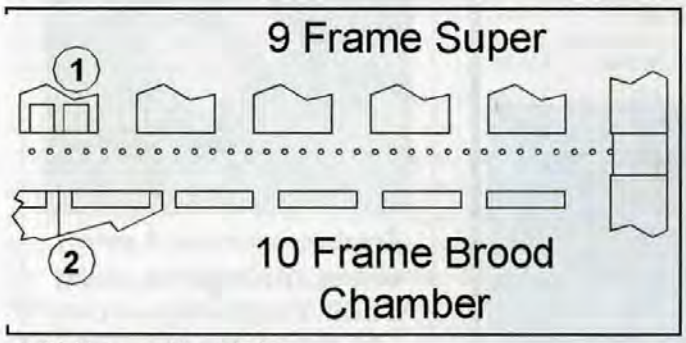
Beekeeping lore in general is a collection of opinions. In some cases, there is general agreement, and on other subjects, there is wide disagreement of opinion. There are very few subjects in beekeeping where opinions are more polarized than use of an excluder. Those for and against are equally strong in their conviction of their side of the issue. Both sides of the argument have some foundation in supporting facts: A worker bee can easily negotiate passage through the queen restricting spacing of a queen excluder, *if she wants to.* In apparent contradiction, the queen excluder definitely reduces honey production. The reason that those two statements are not contradictory is that the workers ability to gain passage through the device is one of the lesser problems affecting production. The design deficiencies of the device and the colony's reluctance to pass through it will be discussed in this article. It's a complex subject, and some pertinent factors may be overlooked, but there will be more than you've seen before on the subject.

Starting on neutral ground, both sides generally agree that getting the colony started passing through the excluder is somewhat problematic. If the excluder is added early in the buildup with addition of the first honey super, the bees are reluctant to immediately traverse the excluder to put nectar in the super. There is ample reason for this reluctance.

You have seen a modified version of the figure below in the discussion of a nine-frame brood nest (Jan, 06). For this article, a wood-bound excluder is added between the ten-frame brood chamber and a nine-frame honey super. Note on the sketch that there are at least one, and sometimes two, exclusion wires above every opening between 10 spaced top bars. The barrier is not just perception by the colony; it's an actual obstruction. Viewed from below, every top bar spacing has at least one exclusion wire in the way of upward travel. It is a prominent fault of excluder design that there is no relationship between comb spacing and excluder wire spacing. Excluder wire spacing progresses across the device with no regard for openings in comb spacing. Queen exclusion should have been the starting point in device design, and not the only consideration.

The sketch shows an end view of the installed excluder for half the hive width. The other side would be essentially the mirror image. Random parts available in the bee barn were used for actual measurement of the geometry of the installed device. My engineering background pushed me into an examination of the device from the bees' perspective. The wood-bound model was selected for measurement. Metal-bound units were available, but the reduced thickness of the metal-bound would only make the problem worse. I was aware from the results of a previous experiment that transitioning frame count from ten to nine creates congestion above and below *without an excluder.* Up/down traffic backs up on both sides waiting their turn at the frame count change maze. There would certainly be less congestion with lesser populations, but I manage for maximum brood volume and greater populations.

Although the bees were apparently packed solid on both sides of the frame count change, it may not be as serious as it looked. They have a special gift for operating when crowded. The next time you see a swarm cluster, note the returning-scout with news for the interior. After a sip of nourishment from a surface "tanker", she effortlessly melts into the solid wall of bees on the outside of the cluster. (It's one of those "How did she do that?" things).



9-10 Frame with excluder.

Tip Of The Month

For excluder addicts, there is a simple way to start traffic through the device. You can't hide brood or honey above the excluder. Raise a frame of brood or honey above it at installation, and traffic through it starts promptly. When you decide to replace your upper deep with two shallows for wintering, many things become easier.

The sketch shows the wood-bound excluder installed between the typical ten-frame brood chamber and a nine-frame honey super. Many beekeepers transition their box frame count at the excluder. The congestion caused by frame count change and excluder may not be a significant delay in terms of the overall round trip forager* time, but it certainly doesn't make it better. With multiple round trips to the field, the turn around time could easily accumulate into less round trips per day. Any reduction in production caused by congestion is not a result of the bees' inability to squiggle through the excluder.

The sketch is drawn with comb at the bottom bars the same width as top bars. The circle one detail shows the frame end with divided bottom bars. The circle two detail shows the end of the top bar with frame spacing shoulders pushed together. Both circle one and two details are typical of remaining frames. The top bar width is preset by the manufacturer to the width of comb at brood rearing depth. Up/down traffic travels in the extra space generated by the spacing shoulders of frame ends. The obvious traffic path is included to make the point that the excluder only complicates travel through the offset in frame count.

The excluder should provide space for lateral travel both above and below. The quarter inch space above is marginal at best. If there were room on upper and lower faces of the excluder for lateral travel and turns up and down, all the wire spacing could be used to good advantage.

When two bees traveling in opposite directions meet face to face in a restricted space, both back up momentarily. Whichever starts forward again first is given the right-of-way by the other. For the new forager, finding a path through the maze that produces good results by trial and error is a slow process. They do have another gimmick that you won't find in the literature: They often use a different route on incoming and outgoing. In other words, one-way traffic patterns are established by the experienced foragers. This improves traffic flow immensely. But add a thousand new foragers joining the work force daily and congestion is inevitable. The beginners need to learn the routes by hunt and peck. That's a lot of backing up to get out of the way.

An article on a poorly designed or misapplied beekeeping device shouldn't end without some sort of recommendation. Of primary importance is the irregular location of exclusion wires with respect to normal traffic paths of comb, inducing the requirement for lateral travel above and/or below. More space is needed for that lateral direction change. You might try adding a spacer on the upper side if you use top bee space boxes. The bees have almost sanctioned the half-inch below by adding little comb there. The space above should be at least that much. Don't wait for any further information from me. I don't use the insidious device. The whole concept of limiting brood volume is counter productive – literally.

*The bees that routinely travel from the brood nest below to honey supers above may be the original forager, returning with a full load of nectar, climbing to find a house bee that will accept her load; or, it may be an army of house bees, having already accepted a load from a forager below, and now moving up to the honey supers above to deposit that load for drying. In either case, there is considerable traffic at the 10 frame – excluder – nine frame interchange. BC

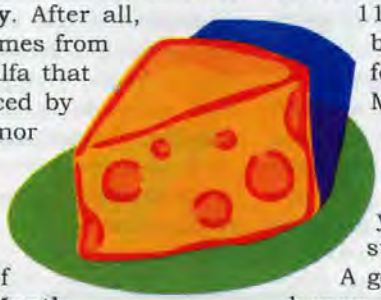
Walt Wright is a retired engineer and a hobby beekeeper in Tennessee.

Bees Celebrate!

Ann Harman

As you may have gathered Groundhog Day and April Fool's Day are two of my favorite days of the year. Both of them have absolutely nothing to do with bees or honey except for a couple of recipes for cooking groundhogs. But then we would lose our weather forecaster. I think it would be best if we could appreciate and celebrate our bees and their honey all year. So get out a pencil and a calendar and we'll make note of months, weeks and days to do this. By the way, these occasions are real and are undoubtedly celebrated by others – somewhere.

We'll start the year with **January**. It's **Hot Tea Month** and **Oatmeal Month**. Both of those certainly benefit from honey. We then come to January 14th – **Clean Off Your Desk Day.** I have no intention of celebrating that because I might discover something that I should have done months before. However on the 20th we can have **Cheese Day**. After all, cheese is made from milk; milk comes from contented dairy cows who eat alfalfa that has been grown from seed produced by bee pollination. A long route to honor that day.



February is a bit better. **National Cherry Month** certainly celebrates the hard work of pollinating bees. Cook books are full of recipes to honor **Sweet Potato Month**, but don't serve them every day or you'll get tired of them. Get out the squeeze bear full of honor for **National Pancake Week (10–16)** and **International Pancake Day** on the 27th. Make a nice salad dressing with honey so you can use **California Kiwi Fruit** on their day – February second. Don't let that celebration interfere with **Groundhog Day**.

March is important because it is **National Nutrition Month**. Honey is definitely more nutritious than sugar so start thinking about ways to substitute honey for sugar throughout each day. It's also **National Peanut Month** and peanuts combine so well with honey in many ways, including peanut butter sandwiches. On the 21st we need to honor our bees on **National Agriculture Day**. Where would agriculture be without honey bees? Please don't bother to e-mail me or phone me on the 22nd. It is **National Goof-Off Day.** However we all need to get busy on the 25th and bake a pecan pie – with honey, of course, for **National Pecan Day.**

April is a rather quiet month in spite of **April Fool's Day**, perhaps because of Income Tax. However April is **National Garden Month** and we all know how much our gardens appreciate bees. We have an opportunity to bake another pecan pie anytime we wish because April is also **National Pecan Month.** The 17th promises to be a bit noisy because it's **National Blah, Blah, Blah Day.** Wonder who thought that one up? It comes right in the middle of **Organize Your Files Week** (16-22). A whole week spent organizing files? I don't think so. But cheer up, **Food Day** is the 20th so you can make good use of the honey jar that day.

Our honey jar will be really busy again during **May**. We need it for **National Strawberry Month**. May is a good time to open up the grill, make some honey BBQ sauce and honor **National Barbecue Month.** Eggs are essential to our baked goods with honey so find some recipes for **National Egg Month.** Honey salad dressings are popular so make different kinds since May is **National Salad Month.** We will also find that May is **National Messes Month**. I don't need a special month for that – everything is a mess twelve months of the year. Here's an exciting day – the 11th is **Eat What You Want Day.** You choose but be sure it includes honey. Three cheers for **National Pickle Week** (last two weeks of May). You can make delicious pickles with honey.

June is a good month for both honey and bees. It is **National Dairy Month**. Tell all your friends that honey is much better than sugar to celebrate **National Ice Tea Month.** A good steak will be a much better steak with a honey marinade for **National Beef Steak Month.** To go along with the steak you need to celebrate both bees and honey for **National Fresh Fruits and Vegetables Month.** I am going to enjoy **Peaches and Cream Day** (21st) and **Strawberry Parfait Day** (25th) both made with honey, of course.

We all enjoy picnics in **July** so be sure to bring some baked beans made with honey since it is **National Baked Bean Month.** Fresh blueberries are ripe now, just in time for **National July Belongs to Blueberry Month.** I know all of us will be glad to celebrate **National Ice Cream Week** (8–15). Ice cream made with honey is positively wonderful. Pay attention now because an important day is coming—**Don't Step on a Bee Day**. Be sure you don't step on a bee on the 10th. Actually it is nicer never to step on a bee. Although we just had salads a couple of months ago you can still use those recipes during **National Salad Week** (23-31).

We will have a busy month in **August.** Bake lots of brownies with honey for **Brownies at Brunch Month.** We'll need our bees for celebrating **Crop Day** on the 6th. Do we blame the bees for an excess of zucchini? Anyway on the 8th you can do this – **Sneak Some Zucchini onto Your Neighbor's Porch Night.** At least this month we can get out the hammock for **Na-**

tional Relaxation Day on the 15th. Get a good rest because we'll be busy on the 18th for **National Watermelon Day.** Next come **Lemonade Day** on the 20th and **Waffle Day** on the 24th. You know how essential honey is for both of those!

Hooray! **September** is **National Honey Month!** The honey we honor this month certainly fits in with other celebration months: **Better Breakfast Month** and **Biscuit Month.** Honey is so important for both of those. Since it is also **National Chicken Month** I assume we can make some tasty dishes using chicken and honey. Another appropriate celebration is **Waffle Week** (1–7). Since the 10th is **National Popcorn Day** you can use some of your honey to make popcorn balls.

We are going to be busy again in **October.** I hope you use up a big jar of honey in celebration of **National Dessert Month** and **Gourmet Adventures Month.** Of course in autumn we have plenty of fresh, crisp apples for **National Apple Month.** Use honey in your apple recipes, especially apple pie, or just dip pieces of apple in your favorite honey. Get another jar of honey to use during **National Cookie Month.** There are so many honey cookie recipes that you can probably have a different one each day. I don't understand why we need 31 days devoted to **Toilet Tank Repair Month** but it's on the schedule of events for this month. Never mind, let's use some of those honey cookies during **National School Lunch Week** (14–20). On the 21st we have **World Food Day** and certainly honey is worldwide in appeal. If course we will not forget all the treats possible for **Halloween** on the 31st.

November brings us some repetition but since honey is so important it is good to repeat some of our treats. This is **Good Nutrition Month** so start reminding your friends to use honey instead of sugar, just like you did in March. Here comes another pecan pie but you will have to be a bit particular about the source of your pecans because it is **National Georgia Pecan Month.** Get out the jar of peanut butter while you are reaching for your honey jar. It's **National Peanut Butter Lover's Month.** Yes, you can make sandwiches but why not make some more of the peanut butter cookies. Men—here's a special day for you: **Men Make Dinner Day** on the first of November. Get out the honey recipes and make a wonderful dinner. Here's a good day for honey – **National Homemade Bread Day.** Honey is good in the recipe and really good on a thick piece of warm, just-out-of-the-oven bread.

And so we come toward the end of the year with **December.** I guess with Christmas and other excitement December turns out to be a rather quiet month for celebrations. However it is **International Calendar Awareness Month.** I think I've done a very good job being aware of months, weeks and days to celebrate honey and honey bees throughout the year. You can get out the honey jar again and get busy on **Cookie Cutter Week** (1–7) and get the holiday cookies made early. Just store them in a good airtight tin. I haven't figured out what to do on **National Bathtub Day** (5th)—do I buy a bathtub? Have a good soak in a bathtub? I doubt that the demonstrators who threw tea overboard on December 16th, the date of the famous **Boston Tea Party,** threw any honey after it. I am sure the fish in the harbor were most surprised. Guess what – the 26th is **National Whiner's Day.** We can officially whine about the hideous scarf we got as a present on Christmas day. And so we come to the last day of the year – the 31st. Yes I know it is New Year's Eve but it is also **Make Up Your Mind Day.**

Now I have indeed made up my mind to celebrate honey and the remarkable honey bee throughout the year. I had no idea there were so many occasions to do that.

In case you think that these few months, weeks and days listed here are all there are, rest assured that there are hundreds of other dates to celebrate just about everything else you can imagine – and then some. BC

Ann is still celebrating, somewhere near her home in Flint Hill, VA.

Honey Plants

Connie Krochmal

Privets (UGA photo).

Privets – Good & Bad Honey

Many of the invasive bee plants in the U.S. were originally introduced as ornamentals. Take the privets, for example. Among the most commonly grown woody plants, these are often used for hedges.

Members of the olive family, the privets have escaped from cultivation and naturalized. They occur throughout most areas of the country. Of the 50 or so species, eight of are considered major invasive species in America. Their blossoms are much loved by honey bees.

General Description

Because the various species are similar in appearance, it can be difficult to tell them apart. These stout, fast-growing, many-branched plants are either trees or shrubs. They range from 10 to around 35 feet in height.

Their arching or leaning trunks can reach almost a foot in diameter. These are covered with gray to tannish-white bark. Hairy when young, the slender, greenish-gray twigs can be angular shaped. They often form right angles with the stems.

Privets have opposite leaves that are thick and leathery. Medium green above, they are paler underneath. The shape varies from oval to elliptic. Anywhere from 1½ to five inches in length, they are about half as wide.

Quite often, the privets are deciduous. They can hold their leaves into the Winter months. In some climates, certain kinds of privet will be semi-evergreen to evergreen.

Depending on the species, privets bloom between April and August. Small and white, the blossoms have a fragrance, which is sometimes unpleasant in certain kinds of privets. The perfect flowers contain both male and female parts. Their four petals are fused together at the base to form a tube. Opening in cone-shaped panicles, these appear terminally and in the leaf axils.

The berry-like drupes ripen in terminal bunches from September onward. They are blackish-blue to dark purple. Often, these can remain on the plant throughout the Winter. Each fruit contains one to four seeds.

Growing Conditions

In general, privets prefer reasonably moist soils. Most kinds will not thrive on dry sites. They prefer full sun. Though the plants can become established in full shade, they don't spread as freely in such situations.

Privets can be found in many different habitats. These include barrens, bogs, bottomlands, disturbed sites, fencerows, old fields, floodplains, landscapes, right of ways, roadsides, wetlands, windbreaks, and woodlands.

How Privets Spread

Privets spread by root sprouts and seeds. A mature privet plant can produce hundreds of fruits. Those plants with the thickest stems tend to produce the largest number. When privets are less than a foot in height, they begin flowering.

After consuming the fruits, birds and other wildlife distribute the seeds in new locations through their droppings. Seeds that have passed through the digestive tracts of animals will have the highest germination rates.

Why Privets Are Successful as Invasive Plants

Adapting easily, these plants are prolific. From seeds and sprouts, they quickly produce pure stands and dense thickets. A monoculture can contain around 2,500 privet plants per acre. As introduced plants, these have no natural enemies or serious diseases in the U.S. In fact, many insects won't feed on the foliage because it contains a bad-tasting substance.

The Environmental Impact of Privets

Privets out-compete and crowd out the native species, adversely affecting natural diversity. In some locations, these intruders have displaced rare or endangered plants. They interfere with the ability of forests to regenerate.

Control of Privets

Remove seedlings before they have a chance to get established. Begin control measures early. Large plants are difficult to eradicate.

Small seedlings can be pulled by hand very easily. Use a weed wrench for those that are less than 2¼ inches in diameter.

Once privets become established, cutting or mowing once a season usually keeps them from spreading. However, this does not kill the roots. These can easily re-sprout. That's where herbicides come in handy.

Chemicals are used in various ways. They can be sprayed on the foliage or young bark. One of the best means of control is to cut the above-ground growth and paint the stumps with herbicide.

There are really no promising biological controls for the privets. Goats will graze on the plants to a limited extent. Burning isn't always effective. Though this can kill the top growth, the roots will usually send up new shoots.

Privets as Bee Plants

Privet flowers are eagerly sought by bees. Freely yielding lots of nectar, these also bring pollen. The late blooming species are very helpful to bees when there is a dearth of flowers during the Summer. When grown as hedges, privets don't bloom as reliably if they're pruned on a regular basis.

These species are most important to beekeepers in the Northeast, Midwest, Southeast, and Southwest.

There usually aren't enough privet plants for the bees to produce pure privet honey. When available, this crop will be very dark and thick. Normally, it is fed to the bees. Because this honey tends to have a somewhat bitter flavor, it shouldn't be mixed with more desirable ones. Exceptions are those varieties that flower in the delta states of Louisiana, Mississippi and southern Alabama, where Privet honey is a sought-after crop.

Amur privet (*Ligustrum amurense*)

Originally introduced from northern China, Amur privet grows well at all pH levels. It will tolerate partial shade. This is adapted to drier conditions than most privets.

Usually deciduous, it is generally a multi-stemmed shrub. Amur privet grows from 12 to 16 feet in height with about an equal spread. The stems can be hairy.

The leaves of Amur privet are over two inches in length and less than an inch across. Oblong to elliptic, these can be shiny on the upper surface. Hairs are sometimes present on the blossoms and undersides of the foliage. This species usually blooms for several weeks during May or June.

Amur privet is hardy enough to survive Winters in USDA zone four. It has naturalized over much of the eastern and south central U.S. as far west as Texas.

Border privet (*Ligustrum obtusifolium*)

Also known as blunt leaved privet, border privet is native to Asia. This arrived in the U.S. around 1860.

An arching, spreading shrub, it reaches nine to 12 feet in height with a slightly larger spread. Over two inches long, the foliage can be hairy underneath. The leaves are oblong to oval.

Beginning in June, the ill-smelling, nodding flowers begin to open in hairy panicles, over two inches in length. These appear mostly in the leaf axils. The black to bluish-black fruits are lightly covered with a whitish bloom.

Among the hardiest of the privets, this survives Winters in USDA zone four. It occurs mostly in the East, but is also found in parts of the West, including Missouri and Utah.

California privet (*Ligustrum ovalifolium*)

Despite the common name, this species is native to Japan. It was introduced to North America during the 1840s. This reaches 10 to 15 feet in height. California privet has erect stems. Depending on the location, this can be deciduous or semi-evergreen. The shiny, dark green leaves are up to 2½ inches long and about half as wide.

Also known as waxy leaved privet, this species blooms from June through July. The blossoms open in masses on stiff, erect, irregularly shaped, terminal panicles, up to four inches in length. Its fruits are black.

The fact that this plant is only hardy to USDA zone six places limitations on its ability to spread northward. It is found in areas of the eastern and central U.S. as well as in California.

Chinese privet (*Ligustrum sinense*)

This shrub withstands more shade than most privets, and shows some tolerance to drought. It is also called common Chinese privet. Introduced to the U.S. during the 1850s, this is a native of Southeast Asia.

Typically, Chinese privet is about 10 to 15 feet tall. It has numerous, leafy branches. Mostly semi-evergreen, this is sometimes deciduous. The medium green leaves are oval. Up to three inches long, they can be hairy along the midribs on the underside.

In June and July, the blossoms open in abundance on terminal clusters, which are somewhat shorter than those of the other privets. The fruits remain on the plant over the Winter. These are black to dark purple.

Being somewhat tender, Chinese privet is only hardy to USDA zone seven. It is found in 21 states, mainly in the East and central U.S. westward to Texas.

European privet (*Ligustrum vulgare*)

Grown in the U.S. since the 1700s, this is also known as com-

Chinese Privet (UGA photo).

Chinese privet (UGA photo)

mon privet. European privet tolerates most any kind of growing conditions. With spreading branches, this is 10 to 15 feet tall with about an equal width. Depending on the climate, European privet can be deciduous or evergreen.

The dark green foliage, lance shaped to egg-shaped, is 2½ inches long. Blooming from April through July, the flowers open in crowded, hairy panicles. The shiny black fruits cling to the plant over the Winter.

This species is quite hardy, adapting to Winters in USDA zone four. It has escaped in 32 states, particularly in the eastern U.S. In addition, European privet occurs in parts of the West, including Montana, Nebraska, Oregon, and Utah.

Glossy Privet (UGA photo)

Japanese Privet (UGA photo).

Glossy privet (*Ligustrum lucidum*)

This was introduced to America around 1845. Glossy privet is somewhat taller than most species. Typically, it will be 20 to 25 feet in height, though it can potentially reach 35 feet.

Also known as tree privet, this is native to Asia. It can take the form of a large shrub with thick stems or a medium-sized tree with a single trunk. Glossy privet features numerous, spreading leafy branches. These are held at right angles.

The petioles have reddish tinges. Oval to egg-shaped, the opposite, semi-evergreen leaves are five inches long. They have yellowish margins. The foliage tends to curl up slightly.

During August, the white blossoms emerge in long panicles, nearly eight inches in length. These appear terminally. The flowers of glossy privet are larger than those of the other species. Lasting throughout the Winter, the fruits can be black or dark purple.

Glossy privet can't spread as freely as some species since it is only hardy to USDA zone seven. This has naturalized from Maryland southward and westward to Texas.

Japanese privet (*Ligustrum japonicum*)

Native to Japan and Korea, Japanese privet arrived in America around 1845. This has naturalized in the Southeast, and along the Gulf Coast to Texas. It is also found in the state of Washington. Only hardy to USDA zone seven, this can't spread to colder climates.

Japanese privet tolerates some shade. Generally an evergreen, this grows as a small tree or a tall shrub from 10 to 20 feet in height. It is generally multi-stemmed with a spreading crown. The mature twigs are reddish. Smooth and light gray, the bark has raised cork-like dots.

Up to four inches in length and half as wide, the leaves are larger than that of most other privets. These are egg-shaped to oblong. The edges have a tendency to curl under. Along the margins are tinges of red.

Japanese privet blooms for a period of several weeks. Depending on the climate, this can take place between late May and August. The flowers open on six-inch-long panicles, which are mostly terminal. They can also occur in the leaf axils. Containing solitary seeds, the fruits ripen to blackish-purple.

Quihou privet (*Ligustrum quihoui*)

This has escaped in a limited number of states, generally in the Southeast. It has also naturalized in parts of Texas, and Louisiana. Though it is hardy to USDA zone five, Quihou privet serves mostly as a rootstock for grafting other kinds of privet. This species is native to China.

A vigorous plant, Quihou privet has an upright growth habit. It grows to 10 feet in height. Oval-shaped, the medium green leaves are two inches in length. The leaf stalks are hairy.

The blooms form small clusters on the long panicles, which are around eight inches in length. Among the late-flowering species, Quihou privet blooms from July through August. The berries ripen to bluish-black.

Blooming abundantly during the Spring and Summer months, the invasive privets have become favorites among the bees. BC

When It Hits The Fan

Scott Hynek

"What had begun as a dreamy, contemplative evening had now become a red alert, much like an IRS audit or a divorce trial. Each of these situations demands your full attention, and in each of these situations you know you're going to get stung."

Even a first year beekeeper can have experiences that somehow elude the veterans. I had one such experience during my first year, and it is one that you don't want to have.

I mounted my very first hives on a small flatbed trailer, so that they could experience the abundant dandelions in a hayfield a couple of miles away, then an apple orchard, and maybe even some blueberries. Why not? I had a trailer that was just sitting around.

The particular hayfield I had chosen was the lowest field the dairy farm had to offer. Heavy Spring rain made this the last field cut, though, so my planned two week visit to the hayfield became a two month visit.

Leaving the hayfield, finally, these hives were a good bit taller than when they arrived, and they were secured to the trailer only with the same single strap per hive that got them there. This started to bother me as I left, so I kept my speed at about 30 mph all the way home.

When I turned, carefully, onto my own gravel road, I heard the crash. My mirrors showed me just what I didn't want to see – the taller of the two hives was no longer on the trailer. In fact, hive boxes were scattered along the road, none of them upright.

And bees – I had never seen so many bees at one time. I had never before seen more than a few frames exposed at once, with the bees pretty much attached to them. Now each box had a softball-sized glob of bees attached to the outside, bees crawling on every painted surface and more bees flying around in a confused frenzy. So this is what 60,000 bees look like. In fact, this is what 60,000 *really cranky* bees look like. And *sound* like.

My first thought was – do something – quickly, so I put my veil back on and got out of the truck. Then I remembered I was wearing shorts, tee shirt and sandals. Dressed like this, approaching all those frenzied bees could be suicidal.

What had begun as a dreamy, contemplative evening had now become a red alert, much like an IRS audit or a divorce trial. Each of these situations demands your full attention, and in each of these situations you know you're going to get stung.

I walked home and got pants, long sleeves and a headlamp. Then I walked back and addressed the jumble of hive bodies. Now, which brood box used to be on the bottom? The one with brood, right? I took a frame out of each brood box and found that each contained both brood and honey. Great. Let's make the brood box with the most honey (thus least brood) be the upper brood box, then. Happily, one brood box was much heavier than the other, so it was now my upper brood box.

It was as I put the first brood box into place that I got my first sting, right through my glove. And the second sting, and the third. Better get used to it. And better get used to this loud buzzing.

As I put all the frames back into position, I noted that the frames all seemed to be intact. In fact, so were the boxes. Maybe gluing *and* nailing was a good idea after all.

I brushed globs of bees off the side of the boxes and onto the tops of the frames, but the boxes were still crawling with bees. There was going to be no way to move these boxes without crushing a few bees.

Usually, when moving boxes around, I try to put them down slowly, so that bees have a chance to get out of the way. Not an option tonight. A deep full of honey is heavy, especially when you can't stand right next to the hive.

Both supers were upside down. How to right them without spilling sticky frames into the sand? I don't have enough fingers to get one under the edge of all 10 frames. Fortunately, enough of the frames were stuck

My bee eater.

to each other so that I could right them without spilling.

Every time I put a box onto another, that lower box shifted with respect to the one beneath it, so each box had to be realigned with the rest. The mating surfaces were slippery, too, due to the recently liberated honey. Frame staples would have helped, but I didn't think these bees were going to tolerate much hammering tonight.

Worse, as soon as one box got misaligned with the one beneath it by more than the thickness of the side of the box, the upper box settled ever so slightly into the lower box, so that I had to use one hand to pry up the upper box with the hive tool and the other to reach around the box (still crawling with bees, remember?) and yank it into place.

There were still bees everywhere. I could only see those illuminated by my headlamp, but I could hear them all. Still really cranky. Using my bee brush and a shingle as a whisk broom and dustpan, I gathered up bees and dumped them into the top of the hive.

I was working alone in the dark, so replacing the hive boxes took a long time. Finally I began to drive along my gravel road, fully aware of every bump. At one point I got out to check, and sure enough, the boxes had shifted. Then, I remembered that I owned a strap with a ratcheting mechanism, so I got it. Once I tightened this new strap, the old one hung limply, testifying to how much tighter the ratcheting strap was.

On the downhill, rocky portion of the road into my beeyard, the tall hive tipped over again, but it only tipped about 45° before the ratcheting strap restrained it. To heck with it, I'll get this trailer into position and then worry about straightening the hive.

I'm not an accomplished trailer driver, but I did manage to back the trailer into position around a tight curve on rough, uneven ground without tipping the hive any more. At night. Must have been all that adrenalin.

The strap was still holding tight, and the hive was still tipped over to only 45°, so I tried to lift all four boxes into place as a unit. Hooray! That worked, but it still took another twenty minutes to get them aligned again.

As I finally walked away from it all, I realized that I hadn't left that buzzing sound back at the bee yard; I had who knows how many kamikaze bees following me home. At this point, I'd already been stung 20-30 times (I'd stopped counting after five). These hurt a bit, but certainly not 20-30 times as much as a single sting. I had decided earlier that I would abandon the bees and drive to the hospital if I felt anything systemic going on, like difficulty in breathing, but I never did. Still, I didn't want to get stung any more, and I sure didn't want to have angry bees inside my house.

I filled the air around me with smoke, but to no avail. Then I sprayed myself and my environs with water, and that quieted the buzzing down some. I couldn't see very well through a wet veil, so buzzing was the only indication that the bees were still with me. I smoked and sprayed again until there was no buzzing as I stood outside my door.

The moment I went in, though, the buzzing started again. Great, now I was alone with who knows how many bees in the house. Well, not entirely alone, for my two dogs showed up to greet me. Now, these dogs had never seen me in a bee veil, and what was all this buzzing, anyway? Desperate, I enlisted their aid by lying down, bringing the bees down to where they could snap at them. Which they did.

When I got up, I saw that I had crushed about 20 bees on the carpet, and that another dozen were still crawling around. This was the moment when beekeeper became bee destroyer. I had no further thought of trying to nurture these particular bees; I just wanted them dead. These bees were beyond rehabilitation and had to go. So I smashed those crawling bees with my fists.

Each time I laid down there were more dead bees on the carpet, plus still more crawling around to be crushed. How many bees had followed me into the house, anyway? One dog got stung, and retreated. The other dog had evidently decided that bees were so delicious as to be worth a sting or two, and quickly lapped up every bee she could find. Gotta love that dog.

It was well after midnight when I grabbed the last bees off the ceiling and crushed them, and well after that before I asked myself (and, eventually, others) what there was to be learned from this experience.

First of all, trailering beehives with single, unratcheted straps is asking for it. Trailers with small tires see every bump as a big bump, so trucking makes more sense than trailering. Ratcheting straps, two per hive at right angles, would be much better.

Second, this is probably what hive staples are for, right? Once the bees are shut into the hives, they'll just have to tolerate some hammering, which probably won't annoy them any more that driving over a bumpy road, anyway.

Third, I need to remember that bees are attracted to light. One Master Beekeepers said that my headlamp attracted them to me, and that I should instead have arranged to use my truck's headlights. Another said that I could have gotten at least some of the bees to leave my house by turning off all lights inside the house, turning on the porch lights and opening the front door.

Next year, I plan to put several hives in that hayfield again, but this time in a spot with road access, and this time permanently – no trailer. BC

Scott Hynek is a much wiser beekeeper this year, and safely moves his bees around his home in Bethel, Maine.

? DO YOU KNOW ?

Honey Bee Viruses

Clarence **Collison**
Mississippi State University

Interest in honey bee viruses has really increased in the last 15 years since researchers have shown that several viruses are associated with *Varroa* mites and colony demise. The honey bee *Apis mellifera* L. has been reported to harbor at least 18 viruses. Among the viruses infecting honey bees, 10 have been found in the United States.

Please take a few minutes and answer the following questions to determine how familiar you are with this important beekeeping topic.

Level 1 Beekeeping

1. ____ Viruses are composed of genetic material (DNA or RNA) enclosed in a protective protein shell or coat. (True or False)
2. ____ Virus particles reproduce by assimilating nutrients and undergo cell division. (True or False)
3. ____ Individual honey bees can harbor multiple viruses simultaneously. (True or False)
4. ____ Sacbrood virus infects larvae, pupae and adult honey bees. (True or False)
5. Describe the two syndromes or distinct sets of symptoms associated with chronic bee paralysis virus. (2 points)
6. ____ Most bee viruses persist as inapparent infections and cause no overt signs of disease. (True or False)
7. ____ Acute bee paralysis virus is associated with larvae and adult honey bees. (True or False)
8. Under natural circumstances, sacbrood virus levels usually remain low, and usually abates markedly and spontaneously during late summer. Please list two probable reasons why this disease remains at low levels. (2 points)
9. What is the primary mechanism that allows continuity of sacbrood infection from year to year within a honey bee colony? (1 point)
10. ____ Acute bee paralysis virus does not kill bees naturally, however, in the presence of *Varroa* mites it will kill adults and larval honey bees. (True or False)
11. ____ The Kashmir bee virus has been isolated from individual honey bees in parasitic mite syndrome colonies. (True or False)

Advanced Beekeeping

12. ____ Virus that has been found in both honey and bumble bees.
    A. Sacbrood virus
    B. Chronic bee paralysis virus
    C. Kashmir bee virus
    D. Filamentous virus
    E. Acute bee paralysis virus
13. ____ Indirect treatment of Kashmir bee virus, Bee virus Y, Filamentous virus and Black queen cell virus may be accomplished through control of nosema disease. (True or False)
14. ____ Kashmir bee virus is associated with both *Apis cerana* and *Apis mellifera*. (True or False)
15. ____ Most viruses that are associated with honey bees are double stranded DNA viruses. (True or False)
16. ____ In adult drone honey bees, you would look for sacbrood virus in the:
    A. Mid-gut
    B. Brain
    C. Testes
    D. Rectum
    E. Malpighian tubules
17. ____ Bees injected with this virus usually die within 12 days and typically suffer from paralysis of the forelegs and midlegs in the final few days prior to death.

A. Kashmir bee virus
B. Slow paralysis virus
C. Arkansas bee virus
D. Cloudy wing virus
E. Deformed wing virus

18. Define a virion. (1 point)
19. What behavioral and physiological changes occur in worker honey bees that are infected with sacbrood virus? (3 points)
20. ____ The proteins associated with the virus coat aids the virus in selecting the appropriate cell type and gaining entry into the cell. (True or False)
21. ____ *Varroa* mites are effective vectors of deformed wing virus. (True or False)
22. Where would you look for an accumulation of sacbrood virus particles in an infected adult worker honey bee? (1 point)

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **True** Virus particles are little more than genetic material (DNA or RNA) enclosed in a protective coat of protein.
2. **False** Virus particles do not posses the mechanisms that would enable them to multiply independently by assimilating nutrients in the manner of most micro-organisms. They can multiply only within the living cells of their host. When a virus infects a cell, it uses the cellular apparatus to make copies of itself. This can continue, as long as the organism of which the cell is a part, remains alive.
3. **True** Upon screening honey bee colonies for the presence of several bee viruses at Beltsville, it was found that mixed virus infections exists within individual colonies. They also found that individual worker bees can harbor four viruses simultaneously. Further research has also shown that queens can also have multiple virus infections.
4. **True** In nature sacbrood virus infects larvae, pupae and adults even though it is considered to be a brood disease. Diseased larvae are unable to pupate and death normally occurs in the prepupal stage. Infected adults appear normal.
5. **Type** I symptoms include abnormal trembling of the adult bees, partial paralysis, failure to fly and bloated abdomens.
   Type II symptoms are characterized by hairless, dark-black, shiny bees which are initially capable of flying. These bees are often subjected to attacks by healthy bees and denied reentrance in the hive by the guard bees.
6. **True** Diagnosis of bee virus infections is difficult because honey bee viruses usually persist as inapparent infections and cause no overt signs of disease. Virus particles cannot be seen with the naked eye and they normally persist as low-level latent infections.
7. **False** Acute bee paralysis virus affects only adult honey bees.
8. Adult bees detect many larvae in the early stages of sacbrood and house cleaning bees remove them from the colony.
   Sacbrood virus quickly loses infectivity in the dried remains of the dead larvae that remain in the hive.
   Behavioral changes in infected adults.
9. The continuity of sacbrood infection from year to year is provided by adult honey bees in which sacbrood virus multiplies without causing obvious disease symptoms.
10. **True** Prior to *Varroa mites, acute bee paralysis virus (ABPV) had never been associated with honey bee disease or mortality in nature. The virus was thought to be contained within nonvital tissues such as fat body cells. However, when acute bee paralysis virus is injected into the hemolymph in the laboratory, symptoms are very severe and the bees die quickly. Also, as a varroa mite parasitizes an ABPV infected bee, it damages tissue, releasing ABPV particles into the honey bee's hemolymph. Once in the bee's hemolymph, the ABPV is systemic and eventually fatal.*
11. ***True*** *The Kashmir bee virus has been isolated from several samples of bees in parasitic mite syndrome colonies and from Varroa mite samples taken from syndrome colonies.*
12. E) Acute bee paralysis virus
13. **True** As with most animal viruses, there are no known direct treatments for honey bee viral diseases. Indirect treatment of Kashmir bee virus, bee virus Y, Filamentous virus and black queen cell virus may be accomplished through control of nosema disease since these viruses are associated with nosema disease.
14. **True** Kashmir bee virus was first discovered in eastern honey bees, *Apis cerana* originating from Kashmir, India. It was then discovered in European honey bees, *Apis mellifera*, in Australia shortly afterward. It has since been found in U.S. honey bees.
15. **False** Except for the filamentous bee virus, all honey bee viruses reported so far are single stranded RNA viruses, 20-30 nm in diameter, isometrically shaped, and nonoccluded.
16. B) Brain
17. B) Slow paralysis virus
18. Virion- infective viral particles
19. Infected young bees cease to eat pollen
    Cease to feed and tend larvae
    Fly and forage much earlier in life than normal
    Fail to collect and pack pollen, reducing the potential for contamination of food stores
    Reduced life span
20. **True** The proteins of the virus coat are folded in unique ways to expose special immunologically active binding sites on the surface which are known as epitopes. These recognition sites can assist attachment to particular cell types and enable the virus to gain entry. The virus then takes over the biochemical processes within the cell to make further copies of itself.
21. **True** Studies have shown that *Varroa* mites are effective vectors of deformed wing virus. Mites are capable of acquiring deformed wing virus by feeding on infected honey bees. In addition, it was found that a bee was more likely to die or emerge deformed if the *Varroa* mite feeding on it had previously fed on a deformed bee.
22. Hypopharyngeal (Brood-Food) glands

There were a possible 13 points in each test level this month. Check the table below to determine how well you did. If you scored less than six points, do not be discouraged. Keep reading and studying- you will do better in the future.

Number Of	Points Correct
13-11	Excellent
10-8	Good
7-6	Fair

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

GLEANINGS

APRIL, 2006 • ALL THE NEWS THAT FITS

AHPA MARKET ALERT

The Argentine crop is over and it came up 30% below average. Argentine drum manufacturers report sales off 25-30% which supports the short crop.

Honey crop in the north of Argentina was good but very few bees are kept there. In the south, where most of the bees are, there were a lot of reports of around 20 pounds average. Due to the high price of sugar and the low price of honey, many beekeepers are leaving honey on for winter feed.

Also, the EU has banned all Brazilian food (including honey) due to the failure by Brazil to implement food monitoring programs as they'd agreed upon previously. Consequently, buyers from Germany and England are in Argentina trying to obtain honey.

The upshot of all this is that Argentine prices have moved up 10% in the last week. The minimum price Argentina honey 34mm and lighter could be bought for last week was 83 cents on the dock, NY.

Two large exporters in Argentina have said they're not taking any new contracts for any amount at any price. Their comments are that at this time prices are too volatile and Argentine beekeepers are holding what honey they have for the higher prices they see coming.

Some U.S. packers have made the comment that they won't pay the high prices the Argentines are asking as they can get domestic honey cheaper. This bulletin is to alert you to what's happening in the market place so you can market wisely. If we can get the bonding loophole closed, which looks very possible in the next 2-3 weeks, the price of honey could really take off. A dollar a pound may be cheap.

NHB RESEARCH

The National Honey Board (NHB) will fund six production research projects in 2006 to study a variety of colony health issues. Funding for the projects totals $63,475.

NHB began funding production research projects in 2004 to help beekeepers maintain colony health, without adversely affecting their ability to produce quality honey. Since 2004, NHB has funded seven such projects with funding totaling $135,877.

Hygienic Removal by Honey Bees of Reproductive parasitic *Varroa* Mites, H. Glenn Hall, Ph.D., University of Florida.

Is Propolis Effective Against American Foulbrood and *Varroa Destructor*?, Marla Spivak, University of Minnesota.

Environmental and Genetic Traits of Bees that Resist Disease and Increase Productivity, Jay Evans and Jeff Pettis, Research Entomologists, USDA-ARS Bee Research Laboratory.

Co-encapsulation of attractants to Improve Ciocontrol of *Varroa* in Honey Bee Hives, Kelly Cartwright, Ph.D., Agricultural Research Initiatives, Inc.

Investigating *Bacillus thuringienses* CRYIII toxin for the biological control of Small Hive Beetle (*Aethina tumida*) Audrey Sheridan, Mississippi State University.

Varroa mite control using mineral oil and essential oils in honey bee colonies, Jeff Pettis, USDA-ARS Bee Research Laboratory.

FLORAL SOURCE ID

Not all honey is created equal. When bees feast on the nectar from different flowers, they produce honey that differs greatly in taste and appearance.

Researcher Jagdish C. Tewari and associate professor in agricultural and biological engineering Joseph M.K. Irudayaraj from Purdue University in West Lafayette, IN, used Fourier transform infrared (FTIR) spectroscopy and surface acoustic wave sensing to identify the flowers responsible for the sweet fluid.

It is important for industry to know the floral source of honey because of its economic importance and to maintain the quality of honey," Tewari said.

According to the researchers, FTIR identifies the nonvolatile components of honey via the vibration of molecular bonds, and surface acoustic wave sensing, ferrets out information related to the volatile flavor compounds.

After analyzing the FTIR spectra and zNose results, they found they classify the known honey samples into seven floral categories. They then used this approach to categorize unknown samples, achieving close to 96 percent accuracy on a classification validation set.

The two scientists performed the research while at Pennsylvania State University in University Park, in collaboration with the National Honey Board. They published their results in the September 7 issue of *Journal of Agricultural and Food Chemistry.*

PESTICIDE APPLICATOR PAYS SETTLEMENT

In the most recent development in the Minnesota case involving pesticide-spraying and its alleged effect on honey bees, pesticide spray applicator Terry Ricks agreed to relinquish his spray airplane as partial settlement and release of beekeepers' claims for damages arising from lost beehives as a result of the spraying. Ricks is one of several commercial spray applicators accused of having applied the insecticide Sevin XLR Plus to hybrid poplar tree plantations. The balance of the beekeepers' settlement with Ricks is a cash settlement of an undisclosed amount that may be collected only through an assignment by Ricks to the beekeepers of any insurance rights available to Ricks for his pesticide-spraying activities.

This settlement follows an earlier settlement last summer between the beekeepers and the Minnesota DNR in which the DNR agreed to pay, among other things, $335,000 cash to the beekeepers.

The dispute between the beekeepers and the poplar growers centers on the beekeepers' attempt to enforce proper application of the pesticide according to the federally-mandated and federally-approved label Sevin XLR Plus. The label includes a specific Bee Caution which states, in part, *"Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area."* The beekeepers contend that hundreds of pesticide spraying applications violated this label prohibition because the spraying occurred in areas of blooming weeds during times of the day when bees are foraging for pollen and nectar.

Gary A. Van Cleve Larkin, Hoffman, Daly & Lindgren, Ltd.

FIVE YEARS SO FAR

The head of New Zealand's new *Varroa* control agency believes the country's South Island should remain free of the mite for years to come if movement control conditions continue to be enforced.

The *Varroa* Agency Inc took over from the Ministry of Agriculture in controlling the movement of bees and related equipment across the Cook Strait, which separates the *Varroa*-infected North Island from the South Island.

The NZ$730,000-a-year strategy is being funded by South Island councils' property taxes and by a NZ$2 a hive levy on the beekeeping industry.

The central government will manage any eradication attempt if *Varroa* reaches the South Island.

Agency chairman Duncan Butcher said the changes to the *Varroa* administration system would not impact on day-to-day beekeeping activities. "We see this as being a positive move, where local government and industry are working together to keep the South Island *Varroa*-free," he said.

"Movement controls have kept *Varroa* out of the South Island for five years already, which reflects the high level of compliance and support from beekeepers in both islands."

Alan Harman

KASHMIR VIRUS IN UK

The U.K.'s National Bee Unit's (NBU) first large-scale survey for bee viruses in England and Wales has found Kashmir Bee Virus and indications that it has been present for some time.

The NBU used TagMan PCR – a molecular based diagnostic technology – and targeted the survey specifically at Kashmir Bee Virus. No official survey had been carried out previously.

Some 458 samples from hives were collected by bee inspectors carrying out apiary inspections or submitted voluntarily by beekeepers to the NBU's laboratory. RNA was extracted and tested for the presence of KBV.

Of the 458 colonies tested, three tested positive for KBV.

The researchers said all three colonies were in normal condition with respect to size for the time of year.

"These results indicate that Kashmir Bee Virus is likely to have been present for some considerable time, and that the findings are not related to imports of bees or migratory beekeeping," the researchers said in their report. "The results tend to confirm what the CSL (Central Science Laboratory) has considered a possibility for many years, that KBV is not necessarily an exotic bee virus."

Alan Harman

HONEY RECIPES AVAILABLE FROM ALLRECIPE.COM

Safeway and SuperTarget have selected the fully customizable turnkey recipe and meal planning application service provider (ASP) platform provided by Allrecipes.com, the world's biggest community food and recipe site for home cooks with over 200 honey recipes. The ASP solution features proprietary technologies, recipe and cooking content, and patented meal-planning tools.

Allecipes.com's innovative online meal planning and shopping features include shoppers' ability to plan a week's supply of meals by viewing, sharing, rating, and printing recipes while at the same time finding out which items are on sale and printing coupons right from the grocers' Web sites. Customers can also use Allrecipes.com's timesaving tools, among them automated shopping lists, ingredient search, recipe scaling, and even such patented features as "More Recipes Like This," which let users scan recipes with similar ingredients. In the near future, shoppers will be able to create personalized recipe boxes.

NASTY STUFF STILL OUT THERE

The magazine, *Pro Teste* has carried out a study that has concluded that the producers of honey in the EU are continuing to use antibiotics and sulphonamides.

From the 20 samples of honey that were tested, six contained residues of antibiotics and/or sulphonamides, and of the three royal jellies, one contained chloramphenicol, an antibiotic prohibited within the European Union in the production of foods for human consumption. Some products showed remains of more than one substance.

The situation is, however, better than in 2003, the year in which *Pro Teste* also analyzed 20 honey samples. The study at that time revealed that half contained traces of antibiotics and/or sulphonamides.

Deco Proteste, in conjunction with other consumer protection organizations of Belgium, Spain, Italy and the UK, found that "from more than 100 honey and royal jelly samples tested in five countries, around 20% are accusable in respect of the products containing antibiotics and/or sulphonamides. As well as this, more than 40% of royal jelly samples analyzed contained, despite the laws, traces of chloramphenicol," confirmed the same source.

FOOD MILES ADD UP

Organics is big business. The European market was worth E$20.7 billion in 2004, and has been growing by 26 percent since 2001.

Growing concern about the environmental impact of artificial fertilizers and pesticides has of course been a factor in this, but supermarkets have also been quick to tap into mainstream concerns about the consumption of possibly dangerous chemicals.

Dressed up as evidence of environmental concern, the mainstream organic industry is increasingly being used as a marketing tool, feeding off consumer worries.

And other vital environmental considerations are being ignored as a consequence.

The environmental damage caused by food miles, for a start.

Organic produce destined for supermarket shelves is increasingly being sourced abroad. A recent Soil Association report, which reported increased sales of organic products, was disappointed to report that supermarkets were achieving a portion of this growth with organic food from countries other than the U.K.

Transport of food by air, which creates the highest CO_2 emissions per ton, is the fastest growing mode, and is causing concern among environmentalists.

The effect is that the positive environmental impact of organic farming can often be offset by such lengthy transportation.

This increasing reliance on imports is fundamentally undermining the good intentions behind the organic movement and misleading consumers. Organic apples from New Zealand might leave a bigger environmental footprint than locally produced regular apples. The consumer has no way of knowing.

The food industry is therefore misleading the ethical consumer, and as with everything, it will all come out in the wash eventually.

That is not to say that the food miles argument is above reproach. The concept of sourcing food exclusively from local suppliers is in direct opposition to the notion of global free trade, and suggests a protectionist agenda that in Europe (and the U.S.) has been responsible for denying market access to some of the world's poorest nations.

Eventually, we could see energy audits on supermarket shelves to help consumers choose wisely. If and when that happens, you can be sure that food makers will be falling over themselves to show the world that they *think globally, act locally*.

ALMOND POLLINATION LESSONS 2006

A year unlike any other, ever, said many beekeepers who know this California experience. The lure of extraordinary fees brought beekeepers to the Golden State from places near and far. Some, prepared and knowledgeable about the quirks did well. Others, virgins in the wilderness, arrived unprepared and unaccepted, and didn't do as well. Below are chronological bits of exchanges from online conversations between beekeepers discussing the situation from early February to early March this year. What they bring up about almonds, though, transcends that crop, and appeals to every beekeeper who pollinates. This is down-to-earth beekeeper to beekeeper talk. It's real, and it's live. Read, and learn.

News from California. There is now a glut of bees in California for almond pollination. All the press about shortages here created another "Gold Rush" of fortune seekers. There are now local and out-of-state beekeepers dumping bees for $80/colony just to get anything! Lots of hard feelings all around, and both beekeepers and growers being taken advantage of.

Here are some suggestions for the future: DON'T CONSIDER COMING UNLESS YOU HAVE A SIGNED, WRITTEN CONTRACT WITH A GROWER. Have average (six-frame min, usu. eight frame, best are 10 frame) and minimum (usu. four frames) specified in contract, and a provision for inspection at 60°F. Don't overestimate how many strong colonies that you will be able to supply, and don't move weak ones. Move in and move out time specified. Move in at 10% bloom of first variety – usu. Feb. 10th. Remove half of bees at 50% petal fall of late variety, balance at 90% petal fall. Half payment upon delivery, rest upon removal. A map of the orchard, and placement indicated and flagged on the trees. Make sure orchard has passable roads in wet weather! You can contract directly with the Grower, but a good broker is well worth a reasonable fee (about $4/colony).

Don't bring junk, diseased colonies, or weak colonies. Have a good holding yard ready so you don't create a nusiance. Be ready to feed your bees before and after bloom, or they can starve. If all this sounds like too much, stay home and make honey.

Randy O.

•

Its a 1-year situation. Beekeepers that got burned or didn't place their bees this year will be ultra-cautious next year. In past years, esp. last year, beekeepers that waited around until January to place almond bees (and some waited that long on purpose) were able to place their bees with no colony strength standards at or above market price. They didn't "get away with it" this year. Some of the beekeepers that didn't make it into almonds this year will be in a world of hurt financially; some are selling a portion of their hives here in order to get bus fare back home. The ones that survive won't have the money necessary to provide strong colonies for almonds in '07. Come 2010, the situation will again be reversed; 200,000 more bearing almond acres and probably less bees than this year.

Joe T.

•

A good truck driving friend of mine told me that he had helped haul a total of seven semi-loads (544-816 singles and doubles) of dead outs back to Texas. Those out of state beekeepers now have a different view of California. The hives they did rent were nowhere near the $150 mark they thought they were going to get. I tried to tell them that three rounds of pollen, lbs. each, and three gallons of 50/50 syrup would be needed. I wonder how much they spent on trucking bees to Calif. and dead outs to Texas? A lot of growers are P.O.d about the quality of hives, but you get what you pay for. If the bees are there, the rest will follow. I'm at $150 rental rate. It's easy to fly like an eagle when you're surrounded by turkeys.

Anon CA Beekeeper

•

When I say good bees I mean nine to 12 frames average, six frames of brood. To get there, I put on three rounds of pollen sub, six pounds each. That's the same as putting on 18 (one pound) rounds that the bee suppliers sell (Mann Lake, Dadant), so you get a good understanding of how much we push them in the Winter. As far as the 50/50 syrup I spoke of, half fructose half sucrose. Some keepers are still feeding type 55 fructose, poor move going into Winter, but it's cheaper. The moral of the story is, you get out what you put in them ($$$). Most beekeepers I've met want the $150 rental, but they are going to have to earn it. That doesn't mean field run bees or six frame averages.

Keith J., CA

•

As far as I can tell, there were five main problems this year – (1) supply and demand, (2) lack of contracts, (3) changing rules at the bug stations, (4) grading, and (5) gouging.

1. Supply and demand: Is this a repeat of the 1849 Gold Rush, or what? A few firstcomers get rich, the rest go broke. Joe Traynor's right that there is a shortage of bees. The main shortage is yet to come. The midwestern beekeepers just jumped the gun this year. Supply and demand really kicked in, and the out-of-state beekeepers have no one but themselves to blame for the price dropping. They ran up the supply so much (speculating to get $150), that they filled the demand.

2. Lack of contracts: Who in their right mind would pay thousands of dollars to haul bees across the country without a signed contract? They were gambling, and didn't hit the jackpot

3. Changing rules at the border bug stations – can't comment on this. But if your bees ain't clean, do you think we want them here?

4. Grading: I've been mostly with a broker who has run a graded program for at least 25 years. We get paid by frame strength. 10% of colonies are inspected by his crew at 10% bloom of main variety. One frame stength is one deep Langstroth frame 70% covered with bees at a temp above 60°F. No payment for any colony under four frame. The last two years we got paid $4.50/frame, then $6.00/frame up to a max of 12 frames. This year the payment was considerably better to match the going rate for strong colonies, but topped out at 10 frames. If either Grower or Beekeeper disputes the count, we can pay for a recount at $20/hr for a team of two.

5. Gouging: I return to the same orchards, and work with the same growers and broker year after year. We get to know each other personally, and care about each others' operations and problems. A little different than sending semiloads of bees to an anonymous almond farmer in another state who you only want to extort for cash.

Another addition to the almond problem: Education

Educate the growers about the big difference between renting boxes and renting bees! Many have become much more educated in the past 10 years re frame strength. A stronger colony has many more foragers available to fly than a weaker colony that needs to devote its workers to keeping the brood nest warm and fed. On cold days in the almonds, a 12-frame colony will be flying like mad, when a six-framer is huddled up (there is also a huge genetic variability for cool-weather flight, with dark bees often flying when Italians are inside on the sofa). An eight-framer is the minimum size to take in. Note that I'm not saying eight-frame average, but eight-frame minimum!

Anon

•

The cost of this will be that many will not return and some may well go out of business. If the growers and the brokers do not get together and resolve this situation and real shortages do occur in the future, the border dams will break and it will be "Yo Quiero Pollinaccion!" And then you can put your $150 contracts under glass, on acid free backing board and preserve them with all of your fond memories. Then we can all get jobs making real money.

Tim T.

•

What I'm about to say is going to sound off the wall, but remember I'm from California, 40 miles south east of Sacramento.

Here's how I run mine.

Continued on Page 67

After I pull out of the Almonds I head for home, I drive right through cherry and apple country (Stockton & Lodi), which pay about $10-$15. I don't stop the truck for anything under $30. I get home, place the bees in 200 hive loads. I start shaking packages about April 1st, and pull about five pounds of bees each shake, I shake about three rounds. At the beginning of May I only have about 10 frames of bees, I typically split those in half which leaves me about a 4 frame hive. Once I get everyone queened right, I focus fairly heavily on the mites. I then go down to Summer pollination (stock seed) around the middle of June. From there on I set the throttle on cruise control. I don't do much after June other than adding a few supers and monitor mites (ether roll), from there I have another job that I go to. I don't consider running this style with my 1,500 colonies a full time job.

My two-ton averages 12,000 miles a year, that will give you a little idea how hard I'm running. If you figure $150 for almonds, $100 for bulk bees and $35 for summer pollination, it adds up to somewhere around to $275/hive.

As to the Fall, here in California any kind of honey flow stops around August, but we still have 100 degree days till mid October. Keeping bees strong isn't a picnic here either. I do more bee work in the months November December and January than I do any other part of the year. Once I get those hives brooding in the right direction, that's my main focus. Remember, if you're brooding, your raising mites too.

As far as the Australian package bees, I was at the California beekeepers Assoc. convention in Tahoe. A guy was giving a slide show about how great they looked in the first part of May, double boxes of bees. I looked over at a friend and said "Who wants double boxes of bees in May?" Nintey percent of my revenue comes in from February to April. After that the bees are basically a liability.

Anon

•

Based on last year's scenario, many beekeepers figured 2006 would be a repeat. The combination of less Winter losses, beekeepers increasing colony numbers and bees coming to CA without a firm contract, put growers in the driver's seat. With a bigger supply, growers began asking more about colony strength; some hired independent inspectors to evaluate colony strength. Evaluating colony strength can be subjective; send five different people out and they can come back with five different frame counts. Informing a beekeeper that his colonies are sub-par or weak is often akin to insulting his wife, mother or children; his bees are his babies; if a beekeeper has spent a lot of time, money and effort on his bees, and they still come up sub-par, it can cause a good deal of frustration even anger. Getting a good pollinating colony in the middle of winter (when almonds bloom) is a daunting task. The 2006 almond pollination season is an aberration that won't be repeated. Beekeepers will make sure they have firm commitments well ahead of almond bloom.

Joe T.

•

I suggest that if there is a question about fair grading, that the beekeeper hire an independent grader. There are skilled grading crews out there, or he could hire the county ag inspector to get an independent, written grade.

If you are talking about losing thousands of dollars, get a second opinion!

Randy O.

•

Feed: The mix is (50 pounds brewers yeast, seven to eight gallons syrup, 1.5 gallons bee pollen). The mixer is a Kushlan 150 motor mixer, Leland 200 meat mixer. I use a Kusland 150 model. You can order them at (Home Depot) some East coast stores have them in stock, thousand dollars or so. A batch will do about 25 hives and will weigh about 145 pounds. A two man crew can feed about two hundred hives a day or about 1,200 pounds of product. I use tubs I bought at WalMart, six dollars a piece. I run a load of mix, slide the tub underneath and pull the pin (use cooking oil to coat the tub first). When I get to the bee yard, I use a three feet by three feet plywood, flip the tub on to it. One guy handles the mix the other handles the bees. It's a sticky mess if you try to do both. Two keepers work the best. The keeper will crack the supers apart and smoke them good, so when we apply the patty (6 pounds, about the size of a gallon milk jug) the bees and queen don't get crushed. Also bring water and some dry brewers with you. Its kind of like making biscuits on a larger scale. Try to use all the mix up that day as it will be harder the day after.

The first rounds start about October 20, I spend the first part of the fall getting mite levels as low as I can, it would be nice to start in September but I don't have the time (other job). Once you get the first round on, make sure to keep your dates, you do not want the queen to stop and start, i.e. run out. The first round is consumed a little faster as the glands are dry (royal jelly gland) but once the glands are full its off to the races. 50°, 40° even mid 30s keeps pushing them. Do not put patty on top (lid) as it won't work and do not let them get wet.

Keith J.

•

East of the Rockies you have the luxury to let the weak and mite-infested colonies die off over Winter and restock from early splits for Summer use. You can't do that with almonds. You're going to have to pump up your bees from August on so they Winter with a big cluster of young bees, lots of late brood rearing, fat with pollen or supplement, plenty of honey, and stock that builds up early regardless of the weather or pollen flows. Most important, they absolutely can't be compromised by mites (or any other disease) during the last rounds of brood rearing, or going into cluster, or they will dwindle or collapse in January or February. Winter time is WAY too late to think about getting your bees ready for almonds; think August at the latest!

Randy O.

•

Try to find a local keeper near where you will be staying, he or she can help you find the repair shops, bulk syrup, medication and so forth. The yards that you Winter in, make sure that they are accessible in the worst Winter conditions, ask a local. Make sure that someone can check on them regularly, to make sure lids don't blow off, cattle don't trample them etc... Field prep, some of us use G.P.S. to mark the locations ahead of time in the almond fields. Farmers sometimes have locked gates, overflowing rivers, etc... so you may have to enter the field from a different direction at delivery time, G.P.S. will help you with this problem especially at night. Make sure the bees won't flood, be in the way of spray rigs, etc..., you don't want a phone call two weeks later when you're home telling you have to move them. Have phone numbers of the county, private and other keepers in the area for a second grading if needed (ahead of time).

Contracts: My God, be sure to have one. What is a good one?, that's up for debate, but ask other keepers that have a pollination history, look at what they use (just do your home work). It may be worth consulting your attorney.

Keith J.

•

Finally, pollination, overall, looks good, at least in our area. Northern Calif. got hurt by a frost 22° vs. 26°-27° here. 26° will get flowers; 30° small nuts; we're in small-nut stage now; may have a cold spell after our current storm then should be smooth sailing after that, although can get a freak frost in April. The bee surplus pretty well dried up as growers replaced substandard colonies with good ones, a luxury they didn't have last year. Many growers carry crop insurance and should weather frost O.K. may be difficult for those without insurance to pay their 2007 bee bills, so watch for that; we had maybe 5-10% damage on early varieties here. Can access www.bluediamondgrowers.com for more info. A positive is that frost "news" spiked almond prices a bit as buyers world-wide plug in the Blue Diamond site.

Joe T.

•

Our thanks to all who contributed to this lesson.

See you next year – same place, same time.

Display Advertisers

I Know You're Good For This

Ed Colby

My beekeeping days almost ended December 3 when I got buried in an avalanche ski patrolling on Aspen Mountain. Maybe I even caught a glimpse of Heaven.

I was blue (some say purple) when they dug me out. The first face I saw, the first voice I heard, was 19-year-old Ali's.

"Ed, we love you," she said over and over. She sounded so desperately sincere. Everybody who was there says I smiled.

My little adventure was the talk of the town. I got phone calls. I got hugged by women and sometimes even men I barely knew. None of this short-lived celebrity hurt my honey sales one little bit.

I sell some honey right out of the ski patrol headquarters at 11,212 feet. Not a lot, but a few hardcore skiers do go down the hill with 3-pound plastic lugs of honey tucked inside their jackets.

I use a low key "don't ask, don't tell" marketing strategy, and so far management has rewarded me with a wink and a nod. My only advertising is my beekeeper's card on the patrol room door, with "Inquire Within" hand-printed on it. But word gets around.

The other morning I filled my backpack with 12 quarts and skied down to Bonnie's Restaurant halfway down the mountain. It was a Saturday, so I knew there'd be not only the El Salvadoran kitchen crew to sell to, but also the Swiss pastry ladies.

When I arrived, Manuel and Santos were shoveling the deck. Felipe was shoveling the roof. They asked, "How much?" When I said "Nine bucks, just like last year," Santos immediately reached into his pocket. Felipe leaped off the roof into a snow bank and said, "How many do you have? I'm sure Hugo wants one, too."

The El Salvadorans and Mexicans around here are crazy about honey. But they always look me in the eye and ask me if it's "pure." Back home the custom is to cut honey with some other sweetener, and they seem incredulous that I sell unadulterated product.

Felipe handed me a ten-dollar bill and refused to take his dollar change. You gotta love these guys.

Inside the restaurant, the word was out. The El Salvadorans were all buying. The Swiss pastry ladies with their Heidi pigtails pushed some and poked with their sharp elbows. It was a buying frenzy, complete with a touch of panic that I might run out. Within five minutes, I'd cleared $108.

Bridgette the owner took the last lug. She might be 35. Her father ran Aspen Mountain's Sundeck Restaurant for 28 years. The whole family lived on top of the mountain. Bridgette skied to school, just like in a fairy tale.

The ski patrol director from another ski area called the other day about eight-ounce honey bears. At first he said he wanted 400. I said, "Whatever for?"

He said, "For ski safety week. We're giving them away. We'll get you some free advertising. I'll need them Saturday."

I said, "I see. Instead of pulling their tickets, you'll stop the speeders and say, 'Slow down, Honey,' and give them a bear, right?"

"Not exactly," he said. "But we're calling it 'Colby Farms Slow Zone honey.'"

I didn't get it, but the director did, and that was what mattered. I told him I'd come up with a price.

I decided $1,000 would make it worth my while. I'd have to rush-order the empty bears, and packing and melting honey would occupy both of my days off. And I wasn't going to compete with Wal-Mart.

When I called back, he said, "$500 is all I have in my budget."

I said, "OK, I'll give you 200 bears for $500."

He said, "How much are those bigger honey bears you sell to the restaurants?"

I said, "Three dollars."

He said, "Three dollars? That's all? Three bucks? I'll tell you what. I'll take 50. That would be $150, but I'll give you $200. Would that be worth your while? And next year we'll do a big order."

OK, I wasn't going to make a killing, but all of a sudden this project looked manageable. And I don't have a lot of spare time in the winter. I liked the idea of a $50 tip. I said sure. I said I'd drop them off.

That night in our patrol locker room, I told this story to Bud, who is a contractor when it isn't snowing, and who knows about deals. He said, "What do you think about that extra 50 bucks?"

"I like that extra 50 bucks," I said.

Bud said, "When a guy makes an offer like that, I think it's always smart to give him what he pays for. That way he'll think you did him a favor, and not vice-versa. That's just my opinion, Ed."

I was going to ignore Bud's advice, but on reflection I decided to deliver 67, not 50, bears for the $200.

On delivery day, the patrol director called me at home just as I was about to head out the door. He said, "I know I promised to leave you a check today, but I found out I need your invoice first."

"No problem," I said. "I know you're good for this."

When I dropped off the honey, I made sure I put "67 honey bears" on the invoice.

I think Bud's advice was good advice. Now I feel like I have the upper hand. It's been a month now, but I'm not worried. I know they're good for this. I'm sure the check's in the mail.

BOTTOM BOARD