MAR 2009

Bee Culture

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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

MARCH 2009 VOLUME 137 NUMBER 3

Bees in the Florida Sun. Photo by Dick Marron (see the Bottom Board this month) of Wade Fisher's bees, getting ready to load for California almonds, back in late January.

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FEATURES

DEPARTMENTS & COLUMNS

More On Calendar

I enjoy the pictures in the calendar. I wish that there was enough space to place information about when it was taken, where (i.e., This month's picture by Mondjack's African Queen bothers me because he is located in PA – hope the picture was taken elsewhere), what is being taken (i.e., flower type), specifics about the camera that was used and how it was illuminated (i.e., this month's cover). However, I understand that there isn't enough room. Would it be possible to create a web page with these specifics?

Alan Coble
Douglassville, PA

Editor's Note: *Great idea! We'll get it in the hopper and see if we can make it work for next year.*

2009 Calendar Cover

Regarding the cover photo of the 2009 *Bee Culture* Calendar –

That's one of my Russian Colonies in Stratham, NH in late April! I knew I needed to watch for swarming with that one but due to deep snow I didn't get there in early April as planned...and that's what I found, with snow still on the ground.

My husband cracked the top deep from the second deep so I could take a peek inside. After peeking inside I thought "what a great shot that would make" and stuck the camera in. I planned to use it for the next bee school for the class on swarming.

I always have my camera with me. I use a Nikon coolpix 7900 with 7.1 megapixels on the highest resolution setting. I'm pretty sure autoflash was on, it normally is. I also was in macro mode for that shot.

I have gotten tons of emails from beekeepers all over about the photo since the cover came out. It's pretty fun that people have noticed. One friend even commented on my calendar shot, without knowing one was on the cover, she then asked what I thought of the cool cover shot and was surprised to hear that was mine too.

Gotta love the old propolis covered coolpix!

Wendy Booth
Nottingham, NH

Not Enough Info

I enjoyed your recent article on finding a new beeyard, and Jim Tew's article on his new bee equipment storage building (both in the January 2009 issue). I am afraid that both missed resolving fundamental issues for me.

First, I appreciate the details your article covered, I was disappointed that it did not cover the issue most important to me – how close/far can two outyards be? Living in the country, I have plenty of potential locations close to home, but how close/far is appropriate for a two-yard operation?

Second, I too am looking to build a new storage building for my bee equipment, so I was excited to read Jim Tew's article. However, I was disappointed to see him put up a building that had no windows and very little ventilation. From everything I've read, a bee equipment storage building should be airy and bright to discourage wax moth colonization. Is Dr. Tew's building optimal? Could you point me toward a building design/plans?

Joe Loucek
Windham, OH

Editor's Note: *Beeyard proximity has less to do with how close, than how much forage is available. If you've found that a particular location maxes out at 12 colonies, then another yard a half-mile away will be in competition. The opposite is true – if your bees haven't maxed out in yield, then more bees, there or down the road won't matter. All this, of course, supposing that queen and drone production for mating purposes isn't part of the equation.*

Buildings . . . good ventilation and light are suggested but I'm not sure what Dr. Tew had in mind. We'll let him answer, but in the meantime, perhaps one or more of our readers has a thought on a building design – diagrams and drawings welcome!

Small Hive Beetles

Almost every issue has something on small hive beetles. Here is an observation I have not seen described before. My hives have had SHBs for about three years. The first year they were more in evidence than following years. I treated them with Checkmite strips on the black plastic cardboard-like squares, or just plain cardboard, and used ground soak. For the next two years I did nothing. The population seems variable from one inspection to the next at weekly intervals. When I took honey off this past Fall I noticed that on the bottom of the bottom bars of each frame, as well as on the walls of the super there would be several to a dozen SHBs mummified in propolis, with only a rare one seen crawling about. It seems that in these healthy hives the bees have devised a way control the SHBs that seemed to be a threatening presence not long before.

Thanks again for a great publication.

Norris Childs
Philadelphia, PA

American Farmer Book

In the November 2008 *Bee Culture* you had good words to say about the *American Farmer* book, photos by Paul Mobley, featuring one sideline beekeeper.

I am that sideliner beekeeper. I never dreamed that my honey bees would get me into a great nationally advertised book of photos, a national magazine, and a TV show in New York City.

Mobley is an outstanding photographer and when he was at our farm late Summer '07, he had in mind what he wanted his "bee photo" to look like. It has been a hit and certainly helps to sell the book. The October 20, 2008, issue of *People* magazine featured my picture to advertise the book. On November 25, I was one of three of his book "characters" on the Martha Stewart

Show. Unfortunately, there was no time to say much about bees – just to talk about how the photo was taken and to promote the book, of course. I received no travel allowance from either Mobley, Stewart, or the publishers. I discovered that the head of the publishing company, Welcome Books, is an "old" friend of Martha Stewart. The publishers did provide Monday evening dinner for us and our guests.

It is a great book! It offers a different prospective to view our farmers and ranchers. Hopefully a lot of urban folks will purchase the book and read the interviews. We need all the help we can get.

Alice Wiemers
Hondo, TX

Bees & Cows

Whoa! Be careful how you speak to an informed audience (Ross Conrad, January 09).

As a hobby beekeeper, dairy farmer I take up the argument. A cow was bred to produce 90-120 pounds of milk – right. However, we are breeding bees resistant to mites for the same reason: to be sustainable. Moreover, dairy farmers hire special nutritionists to come up with a ration that will keep the cows healthy. A healthy (good) cow will then, naturally, produce 90-120 pounds of milk.

The "poor cows" aren't wore out just to produce milk. We are currently milking seven-year-old cows with a 100 pound average.

We, as dairy-farmers intend to milk cows in a sustainable way, just as us beekeepers endeavor to do.

Josh Sommers
Cincinnatti, IA

Bear Proof Hive

I am a member of the VT Beekeepers Association and a mentor through their mentor program. A friend of mine wanted to get involved with bees, asked for help this Spring getting started. I told him he should think twice about keeping bees in his neck of the woods, due to the healthy bear population. He said he thought he could do it by placing his bee hive in an old (1940-ish) steel light house from Lake Champlain, he had purchased four or five of them when the Coast Guard decided to upgrade the existing lighthouses with new ones. He also has an old "Fairbanks" scale that the hive sits on so he can monitor the weight of the hive throughout the season.

Gib Geiger
Waitsfield, VT

Needs Answers

As a new beekeeper and a novice I'm always searching for new information, new ideas, or just trying to find answers for questions that have probably already been answered a few times!

I'd like to start providing hives to the farmers in my area for pollination services. My question that I have yet to find an answer to is this. When providing hives, how many should be used? Is there a ratio per acre that I should follow or a set standard or rule of thumb? i.e. 1:1 (one hive per acre) for example. Does the amount of hives have anything to do with the type of crop that needs pollination? For example, does an apple orchard require more than fields of clover, buckwheat, or soy, or vice versus? Can you place too many hives in an area? And if so I'm guessing that could be determined by how fast or slow the bees are filling up the frames in the supers. Right or wrong? Otherwise if it is possible to have too many hives in a given area how do you determine this? What do the commercial guys do?

Also do all crops require pollination from honey bees? Are there any that don't or that bees don't really take to, such as cornfields and vineyards? Both of these are abundant in my area but I've never seen them mentioned in any articles. Everyone always talks about the almond, orange, and apple crops but I don't ever hear about vineyards and corn.

Matthew Smith
Fauquier, VA

Editor's Note: *Go to our web page and start reading the online version of* McGregor's Handbook Of Pollination, *(no longer in print but you may find a used copy somewhere). Then read the Delaplane book on Crop Pollination, which is similar, updated, but has less peripheral information. And read the two pollination articles in this magazine – last month and this month.*

Online Urban Beekeeping

I wanted to let you and your readers know that February 1, we are launching a brand new online community dedicated to urban beekeepers. **UrbanApis.com** aims to become a place where beekeeping hobbyists can exchange information to help them become better beekeepers and connect with other enthusiasts in their area.

Some of the features we are working on:

- **Original Articles** - improve your skills and knowledge
- **Municipal Codes Search** - to find out the codes related to beekeeping in your area, including state regulations where applicable
- **Hive Diaries** - Keep track of your activity or publish photos for everyone to see
- **Retail Directory** - find supplies online
- **Message Boards** - Get in touch with other urban beekeepers and trade experiences

While we are preparing to launch, people interested in our community can sign-up to receive a sneak peak before the launch. I hope you'll help us spread the word along to anyone who would be interested in our community.

Michael Franklin
Ruston, LA

INNER COVER

At our last meeting I mentioned that this was going to be an interesting year ... there's a saying about the curse of living in interesting times. I'll let you be the judge after this.

I'm putting this together in very early February, just as colonies are beginning to move. Already it's a crazy world out there . . . well, actually it's crazy in California where all the action was supposed to be this Spring. It seems that's turned out to be true but for reasons most of us weren't expecting.

Had we been paying attention, there were hints of the way it was to be that began even last Fall. The trend became more and more obvious as two events began to unfold . . . the first was the fact that there wasn't as much snow pack in the mountains or rain down below in California as everyone was expecting. By late January it wasn't looking at all good for the future of irrigation and almond growers had to make some hard choices . . . you can't grow almond trees without irrigation water. Oh, and the price of almonds wasn't nearly as strong as it had been, either. That wasn't helping.

Their choices? They could outright abandon some groves. Or they could reduce irrigation enough to keep trees alive but not produce much. Pulling out old, less productive trees was an option. They could use the absolute minimum number of bees to qualify for crop insurance so if down the line there really was no water they'd have done what they could and be able to collect. And reducing colonies per acre from the maximum number for perfect pollination to the minimum number to meet insurance needs to keep costs down was a choice. If they weren't locked into a contract that is.

Well, it seems there was some of all of the above going on just before they started placing colonies in February, but all of the options pointed in a single direction. In the space of a month the California almond crop went from the craziness of searching frantically for colonies to how can I reduce my pollination costs. A reasonable business decision, and almost immediately pollination prices started to drop, contract or no contract.

Meanwhile, back in the beeyard our pollinators had been practicing what they had learned at meetings, from other beekeepers, and from reading what you read here during the past two years. They had been taking better care of bees . . . nutrition, disease and pest control, clean combs . . . the works. As a result there were lots of healthy bees in December for the first time in at least three years. And all those Australian imports didn't stop coming in because nobody had figured that the recovery would be this dramatic this fast. Recovery? You bet recovery. No, CCD hasn't disappeared . . . we're not out of those woods yet. But because of the improved care and feeding that had been going on there were more bees than anybody thought there was going to be . . . thought about at all in fact. More bees were in California than anybody could imagine.

Unfortunately, some of those bees had gone west on a wing and a prayer . . . without a contract, without a grower, without anywhere to go. Suddenly unneeded bees were stuck in California with no pay, and no way home. So some of those growers who had waited for last minute discounts were rewarded with reduced costs, and beekeepers who had gambled . . . mostly lost. It was, in fact, almond pollination business as usual for everybody.

Because of the drought, California was *under-treed*; and because there were fewer trees to pollinate and an abundance of eager, healthy colonies, at the same time, California was *over-beed*. The laws of Economics on supply and demand kicked in fast, and prices on contracts started to drop – because growers couldn't afford $150 colonies, and beekeepers were willing to settle for $40, just to get home.

I don't have the last chapter for this year's tale yet until the end of February. But by now you probably have read the last chapter so you know if it was bad, really bad, not too bad or OK. But in any event, now you know how this year's tale began.

My footnote, if you will. If those who were left out in the cold had had pollination contracts before they headed west looking for gold they may have had something to fall back on. Or not.

•

It was also during January that the bee researchers and beekeepers were exchanging information on what they had discovered during the year since their last national meeting, and some good information came to light.

I listened to talks, talked to many of those who spoke and those who actually keep bees for a living and to vendors who sell to them. In no particular order or importance here are some of the more interesting things I learned . . .

•*Nosema ceranae* has increased from 10 – 20% infestation levels in 2004 to over 40% in 2008. It is the dominant species of Nosema in samples taken from commercial beekeepers, while hobby beekeeper samples were mixed. USDA hasn't figured out why yet.

•In commercial colonies tracked over a season, if Nosema spore levels were high in the Spring sealed brood was reduced May through September. But in September spore levels dropped and bottomed out in October, but then increased again throughout the Winter. They increase in Summer . . . but when do you treat? What's the threshold? Should the one million level be increased before treating, or is treating even necessary?

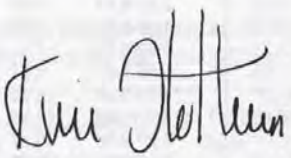
The Rest Of The Story

•Pretty much everybody knows that CCD isn't caused by pesticides, especially those new ones, but here's an interesting study . . . bees with nosema were monitored for spore counts, and bees with nosema were challenged with low levels of neonics and guess what . . . spore levels went through the roof. Bee weights were affected, and here's the kicker . . . what happens when you add *Varroa* into the equation? This isn't CCD (is it?) but it sure makes a honey bee's life rough . . . and a beekeeper's too.

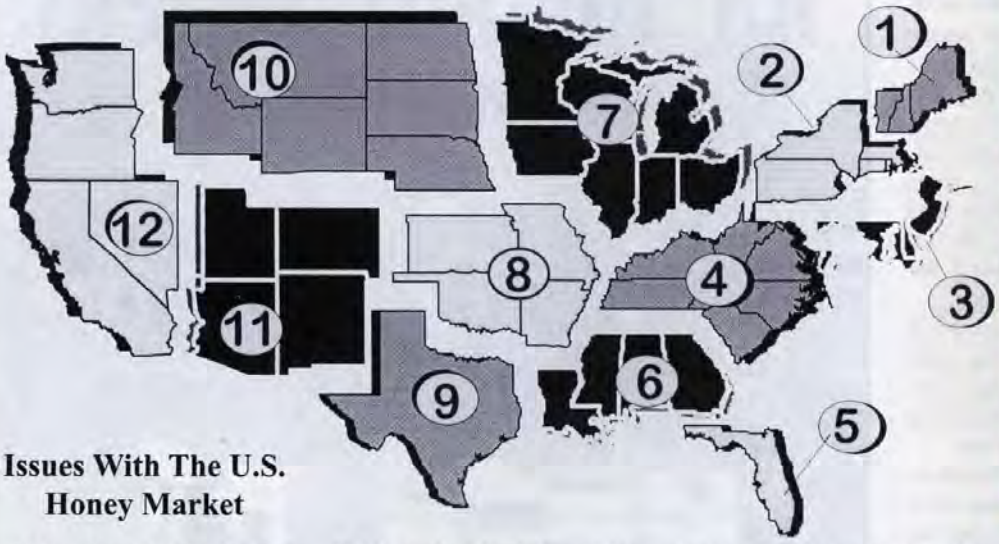
•They're pretty sure viruses don't cause CCD, but they're pretty sure they play some kind of role. But how do bees get a virus . . . Viruses move from bee to bee in a lot of ways . . . from queens to eggs, from *Varroa* to bees, from drones to queens. Any other way? You bet. There's bee viruses in pollen, and it's found in bee bread later. Really! Pollen foragers bring it back from flowers . . . Black queen cell virus, sacbrood virus, and deformed wing virus. In fact, of the 65 bees collected for this short experiment, 100% brought back at least one virus, and many were infected with more than one virus. Jeeze . . .

•How do Australian bees do with *Varroa*? Some Australian package producers are importing *Varroa* resistant queens, so how are they doing? One project followed Australian packages that came into the U.S. with no *Varroa*. By September those package colonies had ***three times*** the *Varroa* of U.S. packages. What do you think? As a kicker, in another experiment, they replaced Australian queens with U.S. queens and at the end of the season those ***U.S. queen packages had fewer mites***, made more honey and were larger.

This is only a smattering of what was at the National meeting. More will come out over the next few months in this and other articles. Stay tuned. Remember to keep your smoker lit and your hive tool sharp because there's still a lot to learn out there. It's March. Get moving.



March – REGIONAL HONEY PRICE REPORT



We are looking for Honey Reporters in Region 3 and Region 5. If you want to be a part of this dynamic team of Marketing Contributors, if you sell honey at the retail or wholesale level, and can routinely fill out and return our monthly questionnarie and survey, please contact the Editor at 800.289.7668, Ext. 3214 (the extension is important), or Kim@BeeCulture.com today.

Issues With The U.S. Honey Market

Notes from a talk by Ron Phipps, honey importer. The 2008 international honey crop was below average. The U.S. is about 160 million pounds (*Bee Culture's* prediction in November 2008 was 156 million pounds), Canada 62 million, Argentina 154 million pounds . . . all below average. This year Argentina has been dry so far due to La Nina and will have another short crop. But Chinese honey has risen to fill the niche left. It's been transshipped (shipped to a second country, then to the U.S.), undervalued (some has sold for as little as $0.26/lb), or mixed in what's called a packer's blend or artificial honey. This has created a two-tiered honey market . . . one where product is legal and expensive competing against one that is illegal and inexpensive.

U.S. honey consumption per year is about 450 – 500 million pounds, production about 160 million pounds so the rest is imported. To deal with this, first, the international honey trade must be regulated so that honey that moves between countries is not violating circumvention orders, and second, honey that moves internationally must be tested, but tested scientifically to prevent artificial non-tariff trade barriers. A comprehensive database of the diverse chemistries of world honey must be established so that everyone knows what honey is, and what honey isn't, no matter where it comes from, or is going to.

Solutions? Criminals must be held responsible for their actions. Transshipping countries must be held responsible for breaking the laws of international trade to protect the quality and safety of their own products that are exported. And China must be part of the solution, not the problem. They must focus on internal corruption or all Chinese products will be suspect, not just honey. And the duty rate on packer blend honey must be changed to reflect what it really is. Honest packers cannot compete with dishonest packers.

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.52	1.62	1.52	1.56	1.38	1.55	1.52	1.63	1.52	1.60	1.41	1.45	1.38-1.63	1.52	1.46	1.20
55 Gal. Drum, Ambr	1.31	1.35	1.31	1.32	1.28	1.30	1.45	1.31	1.30	1.31	1.15	1.33	1.15-1.45	1.31	1.36	1.07
60# Light (retail)	120.00	139.00	130.00	120.50	120.00	107.50	119.20	109.50	120.00	124.01	124.00	140.00	107.50-140.00	122.81	127.54	112.90
60# Amber (retail)	120.00	141.00	130.00	117.50	120.00	99.00	117.67	110.00	100.00	120.33	124.00	139.00	99.00-141.00	119.88	124.09	108.94
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	52.08	73.32	43.20	45.55	65.45	65.45	45.68	65.45	65.45	43.00	44.40	75.00	43.00-75.00	57.00	57.49	49.61
1# 24/case	65.52	78.28	72.00	66.56	96.00	77.80	68.43	62.32	69.50	94.00	76.72	99.67	62.32-99.67	77.23	78.60	69.71
2# 12/case	69.72	74.72	64.80	58.25	66.00	65.40	61.44	71.77	51.25	69.24	58.80	79.50	48.87-74.72	60.07	69.67	58.77
12.oz. Plas. 24/cs	64.32	69.70	52.20	57.76	57.60	58.00	57.10	50.00	51.00	53.28	59.92	66.25	50.00-69.70	58.09	62.29	54.45
5# 6/case	76.41	83.99	75.00	64.10	78.31	85.53	69.27	58.80	61.50	74.82	64.50	86.25	58.80-86.25	73.21	72.48	64.44
Quarts 12/case	109.68	129.00	71.15	83.92	78.00	84.89	85.78	81.30	102.12	104.52	88.76	119.33	71.15-129.00	94.87	96.46	86.28
Pints 12/case	69.02	74.98	110.20	60.08	58.00	47.83	60.33	54.75	66.00	69.00	49.80	67.33	47.83-110.20	65.61	57.19	60.61
RETAIL SHELF PRICES																
1/2#	2.88	3.55	2.54	2.87	2.49	2.50	2.82	4.00	1.97	2.95	2.76	4.83	1.97-4.83	3.01	2.82	2.63
12 oz. Plastic	3.75	4.09	2.99	3.48	4.49	3.65	3.54	2.67	3.54	3.23	3.72	4.41	2.67-4.49	3.63	3.79	3.41
1# Glass/Plastic	4.13	4.82	4.23	4.24	4.86	4.86	4.24	4.01	4.33	4.43	4.65	6.35	4.01-6.35	4.59	4.62	4.35
2# Glass/Plastic	8.25	7.70	7.74	6.75	7.40	6.80	6.66	6.30	6.96	6.76	7.70	8.75	6.30-8.75	7.31	7.77	7.11
Pint	7.85	7.19	6.50	5.56	6.00	6.21	6.07	6.18	6.45	7.57	6.47	7.95	5.56-7.95	6.67	7.08	6.19
Quart	12.17	12.32	11.00	9.69	7.92	9.71	9.95	7.96	11.43	13.00	10.23	13.00	7.92-13.00	10.70	11.04	10.42
5# Glass/Plastic	15.50	16.09	16.45	16.12	17.47	17.00	15.29	11.99	15.70	13.75	16.28	18.65	11.99-18.65	15.86	16.88	16.23
1# Cream	5.25	6.04	4.95	5.88	6.00	5.15	5.58	9.36	3.29	5.65	5.40	6.67	3.29-9.36	5.77	5.53	5.02
1# Cut Comb	5.50	5.77	6.50	5.16	3.00	4.33	7.46	5.50	9.93	8.00	6.25	8.33	3.00-9.93	6.31	6.95	10.25
Ross Round	6.86	4.31	6.50	5.00	6.86	4.00	6.34	5.99	6.86	6.86	7.25	8.50	4.00-8.50	6.28	6.55	5.69
Wholesale Wax (Lt)	3.67	3.81	3.25	2.51	2.15	4.80	3.16	4.85	4.85	6.00	2.58	5.17	2.15-6.00	3.90	3.05	2.27
Wholesale Wax (Dk)	2.00	3.36	3.25	2.41	1.90	4.00	4.06	4.00	4.93	4.93	2.51	1.83	1.83-4.93	3.26	2.68	1.60
Pollination Fee/Col.	80.00	82.00	70.00	43.75	115.00	48.50	49.83	88.57	88.57	88.57	50.00	104.17	43.75-115.00	75.75	79.31	74.12

Learning To Live With African Honey Bees

Florida's Look, Listen and Run Program

Denise Feiber

Background/ and History

Honey bees brought to the U.S. in the 1600's by European settlers soon became one of the most economically beneficial insects. Their gentle nature made them easy to manage. In 1956, researchers in Brazil imported honey bees from Africa in an attempt to create a honey bee that would be better suited to tropical conditions. The African honey bees were bred with European honey bees. Researchers expected that when mated the hybrid would be less defensive. However, that was not the case. During the mid-50s African queen bees were tried in a variety of locations, all from a breeding program in Sao Paulo, Brazil. The hybrid Africanized honey bees became established and expanded their range through South and Central America. In 1990 they were reported in Hidalgo, Texas and since then, have been found throughout the southwestern U.S. and are now found in Florida.

Africanized honey bees (AHB) are potentially dangerous because of their tendency to aggressively defend their nests by attacking perceived threats in greater numbers and for farther distances than their more docile cousin, the European honey bee.

Africanized honey bees have been established in Florida since 2002. They are thought to have entered Florida as swarms hitchhiking on shipping traffic from South and Central America and Mexico. There have been over 60 AHB stinging incidents reported in Florida in the last few years, many requiring hospitalization. Several animals have been killed including a 900-pound horse, 16 dogs, as well as goats and sheep. Numbers of AHB are growing exponentially. In April of 2008, Florida had its first human fatality due to the stings of a colony of AHB.

African honey bee nest.

The Florida Department of Agriculture & Consumer Services' Division of Plant Industry (the division) is responsible for protecting Florida's beekeeping industry. Its apiary staff is quite active in outreach activities and has traveled by invitation all over the Southeast, the nation and foreign countries to make presentations on not only the AHB, but beekeeping practices in general. Prior to the arrival of AHB, the division's primary focus on the apiary industry had been to protect managed bee colonies from harmful pests, predators and diseases.

Because of the expanding range of AHB and anticipating the eventual arrival in Florida, the division placed over 500 bait hive traps throughout the state in areas where interceptions would be most likely (e.g., ports and major trucking routes). However, no state or federal agency was stepping up to the plate to take the lead on AHB public education regarding public safety, effects on agriculture and pest control.

A Public Outreach Plan – A Delicate Balancing Act

Calls to the division helpline indicated the public was very concerned about AHB and did not know what to do in case of a stinging incident. A public outreach program was developed starting with a needs assessment meeting. Past division outreach programs were assessed to determine which tools would be most effective and which audiences should be targeted for the first phase of outreach. Interviews were conducted with western U.S. states where AHB are established, and where over 15 human fatalities have occurred, to evaluate outreach successes/lessons learned. A lack of inter-agency cooperation was cited by other states as one reason for minimal amount of public outreach efforts, and possibly for the high number of stinging incidents.

Objectives of the outreach effort include reinforcing a balanced message that managed honey bee colonies are essential to agriculture and our food supply, and are one of nature's most economically beneficial insects. Another component of this message is that AHB could easily move into areas where managed colonies do not exist.

The public needs to know that there is a new bee on

FLORIDA BEEKEEPER COMPLIANCE AGREEMENT

Examples of Best Management Practices for Maintaining Honey Bee Colonies

- ✓ Maintain valid registration
- ✓ Apiary deemed EHB with minimum 10% or less AHB
- ✓ Queen with production queens from EHB breeder
- ✓ Practice good swarm prevention techniques
- ✓ Maintain healthy EHB colonies to discourage usurpation swarms of AHB
- ✓ Requeen with EHB every six months
- ✓ Immediately requeen if marked queen found missing
- ✓ Do not site apiaries near general public, students, or tethered animals

the block and it is a grumpy cousin of the more gentle European honey bee.

In April 2006, the division launched a multi-layered program to inform target audiences about the establishment of AHB. Target audiences include:

- Emergency responders
- General public
- Pest control operators, and
- Other government agencies with overlapping responsibilities

Communication tools including message maps, public service announcements and videos with re-enactments of stinging incidents, presentations, bi-lingual brochures, exhibits, fact sheets and websites were produced.

An interagency working group was formed to avoid duplication of effort and ensure delivery of a unified message. The group continues to meet and includes representatives from 20 Florida agencies. Participants are eager to share information and are grateful for ready-made materials that can be easily modified and incorporated into their own organizations' communication tools. A website was established for group access that contains information including message maps, meeting minutes, links and other tools. The group agreed on a tag line: ***Bee Aware...Look, Listen and Run***. The group is encouraged to use this slogan in all of their individual communications.

Over 150 presentations have been conducted by key representatives from the division and the University of Florida's Institute of Food & Agricultural Sciences to public/private groups. Media coverage has been increased by issuing press releases, and by being accessible and providing timely updates to media inquiries after multiple story-generating stinging incidents.

To increase outreach potential, the support of statewide public information officers was solicited by the division. Packages were sent to 200 statewide public information officers, asking them to help "***Take responsibility for educating their publics about AHB***." Florida has hundreds of organizations with public information officers who have the responsibility for educating their constituents. They understand how important it is to anticipate challenges/crises their organizations may encounter. Outreach packages included a strongly stated letter about the importance of this issue and the high probability for an AHB incident to impact their organization. Recognizing the professionalism of fellow public relations practitioners increased confidence that they would take the ball and run with it. A message-packed fact sheet was created

Checking one of the 500 bait hive traps throughout Florida.

and included in the package, along with an electronic version for agency personalization. A public information officer database was developed and follow up calls were made to confirm receipt, clarify messages and record each organization's subsequent outreach activities. This effort resulted in our message being delivered by these various organizations through 150 additional communication products (newsletters, websites and public service announcements) with the potential of reaching hundreds of thousands more people in Florida.

This year a curriculum for grades K-5 was completed by the division. It is called 'What's the Buzz on Bees?" and includes four lesson plans: ***What are honey bees and why are they important? How do bees make honey? What's inside a honey bee, a hive and a flower? What keeps a beekeeper busy?*** and, ***Learning to Live with Africanized honey bees.*** The curriculum has been well received by teachers' organizations throughout the state and will continue to provide educational opportunities. One of the activities requires the students to take a letter home for their parents to sign. The letter discusses the potential dangers associated with AHB and includes an illustration of how to prevent bees from establishing nests in and around homes and businesses.

The Messages

Following are excerpts from communications products developed for the division's AHB public education program.

Africanized vs. European Honey Bees (EHB)

It is difficult to visually distinguish Africanized honey bees from European honey bees. Only through analysis such as DNA testing can the species be verified.

- *AHB are more defensive – they defend their nests with less provocation, in greater numbers and for longer distances.*
- *AHB swarm as many as sixteen times per year – EHB swarm only once or twice a year. Swarming is the reproductive behavior that occurs when bees are looking for a new nest site.*
- *AHB are not selective of nesting sites – they will quickly inhabit empty spaces, holes or cavities. EHB are more selective and prefer drier sites at three or four feet above ground.*

Bee Aware of Your Environment – Look, Listen and Run

When outdoors it is important to survey your surroundings and look out for potential dangers such as fire ants, snakes, yellow jackets and other stinging insects. Often, honey bee colonies are referred to as swarms. But in reality, a swarm is a dispersal stage when bees are looking for a new home or nest site. Swarming bees are not likely to attack because they have no home to defend. It is established colonies, where the bees are producing wax, honey and young that present potential stinging threats.

It is easy to understand someone's initial reaction to an attack by a potential stinging insect, and there is a natural tendency to swat at the intruder. However, it is extremely important not to do this with Africanized honey bees. Swatting may provoke the bees even more.

Bees release an "alarm pheromone" after they sting, which signals others to come and attack. In the case of Africanized honey bees, this could mean almost the entire hive.

There are precautions you can take to protect yourself against stinging insects:

- *Teach children to use caution and respect all bees and other insects.*
- *Eliminate potential nesting sites. Check walls and eaves of structures.*
- *Prepare a safety plan for your home and work place.*
- *Remain alert for bees. Look for bees in work areas before using power equipment.*
- *Run away in a straight line, cover your face and eyes and hide in a car or house if bees begin to chase you.*
- *Contact a local pest control operator to remove the nest.*
- *See a doctor if breathing is difficult, if you are stung several times, or you are allergic to bee stings.*

Outcomes

Outreach efforts over the last few years have produced some notable results, including:

- Procured over 100 print and electronic stories (**potential readership of 8,500,000**); interviewed on FOX Network's *FOX & Friends* national TV morning news program and national evening news; several statewide TV interviews, for a combined **potential TV viewership of 7,500,000.**
- Conducted 150 presentations to an estimated 25,000 people in public and private groups –attendees pledged to incorporate AHB messages into their outreach efforts for an additional potential to reach hundreds of thousands more people throughout the state.
- Distributed 750 *What's the Buzz on Bees?* curriculum booklets/CDs.

The curriculum developed for grades K-5.

What's Next?

Though we have reached close to 10 million residents and visitors to Florida, and more nationally, many surveyed still don't know what to do in the event of a possible Africanized honeybee stinging incident. Therefore, Africanized honey bee education continues to be a high priority for the division.

One of the greatest challenges the increasing numbers of Africanized honeybees presents in Florida is the cost of feral nest removal. Hundreds of citizens call our helpline asking for financial assistance to remove bee hives. Unfortunately, in most cases there is no financial support available. Nest removal can cost several hundred dollars. We continue to urge callers to contact licensed pest control operators to remove the nests because of the potential danger.

Another complicating factor is the recent and important attention given to colony collapse disorder – the still unsolved disappearance of hundreds of thousands of managed honey bee colonies nationwide.

People are becoming more aware of the importance of the honey bee and therefore they may be inclined to try to protect feral nests. The division recommends the destruction of feral honey bee nests because of the high probability these feral bees have been infiltrated by Africanized honey bees. This raised awareness about honey bees is a good thing and reinforces why the division's key message is balancing the importance of managed honey bees with the risks associated with the Africanized honey bee.

Regulatory policies will continue to evolve related to the Africanized honey bee. The division is evaluating new tools and techniques that can help identify AHB and predict when defensive behavior will occur. The division is also exploring the possibility of developing uniform standards for maximizing public safety.

Education and best management practices are what we are relying on to protect the apiary industry and the public. We cannot eradicate the AHB, but as we have with other potentially dangerous insects including the Imported red fire ant, yellow jackets and venomous spiders, we can learn to live with them.

The beekeeping industry is an integral and necessary part of Florida agriculture. Raising public awareness and providing education about the value of honey bees is an important part of the division's mission. The division will continue to protect the apiary industry and combat current and future honey bee threats through education, research, regulations and best management practices because of the significant economic and agriculture contribution honey bees provide Florida. BC

For more information on Florida's apiary industry and the Africanized honey bee, contact Jerry Hayes, Assistant Chief, Apiary Inspection (hayesg@doacs.state.fl.us 352-372-3505 x128) or Denise Feiber, APR, Public Information Director (feiberd@doacs.state.fl.us 352-372-3505 x102. Please visit www.doacs.state.fl.us/pi/ for even more information.

RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

". . . the potential for sublethal doses of imidacloprid to have negative consequences on a honey bee colony is evident."

The effect of a lethal dose of pesticides on insects is often apparent as dead or dying individuals are found around the site of contact with the pesticide or (in the case of honey bees) on the ground in front of their hive. However, in cases where a sublethal dose of a pesticide is received, the effects may not be immediately detectable or even readily linked to the pesticide exposure event. Nonetheless, there is a growing literature on sublethal effects of chemical pesticides, including those used to control *Varroa destructor* in honey bee colonies. For example, in beeswax contaminated with certain levels of fluvalinate or coumaphos, these effects include queen cell rejection, production of underweight queens or production of queens with underweight ovaries. This month we review a report by a group of researchers from Taiwan demonstrating that abnormal behavior in honey bee foraging can be induced by exposure to even small doses of another pesticide, imidacloprid (Yang et al. 2008). This pesticide belongs to the class known as neonicotinoids and, while it is not used in beekeeping, it is widely used in production agriculture in the U.S.

In the introduction of their research paper, Yang and colleagues cite previous studies reporting the negative effects of imidacloprid on honey bee communication, olfactory learning and memory. In the experimental design, they trained honey bees to fly to a feeding station that was set up about 35 meters from each of three honey bee colonies. The training of bees to a feeding station, followed by some manipulation or observation (either at the feeding station or back at the source hive) is widely used in behavioral studies of honey bee foraging and communication. In this case, the researchers marked individual foragers visiting the feeding station and feeding on a 50% sucrose solution and then recorded their subsequent visits to the station for one hour, during normal foraging periods on sunny days. In this way, they were able to estimate the average time interval between visits (T). This interval was defined as the time it took for a forager to leave the feeding station, return to the hive to unload and then return to the feeding station. The feeder was then replaced with one containing sucrose solution with imidacloprid at one of 12 concentrations between 40 and 6,000 ug/liter. The bees were allowed to feed on the contaminated sugar solution only once and then the artificial feeder was replaced with the one containing only the 50% sucrose solution. The visits of the foragers were then recorded for an additional 90 minutes during which the time interval T was measured for all marked bees who fed on the treated syrup and continued to forage.

In reporting the results, the authors noted that in all 14 instances of consecutive visits to the feeder with sucrose solution alone, the time interval between visits (T) was less than five minutes (300 seconds). They used these data to then define the normal foraging behavior of the honey bee in these trials to exhibit T less than 300 seconds. The researchers then used the individual honey bees who exhibited "normal" foraging behavior to generate data from the imidacloprid feeding trials and found that "abnormal" foraging behavior (T > 300 seconds) began in individuals at exposure to concentrations of imidacloprid as low as 50 ug/liter. The specific results of "percent abnormal behavior" in relation to increasing pesticide concentration were as follows: 15% - 50 ug/l, 37% - 100 ug/l, 34% - 200 ug/l, 74% - 400 ug/l, 79% - 600ug/l, 83% - 800 ug/l. At concentrations of 1,200 ug/l imidacloprid and above, all bees were abnormal in their foraging behavior. Some percentage of marked bees that were fed the pesticide laden sucrose solution did not return during the subsequent 90 minute trial. The proportion of these "missing bees" was also dependent on the concentration of imidacloprid that was fed and ranged from 34% at 600ug/l to 97% at 3,000ug/l. At concentrations above 4,000ug/l all bees went "missing". The day following the experiment, bees that had been exposed to concentrations of imidacloprid of 1,600 ug/l and less appeared to "recover" and were back at the feeding station. However, of the bees that had been fed 3,000ug/l, 4,000 ug/l and 6,000 ug/l, the levels of "recovery" were 77%, 64% and 48%, respectively. The foraging behavior of these "recovered" bees was irregular and in the words of the researchers, the bees "still suffered

from imidacloprid poisoning."

In discussing their findings, the authors suggest that the delayed return of treated foragers may be due to disorientation, although without tracking of the flight paths of the foragers, they "cannot be sure where these bees went during the periods that they went missing." However, the researchers did make observations at the entrances of the beehives during the experiments and "did not find any treated bee returning to her beehive." They noted also that other studies have shown that imidacloprid can impair learning in the honey bee and short term memory. They make the point that; in this case, the reduced foraging activity at the feeder and the increased interval between foraging could "be due to the bees inability to retrieve the long-term memory of their flight pathway..."

Regardless of the exact mechanism of interference with foraging, the potential for sublethal doses of imidacloprid to have negative consequences on a honey bee colony is evident. The authors point out that the lowest concentration at which they found a significant effect (50 ug/l) is about four times higher than has been reported for neonicotinoid residues in various crop plants. However, the researchers suggest the possibility that the amount of pesticide in the body of the bees could accumulate "through several flower visits and induce abnormal foraging behavior."

There has been considerable speculation in the popular press and to some extent in the scientific literature that exposure of field bees to neonicotinoids may be a factor in colony collapse disorder. The results of this study do not put this question to rest by any means but, as the authors point out, the method of evaluating foraging bees following exposure to sublethal levels as outlined in this study provides "...a reliable method to help in the risk assessment of behavioral sublethal effects of pesticides on honey bees." Future studies could also provide controlled dosing at feeding stations, while making close observations of both the foraging force and measures of ongoing colony growth and development (through the use of observation hives and marked age cohorts of bees). Such studies should be able to relate the effects of sublethal exposure of foragers to neonicotinoids to changes in colony health and characterize the overall symptomology from such exposure compared to those reported for CCD.

As has been said before, "All things must pass." With a couple of exceptions, I have been fortunate to author this column as a monthly feature of *Bee Culture* since the January 2002 issue. However, due to ongoing publishing changes, Research Reviewed will now become a bimonthly feature of *Bee Culture*. Of course, as I have done in the past, there are ways to sometimes sneak in two reviews per column...so stay tuned. One last bit of housekeeping – I am very grateful to all the readers who have written to me through the years supporting the concept (and sometimes even the content) of this column. When a reader is so taken by discovery in honey bee research that they take the time to write a letter it reinforces my contention that all beekeepers are students of biology. BC

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Malcolm T. Sanford

The Pine Honey Congress

"Turkish beekeeping takes the world stage."

I recently returned from the First International Muğla Beekeeping and Pine Honey Congress, which took place at the modern University of Muğla,[1] republic of Turkey. This event was sponsored by a number of foundations and businesses in the country acting in concert to assist the beekeeping industry. Quickly it was revealed that a goal was to provide a world stage for Turkey to announce its bid to host the world apicultural congress (Apimondia) in the year 2013. The country has a lot going for it. A travelling companion who visited in the 1980s said it is totally unrecognizable from what it was twenty years earlier. The transformation into a lively emerging nation is visible everywhere. Clearly, there continue to be populations of haves and have nots, but a rising middle class is certainly present. Coincidentally, in the same year as it plans to bid for the Apimondia congress, it will also apply for entry into the European Union[2]

Events at the Congress reveal that Turkish beekeeping has also evolved from primitive, rural roots into a solid industry. A paper by Ahmet Yiðit reports the activity was recorded in the Muðla area as far back as 1844. Clearly, beekeeping predates the Ottoman Empire, however, and there seems little doubt that it was practiced all over The Levant during prehistoric times.

The Turkish Beekeepers Association (TAB)[3] reported that at this time the country sports beekeeping associations in 76 cities (38,330 total members), managing 4.6 million colonies (second largest number in a single country). About 82,300 tons of honey are produced each year, averaging 17 Kilograms (36 lbs) per colony. Beekeeping contributes to about seven percent of the national GDP; there are about 15,000 families involved in the activity, managing an average of 129 hives.

A thriving commercial pollination enterprise also exists, including some three million colonies, collectively moving about 2000 kilometers to as many as three sites. Crops pollinated include sunflower, cotton, cherry, apple, and citrus. The map shown here provides an idea of the movement around the country. Green areas are traditional wintering grounds for beekeepers.

Seventy-five percent of Turkish bee hives are registered in a beekeeping registration system called AKS. Beekeepers are also registered by TAB and provided identity cards. Turkish beekeepers and scientists have been prominently represented in world congresses, seminars and conferences and hosted the First Balkan Federation Beekeeping Congress in Istanbul in 2007.

Other elements of the Turkish beekeeping industry include efforts in developing apitherapy, beekeeping technology (labs concentrating on bee products and health), marketing research (compatible with European Union standards).

Turkey is a huge country, larger than the state of Texas, encompassing 302,000 square miles. It also is the gateway to Asia from Europe, and so has tremendous geographic biodiversity, with more native plants and animals than other countries in the region. A paper at the Congress by A. Kence and colleagues reported an estimated twenty percent of all native honey bee ecotypes exist in Anatolia, including those residing in the Black Sea area, Thrace, and the Caucasus. Another study from Ankara University by Irfan Kandemir and associates, reported how diverse these populations are using a technique called geometric morphometrics (GM). The following were identified as subspecies: Armeniaca, Caucasica, Ardahan-Artvin-Kars, Carnica, Trakya, Anatoliaca, Karaman-Kayseri-Konya-Sivas, Adamii, Cyrria, Kibris, Syriaca, Hatay, Meda, Iran-Hakkari, and Muðla-Datca.

The latter is the native Muðla bee. Muðla is a province with a capitol city of the same name in Southwest Turkey, a famous area where the Aegean meets the Mediterranean. It is by far the most important beekeeping region in Turkey. Out of 398 villages, 294 employ beekeeping activities as their main source of income. About 5,800 beekeepers manage 600,000 hives. Most importantly, 75% of Turkey's pine honey comes from the province. The reason the Congress was held in the province.

Pine honey is really honey dew, a product collected and modified by honey bees not from flowers (nectar), but from other insects. In the case of Muðla, it's a one plant, *Pinus brutia*, one insect, *Marchalina hellenica* (M.h.), complex. M.h. is a scale insect, one of the true bugs in the order hemiptera, known as plant suckers. Scale insects and aphids are two groups in the order that imbibe so much liquid from the plant's phloem that they are forced to excrete a good deal of sweet juice as waste. In many systems, the juice becomes a media for the growth of sooty mold, which may turn fruit black, although doesn't often harm it. This is also taken advantage of by ants and honey bees that seek out the juice and convert it into honeydew. The honeydew from Muðla is highly sought after and commands a good price.

This particular honeydew is also produced in areas of Greece. Sofia Gounari reported on a six-year study of the scale (M.h.). Aspects studied included morphology, taxonomy, evolution, life cycle and population density in relation to life cycle in five regions: Crete, Attiki, Evia, Chalkidiki, and Thessaloniki. It is concluded that:

M.h. has one generation per year; the appearance of adults and egg-laying is from 25 March through 25 April. There are very few males, although on Crete some large populations have been found. Egg laying in both lab and field has been documented to average 30 days. The number of eggs by an individual can

reach 400, with an average of 222. All first instar nymphs become attached to pine trees and begin secreting honeydew by 15 June. Further ecdyses (developmental changes) occur at the end of August and in October. The resulting third instar hibernates and continues to secrete honeydew, but the bees often cannot collect this material due to inclement weather.

The developmental times of the M.h. nymph are fairly constant over the five regions, but the honeydew secretion varies considerably. Thus, the weather conditions and the health of the trees determine to a great extent the amount of honeydew produced. This makes it difficult for beekeepers to figure out when to move colonies; they can be caught out if the flow does not occur as projected. Dr. Goundari suggests beekeepers in Greece and Turkey develop information networks as found in Germany and other places to help with this decision making.

The advantages of pine honey for beekeepers include the fact that the harvest is relatively stable from year to year. Large numbers of colonies in holding yards do not appear to affect the flow, which also helps to Winter honey bees, although honeydew is not considered optimal for bee nutrition. There is little danger of pesticide damage (the trees are not sprayed), and robbing is limited. The disadvantages include colonies not going into Winter in the best possible shape (the queen can easily become honeydew bound and unable to lay eggs) and the spread of disease is enhanced since colonies are placed in very large congregations.

Dr. Gounari provided information on how to exploit the M.h. scale in terms of when and where to move colonies and how to manage them specifically for pine honey production. Before moving, colonies should be strong, treated for *Varroa*, well fed (syrup and pollen) and they should be "hungry," not have too many empty frames. In order to determine the optimum time to move, "sentinel" colonies should be placed in areas and monitored for incipient flows.

After the colonies are moved into the honeydew, the management shifts to monitoring combs and pulling them as they fill up – only one brood chamber is used and combs

are taken from it. Too much space (the reason supers are not uniformly used) can mean the bees will put the honeydew in small patches all around the frame instead of filling it up uniformly. This seems to parallel to some extent bees managed for section comb honey, where the insects are reluctant to enter the sections unless "forced" to do so. Clearly the art of managing honey bees for pine honey is just as demanding, if not more so, than producing good section comb honey.

Pine honey is not easy to characterize for export purposes because it contains no pollen, and so it is a great candidate for economic adulteration. Even at the Congress, finding pure pine honey product was difficult. Most sold was a blend with some honey. Thus, there is no codex standard for pine honey. Stefan Bogdanov of Bee Product Science in Switzerland confirmed this in a review of the subject. Characterizing the material does encompass similar analyses, including organoleptic (taste, smell) and chemical analyses, as well as electro conductivity. However, because there is no internationally-valid criteria to distinguish pine honey as there is for unifloral honey in the E.U., the International Honey Commission is currently working on the issue. Another paper by Banu Yücel concluded that because 92 percent of Turkish pine honey was produced in the Muðla area and 15,000 tons were exported each year to the EU, a specific codex could and should be created for this product.

A paper by Chysoula Tananaki investigated the possibility of using volatile compounds measured via Gas Chromatography and Mass Spectrometery (GCMS) on pine honeys in both Greece and Turkey. Specific compounds including three-carene were found only in Turkish pine honey, suggesting these might be markers for the product. It was nevertheless concluded that although useful, this technique should continue to be used only in conjunction with both physiochemical and organoleptic methods.

Challenges in pine honey production in Turkey are many according to one of the Congresses main organizers, Muhsin Doðaroðlu. These include: inadequate colony care and standardized production, marketing and pricing techniques. Most significantly, however, may be environmental changes seen over the last 40 years that might affect the trees, scale insects, honey bees or all three together. Some potential areas include increases in the number of thermo electric power plants, tourist attractions, mines (marble and stone), and rapid urbanization coinciding with water supply issues as found elsewhere in the area.

Fortunately, the country does not appear to be affected by colony death characterized as CCD. However, a study by Tuðrul Giray at the University of Puerto Rico indicated a range in losses reported by beekeepers, some as high as 90 percent. He analyzed a battery of nine questions to try to determine a pattern based on locations, bee diseases, and inputs like sugar feed, wax foundation, and queen source. All contributed to reported losses, but no pattern could be discerned. One possibility is that the new strain of nosema, *Nosema ceranae* played a role.

A paper by several researchers at the Aristotelian University, Greece, revealed that *Nosema ceranae* was detected in 2006 and caused significant problems the next year. Spore counts reached high levels (>50 million spores per bee) and losses in the range of 45 to 56 percent were recorded in the winter of 2007-08. It

is thought to have been introduced via imported pollen. This disease is a real problem as the European Union does not allow the use of fumagillin, the only known effective control, because no Maximum Residue Level (MRL) in honey has been determined. In a trial using Fumidil B, Vita Feed God, Nosestat, Protofil, and Garlic, only the former product was considered reliable as a control for *N. cerana*, although all others controlled the regular *N. apis*.

One of the fears is how exotic organisms like *Nosema ceranae* might affect the native populations of honey bees that have been identified in the region. Another is whether these populations will be compromised by large-scale commercial pollination or queen rearing efforts. A paper already mentioned by A. Kence and colleagues reported that studies done have demonstrated great morphometric and genetic variation in Turkey. So far, microsatellite study has shown that native populations are intact, but how long this can last is uncertain. Thus, the authors conclude: "Behavioral work done on different Anatolian honey bees in a common garden and their native habitats corroborates adaptive evolution of honey bees. This diversity is insurance for beekeeping in Turkey, as well as the world, against future environmental changes that honey bees might face. An important threat for honey bee diversity in Turkey is the distribution of queen bees that are produced in a few localities. Distribution and quality control of queen bees should be carefully regulated. In addition, the practice of importing foreign races of honey bees and replacing local races must be stopped."

A wide variety of other papers were also presented at the First Turkish Beekeeping and Pine Honey Congress, including topics such as the scope of European beekeeping activities of Apimondia, causes of colony losses due to CCD and other reasons, managing honey bees for pollination, legislation on honey and honeydew issues. The Congress also featured a lively poster session and commercial display area. The latter included a unique plastic beehive being sold in the country, and several displays featuring beekeeping paraphernalia.

Those hosting the conference proved to be well organized and extremely good natured, given they were charged with ushering around about 30 invited guests. Special thanks must go out to Muhsin Doğaroğlu and Ali Öztürk for their assistance, but especially Ms. Nurcan Bahar, a local volunteer who took it upon herself to ensure all travel arrangements went off without a hitch. There seems little question that Turkey is ready to host Apimondia in 2013. BC

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

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a closer look

AFB SPORES & VEGETATIVE RODS

Clarence Collison
Audrey Sheridan

Spores are the infectious stage and after being ingested germinate into vegetative rods.

American foulbrood (AFB) is a widespread disease of honey bee larvae caused by the spore-forming bacterium *Paenibacillus larvae* subsp. *larvae* (formerly known as *Bacillus larvae*). Spores are the infectious stage, and shortly after being ingested, they germinate into vegetative rods in the midgut. The rods then migrate into the hemolymph (blood), where they cause septicemia and death of the larval host. Spores are resistant to desiccation, radiation, high temperatures and disinfectants; therefore only the vegetative stage of *P. l. larvae* can be successfully controlled with antibiotics. While older larvae have physiological characteristics that slow or even prevent septicemia from occurring (Alippi 1999), individual larvae that ingest as few as 10 spores before they are 24-hours old will not recuperate once infected. After a larva has succumbed, the bacteria sporulate in the decaying corpse, which becomes characteristically brown and mucilaginous (Shimanuki 1997). Finally, the larva desiccates, leaving a dark scale on the bottom side of the cell. The scale contains millions of *P. l. larvae* spores, which re-enter the cycle when they are picked up by house-cleaning bees. It is known that large numbers of spores are required to establish infections in honey bee colonies and it has also been shown that colonies can maintain relatively large numbers of spores over several seasons without manifesting any clinical symptoms of AFB. In order to understand the epidemiology of the disease, it is important to understand the distribution and virulence of spores within the honey bee population and hive, and the susceptibility of the vegetative rods to various treatments.

Lindström (2008) studied the distribution of *P. l. larvae* spores among adult honey bees taken from different parts of eight clinically diseased colonies and found that the spores were not randomly distributed among the bees. Some bees had much higher spore loads than others and as the proportion of contaminated bees increased, the number of spores from each positive bee also increased. The data also demonstrated a relationship between the number of clinically diseased cells and the proportion of spore-positive bees in individual colonies.

The impact of spores among larvae of different castes is also of interest. An early study compared queen, worker, and drone honey bee larvae of similar ages and genotypes by giving them, in their food, continuous dosages of either water-suspended *P. l. larvae* spores, or water only. The spore treatment resulted in about 93% mortality of female larvae reared as queens, 82% mortality of those reared as workers, and 68% mortality of the male (drone) larvae. Control (water only) treatment mortality was less than 5% for each caste. The differences in resistance between castes were attributed to differences in the food supplied by adult bees to the larvae (Rinderer and Rothenbuhler 1969).

"To understand the epidemiology of the disease, it is important to understand the distribution and virulence of spores within the honey bee population and hive."

Regardless of the density of spores within a colony, adult bees that transfer the spores and have close contact with larvae never seem to become infected (Crailsheim and Riessberger-Gallé 2001). Furthermore, not all larvae that are fed spores develop infection. Crailsheim and Riessberger-Gallé (2001) investigated resistance to *P. l. larvae* in various larval stages and in adults of different ages. Substances inhibiting the growth of *P. l. larvae* were demonstrated in four-day-old larvae and to a lesser extent in one-day-old larvae. No such substances were shown in six-day-old larvae. Extracts of adult bee midguts generally produced a greater inhibition of bacterial growth than did extracts of larval midguts. It was also discovered that the midguts of eight-day-old adult bees showed a greater bacterial growth-inhibiting potential than midguts of freshly emerged adult bees or foragers.

Riessberger-Gallé et al. (2001) further studied the influence of the adult honey bee midgut on spore germination and vegetative growth of *P. l. larvae*. Two groups of workers likely to have large numbers of spores in their gastrointestinal tracts were studied: middle-aged bees, which are known to remove or cannibalize dead larvae and clean brood cells, and winter bees which do not have

frequent chances to defecate. They found that the midgut extract from winter bees and middle-aged bees of different colonies almost completely inhibited the growth of the vegetative stage of *P. l. larvae* and suppressed the germination of spores. The inhibiting substance or substances from the adult midgut are very temperature stable: they maintain about 60 percent of their growth inhibiting capacity after being held at 125°C (257°F) for 15 minutes.

The observations of Riessberger-Gallé et al. (2001) were supported by an earlier study, wherein the ingestion of large numbers of spores over time by adult honey bees of three different genetic stocks did not produce observable pathological effects (Wilson 1971). Dissection and microscopical examination revealed spores abundantly present in the alimentary canal, but no vegetative rods were found in either the canal (with two possible exceptions) or the hemolymph. The recovery of spores from the three major gut regions of adult worker bees (foregut, midgut, hindgut) showed that four minutes after spore ingestion the main spore concentration was located in the foregut. After 40 minutes a majority of the spores were in the midgut, where they remained for more than 6.67 hrs. After 2.78 days most spores had passed into the hindgut. Spores remained viable in the alimentary canal for a period of at least 27.8 days. Viability was demonstrated through the growth of bacterial colonies in solid yeast-starch medium. When fed to young honey bee larvae, these spores proved to be infectious and caused American foulbrood disease.

The pathological consequences of artificially introducing *P. l. larvae* spores into the hemolymph of adult bees were investigated by injecting the spores into the thorax of worker bees. A majority of the spore-injected adults died in less than 2.54 days, whereas most water-injected bees lived 5.92 days or longer. A statistical analysis of longevity data demonstrated not only a significant difference between spore- and water-injected groups, but also that the pathogen reduced the life span of three genetic stocks of bees to an equal level, even though genetic differences in longevity exists (Wilson and Rothenbuhler 1968). Upon dissection of the dead bees, single vegetative rods and long

"The transmission of AFB disease can occur by two principal means: vertical transmission (parent to daughter colony) and horizontal transmission (between unrelated colonies)."

chains of rods were observed in spore-inoculated bees, thus demonstrating not only spore germination but also bacterial multiplication in the hemolymph. Water-injected bees remained pathogen-free. When spores were injected into the abdominal hemolymph above the dorsal diaphragm, vegetative rods were recovered in samples of thoracic hemolymph. Clearly, cells of this pathogen were transported via the circulatory system of adult bees from one region of the body to another. Both abdominal and thoracic injections of *P. l. larvae* spores produced a general septicemia in adult bees. Spores were recovered in the hemolymph of only one adult bee out of 115 bees given thoracic and abdominal injections of spores (Wilson and Rothenbuhler 1968).

Within-colony transmission of *P. l. larvae* spores was studied by giving a spore-contaminated honey comb, or a comb containing 100 larvae killed by American foulbrood, to experimental colonies (Lindström et al. 2008). The impact of the two treatments on spore loads in adult bees, honey, and on larval mortality was determined by culturing spores in samples of adult bees and honey, and by measuring larval survival. The results demonstrated a direct effect of treatment on spore levels in adult bees and honey, as well as on larval mortality. Colonies treated with dead larvae showed immediate high spore levels in adult bee samples; colonies treated with contaminated honey showed a comparable spore load, but spore-spread was delayed until the bees started to utilize the honey at the end of the flight season. During the Winter, there was a build up of spores in the adult bees, which may have increased the risk for infection the following spring. The results confirmed that contaminated honey can act as an environmental reservoir of *P. l. larvae* spores. They also suggested that fewer spores may be needed in honey than in diseased brood to produce clinically diseased colonies. The spore load in adult bee samples was significantly related to larval mortality, but the spore load of honey samples was not.

The transmission of AFB disease can occur by two principal means: vertical transmission (parent to daughter colony) and horizontal transmission (between unrelated colonies). Fries et al. (2006) studied the rate of vertical transmission of *P. l. larvae* in swarming colonies by culturing the spores from several samples of adult bees. The results demonstrated vertical pathogen transmission to daughter swarms, however, the spore density declined over time in both mother colonies and daughter swarms when mother colonies did not exhibit clinical disease symptoms. Robbing is considered to be of major importance to the horizontal transmission of AFB, but although it is widely recognized that honey will retain spores of *P. larvae*, and that inter-colony transmission of spores in contaminated honey does occur during robbing, the relative importance of contaminated honey for intra-colony transmission of spores remains unknown. An artificial form of horizontal transmission occurs through the inadvertent shifting of brood combs containing remains of infected larvae (scales) that have succumbed to AFB. Beekeepers must be aware that contaminated honey can be transmitted either by shifting extracted or unextracted honey combs between colonies.

Another potential source of AFB transmission would be from package beęs that contain either infected workers or queens. When adult workers are taken from a diseased colony, they carry spores with them. Pankiw and Corner (1966) found that brood became diseased with AFB in six weeks when these spore carrying workers were introduced into a colony. Viable spores have also been recovered from the alimentary tract of adult worker honey bees from one to 19 days after they had attended spore-fed adult queens. Recovery of the spores from the worker guts implies that the queens released the spores with their feces, and the feces were eaten by the workers as they removed her excrement (Bitner et al. 1972). If bees cannot defecate outside the hive and rely solely on the honey stores for food, there is a buildup of fecal matter

mixed with *P. l. larvae* spores in the rectum of adult bees, and such spores remain viable (Bitner et al. 1972). If bees defecate inside the hive, spores are released into the hive environment. This likely increases the risk of larval infection due to a more spore-contaminated environment.

Currently the only treatment for AFB is antibiotics (Terramycin, Tylan). Recently, genetic research has demonstrated that some bees have a naturally-occurring immune defense against the vegetative form of *P. l. larvae*, which is inherited through the maternal line and marked by the production of the protein abaecin in both larvae and adults (Decanini et al. 2007). Other researchers have examined the potential antimicrobial effects of essential oils against the vegetative stage of *P. l. larvae*. Among those tested: thyme, lemongrass and cinnamon oil showed significant antibacterial effects on *P. l. larvae* (Gende et al. 2008, Fuselli et al. 2005, Alippi et al. 1996). These discoveries may lead to the development of alternative treatments to the current antibiotics, which are in danger of losing their potency against resistant mutations of the *P. l. larvae* strains. BC

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CONSIDER CONTRACTS

An indepth look at this important business tool

Kim Flottum

Considering Contracts

We have, as a matter of conscience and consideration always promoted the use of contracts when renting out your colonies for pollination. It is true that many beekeepers do not use them, would not consider them, and are irritated, even insulted that we insist that a contract be used when in this business. And yes, over the past 20 or so years we have talked to scores of beekeepers who have, for generations, worked with growers on simply a handshake and been completely satisfied with the results. So be it.

However, if you are new to this business, if you do not know the growers you are engaging into this process with, if the owner of the orchard or crop is a faceless corporation, if there is a for sale sign at the end of the driveway, if you have never done this before but regardless are comfortable with the ramifications of having no legal protection from the dangers of pesticide damage to your bees, have no leg to stand on regarding supposed penalties for colony strength, change of ownership, liability regarding theft, damage, stings or vandalism, or ability to appeal any decision the grower makes, bills for damage the grower sends, or no recourse when a grower does not, or cannot pay you, then, again, so be it.

But if you are interested in working with a grower so that both of you have a full understanding of the rights and responsibilities a business venture such as this entails then using a contract will explain and detail those rights and responsibilities. A well written contract will ensure that both parties are protected from the rigors of misfortune, intentional fraud or unintentional actions, and both can engage in this activity knowing full well that the best of each will be represented, and the outcome will be as profitable as man and God allow.

But each beekeeping business and each crop grower has their own unique set of variables to consider when venturing into a business relationship.

From a grower's perspective hiring an unknown to pollinate his crop is risky business. If they fail to show up, if they show up late, if they show up with too few bees, if the bees are sick, if they disregard and damage property when setting the colonies, if they leave early... all of these actions, and many other activities that are possible, absolutely threaten the outcome and results of their growing season.

Likewise, from a beekeeper's perspective, if the grower only allows restricted access, sprays poison with abandon, is not responsible regarding theft or personal safety, or refuses to pay, a beekeeping operation can most certainly face ruin in return.

Generally, an article like this displays a sample pollination contract and explains the attributes of each entry. There are a plethora of contracts available for viewing on the web, in extension bulletins, and from other beekeepers and growers. I suggest you examine as many as possible to learn what mistakes others before you have made...for every line on a contract is there because someone before didn't put it there and paid the price of that neglect.

So rather than give you boiler plate wisdom, perhaps a more productive exercise would be to walk through the process from beginning to end and examine each aspect of the activity and imagine what could go wrong. If you look closely, you can find a worry under every pallet, but I've always felt it was better to pick up each of these, turn them over and consider the worst that could go wrong. Then enter a line or discard as needed. Better safe than sorry.

Below I've taken the process and separated it into sections representing the progress of the job, from before you load that very first colony to when you tie that last hay-hitch knot and get paid. Actually, I've entered as many as I'm aware of, could think of or find. Because of the unique situations you and your grower have, the particular crop you are working with, the potential of local outside forces entering in and a million other things mother nature, man or beast can throw at you, certainly there may be more. Write them in the margins, at the bottom or somewhere so your final contract gets them into the equation. Then, take a look at any of the many pollination contracts you've looked at before or have found in bulletins or on the web so you have a feel for the form and format of a contract and draw yours up. What you will have when finished is a legal document specifically tailored to your exact situation, covering everything you and the grower need covered. What could be better? Here's the list I came up with. What can you add?

BEFORE YOU BEGIN

Names, addresses, signatures of parties – beekeeper and grower or representatives

Contact information of grower and alternate (s), day and night

Contact information of beekeeper and alternate(s), day and night

Date of contract signing and approximate date of the bloom

Growing season, year and season

Number of colonies needed

Date of movement in, range
Days notice you need before moving
Percent bloom to move in
Competitive bloom considerations
Exact location of crop/address/entrances
Type of crop to be pollinated, variety
Proof of insurance by grower, liability
Proof of insurance by beekeeper (if needed)
Payment amount per colony, with inspection premiums/deductions included
Payment schedule - % when contract signed, % when delivered, % when removed
Penalty for late payments to beekeeper
Penalty for late delivery by beekeeper
Penalty for too few colonies delivered
Delivery fee if any
Transfer requirements of contract to another party if needed by beekeeper
Transfer of ownership (individual or corporation), by grower during contract considerations

MOVING IN

Entry and access at all hours arrangement
Truck and equipment access and room to move, turnaround space, paved or unpaved roads, or off road – does grower pay less for paved access?
No penalty for field damage by beekeeper
Colony placement in crop, determined by field size, access, damage
Colony placement (locations) determined by grower, or beekeeper
Placement on field edge/danger to neighbors/zoning restrictions
Colonies placed by beekeeper and location choices, increased cost
Colonies placed by grower, locations choices, reduced cost
Pallet vs. individual colony for placement counts (even odd counts, etc)
Wind protection while in crop for flight
Permission for movement of colonies by grower, for additional crops, for pesticide application
Paying for additional movements, by grower or beekeeper
Directions colonies face, flight path to avoid people
Direction colonies face to take advantage of sun

WHILE THERE

Safe water sources, natural or grower supplied, how close
Colony damage by grower, physical such as vehicles, irrigation, employees
Pesticide agreements, what can be sprayed when, if any
Days notice to move out or away from pesticide sprays
Supplying protection from other growers spraying in area
Reimbursement if colonies sprayed by grower or neighbor, exact amount
Who determines pesticide damage
Pesticide residue removal, cans, puddles
Payment for moving colonies without notice for any reason, damage to colonies/loss of bees
Payment for additional crops pollinated at same location if not moved
Payment for additional crops pollinated at the same location if moved, who moves
Acts of God while bees in crop for either party, compensation to beekeeper
Act of God before or during bloom for grower, moving colonies to avoid, payment
Theft/vandalism compensation, by employees, others
Liability for stinging incidents while bees in crop to employees, anyone else
Supering or removing honey during contract
Crop attractant sprays
Pollen inserts on colonies

INSPECTIONS

Inspection for health of colonies, pests, diseases, etc
Inspection of strength of colonies
Frames of bees, frames of brood, laying queen, honey stores
Who conducts the inspection
Conditions of inspection/considerations for temp, time of day, sun, shade,
Who pays for the inspection
Minimum strength acceptable
Bonus paid for extra frames, by colony or by % of colonies
Penalty for fewer frames, by colony or by % of colonies
Size of frames, number of boxes on colony
Arbitration, grower and beekeeper plus one more...phone/internet/written access

MOVING OUT

Date of movement out, range
Days notice needed to move out

Summary

This is a good list, but it's not perfect. Walk through your pollination exercise and see how it holds up. If we missed something that could get screwed up, add it in. If you don't need it, scratch it out. If it's close, fix it.

If you have a grower that simply won't work with a contract, even if you have been working with them for many years, my first suggestion is why won't they? For the cynical beekeepers out there, me being one, what are they trying to hide? A grower's crop is absolutely dependant on you doing your job. No bees, no (or reduced) crop. Why wouldn't they want all the protection they could find?

And you, do you not want to protect the opportunity cost of not pollinating for a grower who will pay you for sure, for the lost honey, time, and energy, not to mention labor costs, property damage, colony disruption and wear and tear. Can you simply gamble that an unknown grower is going to be a good business person, just because...

But there is a final chapter here, and I would be negligent if I didn't at least mention this option. My son-in-law paints for a living. He's good at what he does, but his is a typical small business, one, maybe a few seasonal employees, that's it. He, too, often works on a handshake with contractors, homeowners, business owners when engaging in a job. Sound familiar?

Some of his customers are one time jobs, but many are repeats, every few years something needs more paint. Some of these customers are incredibly hard to work for...complaining about price, picky on this or that detail, hurry up and get done but slow to pay, demanding returns to fix things not in the original discussion. But pay they do, eventually. And call him back they do, again and again. So my son-in-law adds what he calls an irritant tax to the bill they get. It's a 10, maybe a 40% increase just because of the grief he has to put up with. If they complain about the cost...hey, there's other painters out there.

"I'm not doing this for practice", he says.

But they almost always pay, because he does a good job and puts up with the grief. It's fair he says. I agree.

Conversely, there are customers that couldn't be easier to work for. Lots of time, a bonus if he's done early, extras like lunch sometimes, offering a reference when needed, pay in advance...great customers to have in any business. These get a Good Customer Rebate, as he calls it. A discount, a breather, a reward for going that extra mile. It's fair he says. I agree.

So you can choose. Good luck. BC

'Bout a 100 – Sideline Beekeeping

FACING THE CHALLENGES OF SIDELINE BEEKEEPING - COLONY CONTAMINATION

Larry Connor

Fear of contamination

Next on my list of the **Ten Challenges Facing Sideline Beekeepers** (Number 5): *Fear of Contamination of hives and hive products from chemicals.* Many beekeepers consider pesticide contamination to be one of the key factors in Colony Collapse Disorder (CCD), even though there has been no defining pattern from the research conducted and reports to date. There is growing evidence that varroacides (pesticides specifically labeled for *Varroa* mite control) may leave residues in the hive, especially in beeswax. Both "lab chemicals" and natural chemicals have been linked to hive contamination. What do these contaminates do? They appear to shorten the life of bees, reduce the production and fertility of queens and drones, and cause bees to die earlier. The results are so threatening that you wonder why beekeepers use them!

The chemistry of the beehive

The source of a chemical does not make it safe or dangerous. Laboratory molecules may be very risky or completely safe, while so-called "natural" materials can be just as lethal as anything developed by a modern chemical company. All this has to do with the way molecules work, and if they attach to products inside the hive, like beeswax. Several years ago ARS-USDA researcher Eric Erickson (now retired) compared the wax comb of a beehive to the liver in a mammal. The wax serves to capture natural environmental contaminates and protects the colony in the process. This is not necessarily the case with human-made chemicals and natural products not ordinarily exposed to the colony. Then the wax serves to not only store the chemical(s), but also serve as a release system to continuously re-expose the colony to the material. This "timed-release" dosage mechanism may be responsible for long-term sub-lethal effects that do not show up in routine screening experiments that chemical companies and researchers routinely use to test a compound prior to release.

Contamination can come from the environment as well as the beekeeper.

In August 2008, Penn State researcher Maryann Frazier reported at the meeting of the American Chemical Society that there are "unprecedented" levels of fluvalinate and coumophos (miticides used to reduce *Varroa* mite levels) in "all" hive samples (especially beeswax, which is harvested and rendered into new wax comb foundation). More important there were lower levels of 70 other agricultural pesticides and their metabolites in pollen and bees. In November I listened to a French chemist and commercial beeswax processor report that in addition to fluvalinate, they found large residues of Thymol in certain wax samples. This was a preliminary report, and I want to emphasize that fact.

The large number of chemical contaminates inside the beehive, brings into play the issue of *chemical synergism*, where one plus one is not two but much more than that; the interaction of two or more molecules may be far more serious than either of them taken alone. When you add so-called "safe" chemicals from modern life – lawn treatments, agricultural fungicides and even landscape herbicides – these may have a boosting effect on miticides and cause problems. Further, the use of chemicals for *Varroa* control that beekeepers consider safer and less likely to be an issue for colony health may be a dangerously incorrect assumption. All chemicals are suspect, and require extensive, meticulous testing in combination with other common compounds.

The only way to win the war against *Varroa* is not to play.

War Games is a 1983 teen-drama movie that flirted with nuclear war only to conclude *that the only way to win the war is not to play.* In the movie a secret government computer that controlled missile launch is hacked into by a teenager who starts to play "Global Thermonuclear War", therein starting the real thing! The computer is programmed to play a game, and tests all possible combinations and, in dramatic Hollywood fashion, reaches the *To Win, Don't Play* conclusion.

"It takes less genetic programming to develop a social behavior than to develop specific genes to fight each disease that comes into a hive, and is thus more efficient as a controlling strategy."

This is a growing thought among many beekeepers: the only way to win the chemical battle against the *Varroa* mites is not to play the game. There is a growing movement to eliminate ALL pesticides from the beehives in an effort to develop a healthier bee stock. In addition to hygienic behavior that I will address in a moment, many beekeepers want to eliminate pesticide use completely from their hives and allow the bees to go through the selection pressure Nature will provide and ultimately come up with a stock that shows survivor characteristics: they can live without chemical treatments in an area loaded with *Varroa* mites.

In January 2009, Michigan State University Emeritus

Professor of Entomology Roger Hoopingarner wrote an essay he circulated on the Internet in which he reported observations made on his visit to South Africa. He discussed the methods beekeepers there used to treat *Varroa* mites. His words ring true, and I will use my former University Advisor's words once again as a source of direction:

The bees (Apis mellifera scutellata*) are very hygienic bees. The beekeepers have almost no problems with diseases like AFB or chalk brood. They also no longer have any problems with* Varroa. . . . *The real reason for the lack of trouble with* Varroa *is that when* Varroa *came to South Africa, all the beekeepers decided to not use chemicals to control the mites. (The decision may have been somewhat economic, but it turns out that was the right decision.) Initially, the beekeepers lost colonies, but in four years they were back to beekeeping just as if nothing had happened. They eliminated the susceptible colonies and only the strong survived.*

Enter the honey bee genome

A few years ago, when the genes of the honey bee were analyzed as part of the Honey Bee Genome Project, researchers were surprised to learn that honey bees have fewer genes to protect them from natural diseases than even mosquitoes. This makes the honey bee less equipped, genetically at least, to fight disease than the common mosquito. The honey bee has an advantage over the mosquito because of the social structure of the hive. As the result of the evolution of certain behaviors, bees are able to manage diseases without having specific genes to provide such protections. Most of us have knowledge of hygienic behavior of bees, a complex set of behaviors that allow the colony to detect, uncap and remove unhealthy larvae and pupae from inside the brood combs. This one behavior provides protection against multiple diseases and also mite infestation: Research has shown that hygienic behavior is an effective method of control of American and European foulbrood, chalk brood, sac brood and is helpful in the reduction of *Varroa* mite infestations. Bee behavior controls these health challenges, although the nature of the behavior may have a genetic basis. One might conclude that it takes less genetic programming to develop a social behavior than to develop specific genes to fight each disease that comes into a hive, and is thus more efficient as a controlling strategy.

Kefuss-Bolt bees in November 2008. This is one of hundreds of colonies developed from breeding families of bees that have not been treated in Kefuss's Live and Let Die breeding scheme.

The limits of hygienic behavior

At least two challenges exist with the use of bees selected for hygienic behavior. First, colonies must be hygienic from both the queen and drone side, and second, even the most hygienic colony does not deal effectively with in-migration of mites from dying, non-hygienic colonies.

Marla Spivak and Gary Reuter, University of Minnesota researchers who developed the Minnesota Hygienic Strain of bees, will tell you that in order for a beekeeper to obtain real benefits from these bees, they must keep all the colonies in the apiary headed by pure hygienic queens that have mated to at least fifty percent hygienic drones. Since the breeder queens for these stocks are instrumentally inseminated but daughters are not, the drone supply in the area where the daughter queens are mating must be predominately hygienic-gene carrying drones. Functionally improbable for the smaller beekeeper, this is an enormous challenge for the large beekeeper, and will require extensive investment in queens and labor for success.

The hygienic mechanism controls mites at the brood level, and does not provide the colony with one bit of protection from an influx of *Varroa* mites from other colonies. This can and will happen when a colony in the area of hygienic bees collapses from *Varroa* mites. The worker bees scatter to other colonies, as do surviving drones – all of them potentially carrying adult female *Varroa* mites and a source of re-inoculation. If the queen is not mated to 50 percent hygienic drones, or is a daughter supercedure queen, that colony is at risk for building *Varroa* numbers and being affected by the disease. I know that many beekeepers distrust migratory beekeepers who place colonies in their area at the end of the pollination season at just the time of colony collapse from *Varroa* mites. It may be possible to deal with a small number of colonies with colony collapse disorder, but to have large apiaries filled with collapsing bees nearby can be an overwhelming biological event.

In areas where non-hygienic colonies are not treated for *Varroa*, or have mites that have developed resistance to the miticide, or the beekeeper is not treating properly, colonies will eventually collapse and spread mites to other colonies in the area. Undoubtedly this is why all colonies in South Africa benefited by being untreated. The use of chemicals in some colonies profoundly delays the benefit from a strong selection against the mites.

Live or let die

In November I visited Toulouse, France where American-born commercial beekeeper John Kefuss has used no chemicals for ten years, and has limited his bees to those without a history of chemical control. Of course he suffered great losses at first, but now his stock demonstrates very low levels female mite reproduction (he monitors this by making annual brood counts). Kefuss is quick to point out that he does not use the hygienic model of selection and testing, since it only selects for one set of behaviors. Instead, he wants the final bees to possess as many mechanisms of *Varroa* control that they can possibly have. There is evidence of *Varroa* control

through adult bee grooming, and a suggestion of other mechanisms as well. Kefuss has set up a system where all such mechanisms are allowed to develop in a miticide-free environment. He does not treat for *Nosema*, foulbrood, chalk brood or sac brood. All are allowed to follow the same path of natural selection for resistance.

It is an enormously gutsy approach for a solitary commercial beekeeper. But now the bees have low mite reproduction, from whatever mechanisms, and the bees are productive. His breeder queens sell for the equivalent of $650, making them the most expensive breeder stock I know. One of his customers is an Australian queen producer selling packages in the United States. Welcome to our global beekeeping economy!

Roger Hoopingarner finished his article with the following quote:

There are some areas, and some beekeepers, that seem to be able to survive without chemicals. I suspect that these beekeepers have either a naturally isolated area, or through persistence they have saturated the area with genes for resistance. This last method may work for many beekeepers, and eventually the country. However, that is a long process that takes real perseverance on the part of the beekeeper. Not only does s/he have to select (or buy) the queens for their colonies, but they have to make sure that when a queen is superseded that they replace the queen immediately so that no non-resistant drones are placed into the free-roaming population. Past experience with the hygienic genes would place the saturation of the gene pool of an area at from four to six years. The four-year time-frame from South Africa now makes sense.

It is fortunate that we already have some resistant bees, such as the VSH strain and the Minnesota hygienic bees. Remember though that when you put these queens into your colonies that they should be marked and their life span kept track of very carefully as a supercedure queen will dilute the selection for resistance.

Eventually maybe these pockets of resistance will coalesce and we will have resistance throughout the country. I think it's sad that it will take at least 25 years to get resistance to Varroa. *A process that could have been accomplished in four or five years – just like South Africa.* BC

Dr. Connor is currently planning road trips for 2009. He has preliminary plans to be in Oklahoma and Texas in April, and is trying to plan a queen rearing and bee-breeding program for the Northeastern states in the Spring. If you are on the way to or from these locations, and want to plan a visit, contact him at ljconnor@aol.com.

What Kind Of Queen?

Italian, Carniolan, Caucasian, or Russian?

Jennifer Berry

A Little Background

Honey bees were first introduced into this country in the early 1600s by settlers from Europe. The race of bees that traveled by boat to the Americas was *Apis mellifera mellifera*, commonly known as the Dark, German, or Black bee. The German bee was predominant for decades but later lost ground to the imported Italian honey bee because of certain, undesirable characteristics. Beekeepers were annoyed with the temperament of the German bee. It was defensive, nervous on the comb and would boil out of the colony when disturbed. It was also very susceptible to European Foul Brood, which swept the country in the early 1900s. Colony losses were severe enough to spark a move towards the Italian honey bee. Today in the U.S., *Apis m. mellifera* is very uncommon and probably doesn't even exist in its pure form.

The Italian honey bee, *Apis mellifera ligustica*, is still the dominant player in the bee industry today. When you order package bees and queens from commercial sources the bee you more than likely will receive is the Italian honey bee: aka the "three banded Italian." These bees became popular for numerous reasons. First, they tend to be a semi gentle bee, not overly defensive or nervous on the comb. Second, Italians can handle most of the climatic variety that the Americas offer. Third, they don't use a tremendous amount of propolis and finally, swarming is not on the top of their list. The main complaint surrounding the Italian honey bee is their propensity to produce a ton of bees. This is fantastic while plants are bearing nectar and pollen but not so much when the blooms have disappeared. Unfortunately, the trend to produce wall to wall progeny continues into the Summer and Fall. This equates to more mouths to feed which in turn means dwindling honey stores which translates to either less honey removed by the beekeeper or more trips to the apiary to feed sugar syrup. In the past the Italians were the reigning monarch in the U.S. but in recent decades they've been challenged. The Carniolans along with the Russians are gaining in popularity.

Carniolans, *Apis mellifera carnica*, are a dark, grey bee that originated in Slovenia. The Carniolan gained popularity because of its gentle disposition and resistance to brood diseases. The other advantage they have over the Italian is their ability to "flow with the flow." In other words they build up quickly in the late Winter in time for the Spring flow then shut down brood production when nectar and pollen become scarce. The Carniolans overwinter in smaller clusters and hence honey stores are conserved. The only disadvantage is their tendency to swarm more readily when the brood nest becomes overcrowded.

Sue Cobey's breeding program developed the "New World Carniolan." Over decades queens in her program have been evaluated and selected for their ability to resist pests and diseases while still exhibiting important traits like overwintering ability, gentleness, increased brood and honey production.

Another western honey bee, the Caucasian, *Apis mellifera caucasica*, originates from the high valleys of the Central Caucasus. This is a geopolitical region located between Europe, Asia and the Middle East. The Caucasian is a race of gentle, dark bees that aren't bothered when beekeepers open their hive. They are slow to expand in the Spring but eventually can reach fairly large populations by mid Summer. They do have a few negative attributes which is probably what has kept them from gaining too much ground. Probably the most annoying to beekeepers is their tendency to collect and use propolis. Over the years beekeepers have selected against this trait due to the difficulty it added while working colonies; sticky hive tools, fingers, or gloves in warm weather while in cooler temperatures frames, lids, and inner covers cemented together. Caucasians are also inclined to drift, and robbing behavior can be bothersome. You won't find them very often anymore for these reasons.

The newest arrivals on the scene are the Russian bees which have been growing in popularity over the years. They are a mixed hybrid of *Apis mellifera* and come from Primorsky region of far-eastern Russia. In the mid-1800s settlers brought European bees, perhaps several races in all, to this area which were already inhabited by the native Indian honey bee, *Apis cerana*, the original host of *Varroa destructor*. It is believed that these initial populations of European honey bees became infested with *Varroa* and over time developed resistance in order to survive. Hence Russian bees have been exposed to *Varroa* mites longer than other races of *A. mellifera*. In 1997 Dr. Thomas Rinderer, USDA Bee Lab Researcher, imported these bees into North America. In 2007 the Russian Honey bee Breeders Association was formed. The purpose of the association "is to maintain and

Battery Box.

Individual Queen Cages

improve the various lines of Russian honey bees through propagation and selective breeding."

The Russian bee is a dark bee that overwinters in small clusters and can withstand harsh Winter conditions. They are good honey producers but shut down brood production earlier than Italians which is good for conserving honey stores. Russians are inclined to build numerous queen cells during the brood season and can swarm more readily than some other bees.

Finally, I'd like to mention the Minnesota Hygienic, which isn't a race of bees but rather a line of queens selected for a particular trait. Developed by Dr. Marla Spivak at the University of Minnesota, hygienic bees will detect, uncap, and remove infected or infested brood from the combs. Bees with this behavior reduce the incidence of diseases like American foulbrood and limit reproduction and therefore population growth of mites and small hive beetles. These queens are commercially available.

While thumbing through the bee journals you will notice numerous ads selling queens. To a new beekeeper this can be a bit overwhelming. How do you know which queen is best for you, or your location? This is when a local mentor comes in handy. Talk with them or other members in your club to see which queens they've been purchasing over the years. You will quickly find out that beekeepers can be opinionated, especially when it comes to a race or line of bees they've been keeping. Actually, if you stay in beekeeping long enough, so will you. Now, you may receive conflicting stories about which queens to purchase and hence your path becomes even more unclear. So experiment. Purchase several different queens from different breeders and make your own decision. Another way to narrow the selection process is to find a queen breeder that fits your particular beekeeping philosophy.

After you muffle through and figure out which queen you want to purchase you need to order her sooner than later. By now it's March. Most early queens are already sold but they should be available later in the year. If you prefer to re-queen in the Fall you still have plenty of time.

If you have never received queens in the mail let me give you a few pointers. Depending on who you purchase your queen from will determine how she arrives. If you are ordering a few queens they usually arrive in a sturdy, cardboard, postal envelope or box. Holes are cut for ventilation and the queens will be in individual cages (wooden or plastic) inside. If you are purchasing a large number of queens they're usually shipped in a battery box; a cardboard box with wired mesh windows. Inside the queens are securely housed in individual cages. The main difference between the two methods is the location of the attendants. In the envelope, the attendants are placed inside the cage with the queen. In the battery box, they're shook directly into the box and then sealed. Hence there are live, free flying bees inside the box but outside the queen cages. It's usually not a good idea to open the box inside unless you like buzzing bees at windows and lights. The battery box is supplied with queen candy which the attendants consume and then feed to the queens. Cages with attendants have the queen candy inside at one end.

If you are unable to install your queen when she arrives, take the cage out of the envelope and place a few drops of water directly on the screen towards the end where the candy is located. Not too much water, you don't want to drown them. This will help the nurse bees consume the candy and feed it to the queen. Then place the queen back in the envelope and keep it out of direct sunlight and away from any heat source. If your queens arrive in a battery box, lightly squirt water through the wired opening to hydrate the bees; again not too much. It is also a good idea to place your queen(s) someplace where the cat, dog, ferret, gerbil, rabbit, or snake will not have access. I've heard numerous stories about the horrible demise of queens due to a quick swipe of the paw or snap of a jaw.

Before installing a queen it is a good idea to remove the attendants. Several years ago Wyatt Magnum conducted research which showed acceptance rates increased when queens were introduced without attendants. Removing these attendants can be tricky if you're not used to handling bees/queens. If your queen is in a wooden cage, both ends will have a cork plug securely in place. Remove the plug on the end without the queen candy and let the attendants out. Preferably you want to have the cage in some sort of clear bag, queen muff, or veil covering because the queen may shoot out of the hole and take off flying. This can be disturbing when you watch your newly purchased queen fly off into the wild blue yonder. If she escapes the cage just carefully grab her by the thorax and gently place her head into the hole of the cage. She will be grateful to return to the cage if it means being released from the Giant Fingers. Plastic cages have a cap but usually the candy is in that part of the cage. There is a second plastic cap that is attached to the cage. Gently remove it and allow the bees to exit. If you are

Description	1876 price	Adjusted 2007 price
10 frame colony with imported Italian queen	$18.00	$346.55
10 frame colony with a home raised tested queen	$14.00	$269.54
One queen tested specially	$5.00	$96.26
One queen tested specially with bees	$15.00	$288.79
Tested queen from imported mother	$4.00	$77.01
4-full size nuc with warranted queen	$6.00	$115.52

brand spanking new at beekeeping you may want to just leave the attendants in the cage and install her. Once you feel confident picking up queens then you can attempt this. If the queens are in a battery box you don't have to worry about removing attendants. Just open the box next to the hive and insert the queen.

Here is how I introduce a queen. Open the colony, find the old queen and remove her. Open one end of the queen cage and remove the attendants then replace the cork or plastic cap. I take a small amount of honey with my hive tool and touch the corner of the screen. The queen will usually immediately start to feed on the honey. When inserting the queen cage, I prefer to put the queen-candy side down. This way there is no chance of the queen-candy melting and seeping down, entombing the queen. Since there aren't any attendants, no dead bodies could possibly block the candy. After several days I personally release the queen from her cage. I want to see the queen emerge from her cage, walk out onto the comb and be greeted, lovingly, by her new court. If bees are balling the cage (layers of worker bees curled up around the cage, biting and trying to sting the new queen) I leave her for another day or two. Take care with this newest member. Remember without her there's no colony.

I'm going to change the subject for just a minute, but I promise there is a point. Recently it seems our souring economy has been on everyone's mind. Turn on the radio, TV or computer and you're bombarded with doom and gloom: stock market down again, raising unemployment, foreclosures, failed bailouts, company closures, corporate thieves and increasing crime rates. Driving around Athens, Georgia I see the direct results of our failing economy. Folks standing on the road side with large orange signs that read, "Going out of business, 60-80% off, everything must go." It's the topic of conversation at dinner parties and lunch socials. Friends in the restaurant business are wondering how they can hold on for another month. Houses still on the market for over a year have new "for sale" signs reading "Price Lowered."

With all this concern about the economy one would think that the interest in beekeeping would also take a downturn. It doesn't seem to be the trend, so far. Maybe it's due to all the headlines about CCD or the desire to save money by making one's own honey. Who knows? But we, as consumers, are still wary of carelessly letting go of our hard earned money. Purchasing beekeeping equipment, bees and queens may still be on our list but we want more reassurance that the product is good.

Where am I going you ask? Last year I was invited to speak at the Western Reserve Beekeepers Association, in Medina Ohio. One of the highlights of my trip was a tour of the A.I. Root Company; you know the place they make all of those fabulous candles. I saw first hand how votives, pillars, and tapers were made, colored and scented. It was a fascinating tour. But more interesting was the building that A.I. Root built back in 1869. It is still standing and houses this amazing company. While on the tour Kim Flottum, tour master and editor of this magazine, handed me the fourth issue of *Gleanings* magazine dated 1876. I sat down and gently began to thumb through it. One thing that caught my eye was the advertisements for queens and bees. A few of those are in that yellow chart. Just for fun, I converted the 1876 price to today's (actually 2007) to see if the industry has kept up with inflation, which is where those numbers come from on the chart. Now granted I'm over simplifying a bit, but it seems to me that we're getting queens and bees today at a steal. Maybe our beekeeping dollar isn't hurting so bad.

See ya! BC

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

The Persona Of A Beekeeper

Keep bees long enough and they become part of who you are!

James E. **Tew**

This may be the most difficult piece I have ever written for you. Historically, I have always told you the truth in my monthly pieces. Good bees. Bad bees. High swarms. Big honey crops – no crops. Spilled honey. You have gotten it all. Now, the strangest and most challenging subject in my life has presented itself. Initially, I was not going to write anything; then I decided to write everything but now, I sense that I should write only "some" things. Presented here are "some of those writable things."

On December 15, 2008, I underwent major surgery to correct a lifelong colon problem. The surgery was not without risk and, in fact, things did go wrong – even horribly wrong as per comments from my surgical staff. An extreme blood loss caused me to have heart, kidney, and respiratory problems that required emergency measures. Then after a long week in Intensive Care and "step-down," a second emergency surgery was required to stop mystery bleeding that I developed. So, a procedure that was to be a few days in the hospital with a week of recovery has turned into far more. Clearly, I am (mostly) still here but this has been the most demanding experience of my entire life. Not surprisingly, I have some philosophical comments – bee related and otherwise.

I now understand much, much better

Through the years I have signed get-well cards and made comments at meetings for various people who were having medical problems. As best I could, I felt for the ailing people in question but life had to go on. That person's problems were not directly affecting me. Now, I am able to feel for those who are having health issues to a much higher level. I now realize that many of you have been through procedures as challenging as mine and had to claw your way through the recovery phase as I am now doing. In the future I will still sign cards and make comments, but in my heart I will empathize much, much more.

The persona of a beekeeper

It was surreal to casually walk into the surgery unit at dawn on December 15th. I had already been preadmitted. Other than being apprehensive, I was remarkably healthy. After being put into a small room, polite, professional people came to ask questions, dress me, shave me, and mentally prepare me for what was about to come. As a technical person was plumbing me for an IV, she asked what I did at OSU and of course I told her bee work. As she inserted the IV, she made some lame comment about it feeling like a bee sting *(actually an average bee sting is much worse than the IV prick)* and went on to ask a few questions about the general state of beekeeping. My inclination was to give a two-hour answer to see if it would forestall my upcoming event.

Then the surgeon and the anesthesiologist, dressed for the event and looking like something in a television medical show, came in with final instructions and a chance for me to ask any last questions. Nope. I was finished with questions. I just wanted this thing to be over. Then after a short quiet time with my wife, two surgical nurses came for me on my motorized bed. I told my wife that I would see her *"on the other side"* and off I went on my bed-ride with doors automatically opening and hallways becoming progressively darker. The surroundings were becoming more and more medically threatening. One of the nurses suddenly said, *"So you're the bee man?"* Okay, what's with these people and bees? Here I am just a few yards from a major medical procedure and people still have bee questions. I was already partially drugged and people kept asking about CCD and bee populations. I know. I know. They were trying to keep me calm and to get me positioned. I suspect that their bee interest could not have been any more superficial than it was, but strangely, it was very comforting to talk about bees rather than to dwell on the eminent event. No doubt, they knew that.

One final set of automatic double-doors opened and I was steered into a large darkish room with a brightly lit center area. Everyone, except me wore surgical masks. In a professional voice, my surgeon was giving vitals into a recording device about JAMES E. TEW, and his upcoming procedure. At the same time, my anesthesiologist was asking me if I could move myself off the motorized bed to the surgical table. *(Mentally, I began to talk to myself. Is it too late to change my mind about this entire procedure? After all, it is elective. Shut up and move to the table – you big baby.)* I moved myself onto a table that was much like lying on an ironing board. I felt as though I could easily fall off. As I was having this thought, nurses began to pull out shelves that supported my arms and my legs. Everywhere, people were doing things with equipment and with me. I was repositioned, prodded, and poked. I looked up into the bright light above me. I must tell you, I was feeling uncertain. In the midst of this cacophony, the anesthesiologist blandly asked, *"So how does one get a beehive? I have always thought I would enjoy keeping bees."* Realizing that this was most certainly a ruse to relax me before sedation, I cut him off by asking him to tell me a minute or so before I was going under. In this intimidating chaotic situation, I just wanted some little sense of control. The Doctor told me I had just about

a minute before the anesthesia began to work. I told him the best way for a new person to get started in beekeeping was to buy a package next Spring. *"Call my lab when I am back on the job and I will help you." "A good second way to get going is to....."* Gone. Out like a light. The deepest sleep of my life. A deep, black void. No memories. My last conscious thought – was not about my health, my family, or medical protocol, but my last cohesive sentence was about bees. I started a surgical process that, *"was not without risk,"* a process that in fact became very complicated, with a short discussion to the medical staff on ways to get hives of their own. Clearly, I am either extremely dedicated or extremely stupid.

Bluntly stated

Bluntly stated, the following seven to 10 days in the ICU and "Step-Down" were in the "unwritable area." Darkened rooms, morphine concoctions, foggy memories and a respectable degree of pain established an environment that even bees had trouble penetrating. Everyone focused on my re-routed digestive system. My system had to awaken on its own, which it finally did. I was to be released for home the next day when another *"unwritable area"* developed. I had to go back into emergency surgery for reasons completely unrelated to any aspect of beekeeping so I will spare you. It was a serious physical and psychological setback. I was to go home the next day. Now, being home in time for Christmas looked very doubtful. All my IV lines and paraphernalia had been disconnected. It had to all be redone. People were focused and directed. During that time, no one spoke of bees.

My second recovery

As I began to recover from the anesthesia of my emergency surgery, the bee questions abruptly started again. It is as though someone wrote in my records that I liked to talk about bees. Honestly, I really didn't mind. It was either enter into a drug-induced sleep or answer simple questions about bees – both were relaxing to me.

As my re-routed digestive system began to recover, some despicable tasks had to be done. I will spare you the details but I should say that I am eternally grateful to the nursing staff for helping me with those tasks. In one instance, as a staff member was working with me, I thanked her for assisting me to which she responded, *"I would rather be doing this all day than be around a bunch of bees for a single minute."* She wasn't angry or hostile. She wasn't sarcastic. She seemed to be truly truthful. As she continued to work on me, she continued, *"I don't see how you do it. All those bees everywhere – flying – stinging. Ugh! It makes me shiver."* It was ironic conversation. I would rather work bees all day than do what she was doing for me for a single minute. I explained how one grows into the beekeeping craft, but I am sure it was lost on her. Some are won, some are lost. This one was lost.

An epiphany – or maybe not. I can't tell

Slowly, ever so slowly, I began to feel ever-so-slightly better. Through the years, I had become overweight. A side effect of my surgery was that I was suddenly 25 pounds lighter. I had a new, redirected gut. I had had all these medical experiences. It made no sense to return to the old cheeseburger me, but I was unsure how to be a new me. Then a thunderclap of an idea – I have honey, in all forms, readily available to me. Honey is a healthy food. Honey is easily digestible. I have major digestive problems. What a perfect time to add honey as a major component of my new diet. I mentioned some kind of honey use program to all my surgeons and doctors. None knew anything about honey as a healing aid for gastroenterological issues. While it sounded okay to them, I was on my own.

One of my physicians was from the Philippines. As a child, he had a beekeeping uncle, *"Who used to buy queen bees in little wooden cages and would pass them around for all the family to see."* He estimated that Western medicine comprises only about 30% of the world's medical procedures. He explained that in human medical studies, it was very difficult to establish test controls. Everyone wants to be in the medicated group while few beg to be in the placebo group[1]. Generally stated, if a procedure is done time and again, and if people generally get better after this procedure is done time and again, it becomes increasingly accepted by medical personnel as a bona fide procedure. He said to try honey in my convalescent diet in a reasonable way. If I sensed that it helped, so be it. If I sensed that it did not help, so be that, too. My goal was to heal as soundly and as quickly as possible.

So, maybe I didn't do it right

After 12 days in the hospital at 3:00 PM on Christmas Eve, I was released. I wasn't happy. I wasn't sad. I was in pain, drugged, and uncertain. As per my honey program, on Christmas day, my first home breakfast of oatmeal was augmented with honey and pecans. I could only get down a few bites. I wish I could tell you the honey was great, but it was just *"okay."* From then on, small meal after small meal included some bit of honey. Honestly, I began to grow sick of honey, bananas, fruit juices and other such good stuff. I know that honey in my diet was helpful – even very helpful – in my ongoing recovery, but I could not make it the standard bearer of my recovery program. An overall good diet seemed to have been the more important issue. Honey is a major trademark of good eating, but honey is not the only thing one should eat. Now, three weeks later, I eat honey as I want it, but not necessarily at every meal. Maybe I didn't do it right.

Thank you

Thank you for all the cards, letters, emails, and calls that you so kindly sent me. I enjoyed reading the mail more than you can know and I was touched that so many of you took time to write. And thanks to all of you who just read this piece. It was cathartic for me write it. My bees look terrible. The weather has been very cold and due to all my health issues, I did not have them in good shape for going into Winter. When I get my stamina back, I will try to make it up to the surviving colonies. My bees were amazingly helpful throughout my entire procedure. After a few more months of recovery, I will be a new man. You just watch. BC

[1] I know that some of you readers are in the medical field. My comments here are superficial and are not intended to be opinionated statements about human drug and medical testing. Human drug and medical testing is complicated and are beyond my training and expertise.

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How To Conduct A COLONY AUTOPSY

Learn Why, To Prevent A Repeat

Ross Conrad

Ah Spring! After a long, cold, and dark Winter the first warm sunny days of Spring are a tonic for the body, mind and soul. The renewal of hope and anticipation that arrives with the re-greening of the hillsides and the quickening of the hives makes spring one of the four best seasons of the year for the beekeeper. Having missed your bees all Winter, you pick one of these early Spring days when the temperatures are warm to dust off your beekeeping gear and head out to the beeyard to see how your girls fared during the last several months. You find a hive, perhaps a few, or maybe all of them that have little or no activity at the entrance. Curious, you pop off the cover and a quick glance confirms that gnawing feeling that had been growing in the back of your mind that something was not quite right within. The hives are dead.

At this juncture there are several paths you may choose to take. If your heart's really not into beekeeping to begin with, you may simply walk away in disgust and give up on the whole notion of trying to manage tens of thousands of highly independent, often rebellious, and sometimes even aggressive females. You could also become numb to the loss (as this is probably not the first time), and with glazed eyes walk inside, pick up the phone as if in a trance, and place an order for new bees to repopulate your now empty hive bodies hoping for better luck next time. Out of love and dedication to the honey bee and the ancient craft of beekeeping however, I encourage you to see this as an opportunity. Before placing that order for more bees, look for the lesson that particular hive has gifted you with; having given the ultimate sacrifice so that you would have the chance to learn to be a better beekeeper. This situation provides you with the chance to identify the reason the hive has died so you can learn from the experience and adjust your management techniques to avoid having it happen again next year.

When conducting an autopsy of a hive it is important to notice all the little details, the clues left behind that can help you piece together the puzzle that is the cause of death. The first thing you will want to do is to find the remains of the bee cluster and the area that held the brood nest. Usually they are one and the same. What is the condition of the remaining brood? Is there any capped brood to be found? Is it worker or drone brood? Are the bees and brood covered with mold or do they look like they may have died recently? How much honey is left in the hive? Can you find any pollen stored in the hive? Are there signs of robbing? What do the dead bees left in the hive look like? Are there many dead adult bees or few? Where are the corpses and what were they doing in their last moments? What is the make up of the debris on the bottom board?

By looking for answers to these types of questions, we are able to gather the critical information that will allow us to come up with a reasonable hypothesis for why a hive died. By understanding why the hive has failed we are better able to formulate modifications to our management plan in the hopes of preventing a similar occurrence from reoccurring. We become better beekeepers, our hives

Chalkbrood while rarely deadly when contracted by a strong hive, can lead to collapse if the hive is already in a weakened state.

The bottom board can reveal many clues as to the reason for a hives demise.

are likely to be healthier, and we will tend to lose fewer colonies each year than we would otherwise.

When working with a dead hive, we have the luxury of being able to take our time making observations and evaluating their meaning. This allows us to practice identifying the cause of death and like most things, the more we do it the better we get at it. Once we get comfortable evaluating the cause of a dead-out we can then apply this skill when we are working with hives that are populated with bees in order to catch issues before they become a problem. Many of the clues that will lead you to the cause of death in a diseased hive are visible prior to its demise. Identifying problems early through regular inspections can allow us to take steps that will prevent the collapse of the colony.

A common question that I hear from beginner beekeepers is "How often should I inspect my hives?" My recommendation to such folks is that on average, your hives should be inspected every week to ten days during times when the bees are active and flying regularly. This inspection schedule can be either pushed up, or pushed out farther depending on the nature of the nectar flow at

Bee Hive Autopsy Results – Over The Course Of A Year	
Characteristics/Symptoms	Probable Cause
No adult bees left in hive either on combs or on the bottom board. If any bees are present they are only the queen accompanied by a handful of very young workers. There is a noted delay of two to three weeks before there is any robbing/scavenging activity by bees, moths, or beetles within the dead hive. Brood is present, often in larger quantities than the cluster can maintain.	Colony Collapse Disorder
Pupal mass under cappings is brownish in color and has a ropey or elastic viscosity. Sunken brood cell cappings that are dark brown or black in color and have a greasy appearance. Some cappings may also contain small pin holes.	American Foulbrood (*Paenibacillus* larvae)
Small pin holes in brood cell cappings. Numerous dead bees with deformed wings and/or short abdomens. Numerous dead *Varroa* mites found in sealed brood cells or on the bottom board.	*Varroa* mites (*Varroa destructor)* and associated parasitic mite syndrome (PMS)
Remains of dead cluster contain bees that are positioned headfirst in cells. Any honey left in the hive is located two or more inches away from the remains of the cluster.	Starvation
Remains of numerous drone brood cells sometimes scattered within worker brood on the same comb.	Failed Queen/Drone Layer
Combs, brood or dead bees covered with mold or mildew.	Indicates that the hive died a while ago or was too weak to maintain combs
No honey left in hive. Wax cappings that covered areas where honey was stored have been ripped open – jagged capping pieces litter the bottom board.	Hive died out or was too weak to defend honey stores from robbing by other bees, wasps, and/or hornets.
Significant brown spotting or large patches of brown staining on frames, comb, or in front of the hive.	Nosema disease or dysentary
Numerous dead bees lying out in front of the hive may be combined with brown spotting on inside or outside of hive entrance. Bees that have disconnected their two pair of wings and rotated them into an orientation that resembles the letter K.	Tracheal Mites (*Acarpis woodi)*
Buildup of webbing on combs containing small black pieces of debris. Remains of old cocoons and rounded elongated indentations in wooden ware. Damaged/disintegrated combs. Grey moths either dead or alive.	Greater or Lesser wax moths (*Galleria mellonella, Achroia grisella)* moved in *once the hive became too weak to defend itself, or died out*
Small hard larval remains that are white, gray or black within the brood comb, on the bottom board, or on the ground in front of the hive.	Chalk Brood (*Ascosphaera apis)*
Combs are riddled with holes (but no webbing is evident). Inside of hive is covered with slime and any honey left in the hive is fermented and runny. Some wax-moth-larva-like organisms are evident.	Small Hive Beetle (*Aethina tumida)* moved in *once the hive died out or became too weak to protect all areas of comb.*

a given time of year. During the first few months, or even the first year or so, the beginner will want to thoroughly inspect each hive by pulling out frames from the brood nest, look for the queen, etc. While this is disruptive to the colony and its organization, it is very beneficial to the beekeeper. Such regular inspections provide the "new bee" with critical experience working with the bees and identifying activities and various physical aspects within the hive. Once the beekeeper has gotten used to looking through the hive, and has a good handle on what they are looking at and what a healthy hive looks and acts like, inspections can become less intrusive and often won't need to include more than a quick peek under the inner cover in order to evaluate the health and well-being of the colony. It is important that we as beekeepers become proficient in quickly and accurately evaluating the health of a hive both for the good of our colonies and for our own benefit. Time and labor tend to be among the biggest investments we as beekeepers will put into our colonies.

When you are first starting out, don't be discouraged if you are not always able to clearly identify the cause of a hive's decline. When confronted with a perplexing situation that stumps you, call a more experienced beekeeper and ask them to take a look at the dead-out with you. Beware however, that no matter how many years you have been keeping bees and how many dead hives you inspect, there is likely to be times when you just can't tell what caused a particular hive to die. I suggest that you just take such situations in stride. After all, it's the mystery and wonder of the honey bee that helps makes the craft of beekeeping such a fascinating activity. BC

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up & running
RUSSIAN HONEY BEE BREEDERS

Bob Brachmann

The idea of a Russian Bee Breeders Association was conceived in the late1990s. Members of the USDA Agricultural Research Service Baton Rouge Bee Lab and industry cooperators foresaw the value and need for such a group. They desired an industry based organization dedicated to maintaining and improving those lines of Russian bees being selected from the wide population that was being imported and monitored by the USDA. I am pleased to report that the Russian Honey Bee Breeders Association is up and running.

At present, we are maintaining, and selecting to improve, 18 separate lines. These lines are divided into three separate blocks. Those blocks are designated as blocks A, B, and C. We beekeepers are also divided into those three blocks. Each member within a block is currently responsible for annually reproducing populations of two lines from his block, monitoring varroa and tracheal mite populations, monitoring honey production and then selecting the best queens from those colonies. Though other characteristics or traits exhibited in a colony may eliminate it from consideration, our focus will remain on those three traits, with *Varroa* resistance given top priority.

The following example describes a member's duties more fully. Beekeeper 'Ivan' is in block A. His breeding responsibilities are focused on two lines within that block, lines A1 and A2. He establishes drone source colonies in an isolated mating yard with queens that he receives from each block B and block C queen breeder. This mating yard therefore is stocked with drone source colonies from all 12 of the B and C block lines.

He grafts from selected breeders from block A line 1 and from block A line 2. The cells from these grafts are placed into mating nucs in the

isolated mating yard. Once these queens are successfully mated they are marked and clipped. These nucs are then used to set up several yards of 15 or more colonies, the colonies in each of these yards all representing queens from just one of Ivan's two lines.

These colonies may be monitored for one season or they may be monitored for a longer period. Each year Ivan will select from the best of his two lines and raise extra daughters from them. Several of these daughter queens are shipped to every other member of the association. Those received by Block B and Block C members mother some of the colonies in their own 'selection' mating yards.

Ivan's 'teammates' in Block A don't use them in their 'selection' mating yards but simply maintain and observe them, using them for production. This provides redundancy and resilience within the organization and allows the teammates to contribute to the evaluation of all the lines within their block. Such evaluations must be made by Ivan and his Block A teammates every third year for the purpose of choosing which line from within their block is performing best and these will be used by all association members the following year to produce production queens for sale to the beekeeping community.

Though customers don't have the variety of stock needed to do any meaningful breeding of Russian bees, they are assured that they will not receive queens from the same block in consecutive years. This minimizes the possibility of inbreeding within their operations. If Ivan's efforts are multiplied by 16, the current number of members of our association, you can see that there is considerable selection pressure annually to improve the lines of Russian bees.

Our breeding plan is organized with the idea of making inbreeding inconsequential. Noteworthy also are the redundancy and resilience imbedded within the organization; every member has some stock from every line.

Our organization is led by President Manley Bigalk, Vice President Hubert Tubbs, and Secretary and Treasurer Charles Harper. For the past decade they all have worked alongside the staff at the USDA bee lab in Baton Rouge to help ensure the highest degree of genetic integrity in the Russian Honey Bee Program.

In order to maintain those standards we have established standards and qualifications. We've determined that in order for an operation to produce Russian stock both with genetic integrity and in sufficient numbers it's necessary that each member must operate a minimum of two hundred colonies. Additionally, the entire outfit must be made up of Russian stock or be moving rapidly toward that goal.

It is also required that mating yards, especially those that produce 'selection' queens, are isolated, and that they have well stocked drone source colonies of the appropriate lineage and in sufficient numbers. (We've set a ratio of one good drone

source colony for 20 mating nucs. So, for example, with 24 well stocked drone source colonies representing two colonies from each of the 12 appropriate lines one could set out 480 mating nucs.)

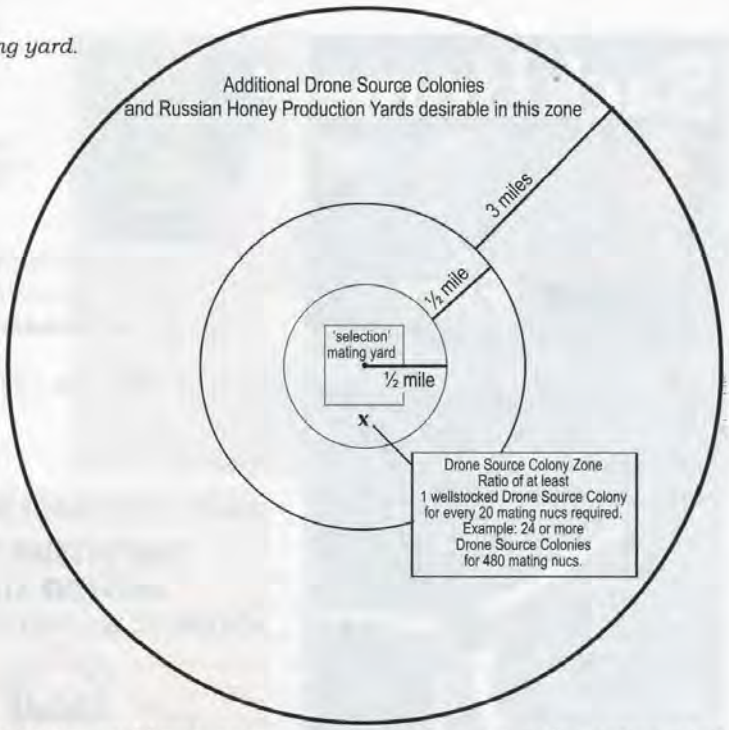
Satisfactory compliance with the above requirements is verified by site inspections by a member of our Board of Directors. (Baton Rouge bee lab personnel have performed some of these inspections for us.)

The Baton Rouge bee lab has developed molecular genetic markers which distinguish Russian honey bees from non-Russian honey bees. Regular testing of the currently propagated lines with this technique will be necessary to maintain genetic stock integrity and to ensure that the bees being sold as "Russian" are indeed representative of the stock. This testing will also confirm that apiaries designated for breeding purposes are indeed isolated and are not overlapping with those of other non Russian stocks."

Our members "will be required to submit 30 worker bees from each of their designated lines on a yearly basis for stock certification" (from the *Russian Honey Bee Breeders Association Manual*). Samples may be taken during site inspections or at other times for the same purpose. In order for a member of our association to be designated a 'certified' Russian Bee Breeder their site inspection must be satisfactory to our six member board of directors, their stock must be tested and found to be genetically pure, and they must be contributing acceptable stock back to the program. To date only our three officers have contributed stock back to the program. With last years efforts more of our members are prepared to contribute in 2009. Some don't yet have all the necessary assets in place but are working towards that end.

The businesses of our members vary. We operate in the South and in the far North, in Atlantic as well as in Pacific states. Some of us produce honey for bulk sales and a few are producer packers. Some of us derive the bulk of our income by providing pollination services. Some of us sell bees and queens. All of us contribute to our organization because we value, and desire to improve on, the various fine qualities exhibited by Russian bees; they help our businesses to succeed.

Ivan's mating yard.



There are many problems confronting our industry. We are proud of our contribution to the list of solutions.

Members – President Manley Bigalk, Vice President Hubert Tubbs, Secretary and Treasurer Charles Harper, Bob Brachmann, Jimmy Brooks, Louis Busby, Crystal Card, Steven Coy, David Ferguson, Bobby Frierson, Nick Nickels, Dwight Porter, Kenny Reed, Ray Revis, Ted Swenson, Carl Webb.

For lots more information visit our web page at www.Russian-Breeder.org, where you can also find out about each member and contact information. BC

Bob Brachmann is a Charter Member of the Russian honey Bee Breeder's Association. He is very active in the Association, and is an active contributor to the EAS conference in Ellicottville, NY this August. Come and meet Bob, Dr. Tom Rinderer, Carl Webb and Charlie Harper this Summer.

The Benefits Of SPRING Requeening

Reduce Swarms And Reinvigorate Your Colony

Swarm cells on the bottom bar of a frame.

Alphonse Avitabile

During the passage from Winter to the Spring, honey bee colonies in northern climates struggle to maintain their wellness. Shortly after the Winter solstice, queens resume egg laying on a very limited basis. Summer and Fall stores of honey and pollen are slowly being depleted and colony numbers are in decline.

As happens the resident queens in any given colony may be less than a year old come January first. This condition results when a new queen replaced an existing queen that departed the previous year with a swarm, or has replaced an old queen by way of supersedure, or by the substitution of a young queen in place of the old one at the hands of a beekeeper. This happens when the beekeeper removes and replaces the old queens with young queens or queen cells; or, after the removal of the old queens, the colonies are left to rear their own replacements. Under any of these conditions, the colony's queen is less than a year old. Otherwise, come January 1, the colony queens are one, two, or three years of age but rarely older. Studies have shown that hives with older queens are more likely to swarm or supersede their queens than colonies with younger ones.

Research over the last 50 plus years (has it really been that long?) has demonstrated that the levels of the queen's pheromones decline as she ages. Pheromones act as chemical messengers, and are both detected and distributed by members of her colony. These distribution messengers have the effect of monitoring the queen's presence and status with reference to her pheromone production. When the production, output or balance of these pheromones decline as a result of aging or injury, the colony recognizes this condition; whereas, when there is a rapid buildup of colony members, the distribution system is unable to provide the expanding colony with the pheromone levels necessary to indicate the queen's actual circumstance.

A typical supercedure cell. (Morse photo)

As a consequence of either the actual true pheromone output or the perceived one, two different outcomes can be set in motion: namely, the queen is replaced either by swarming or supersedure. In the former case, the colony proceeds to replace its queen when worker bees construct queen cell cups, if they are not already present. These cell cups are usually located near the bottom edges of the brood frames. Once the queen deposits eggs in these cups, they are referred to as queen cells (swarm cells). In a matter of days these cells are sealed and almost always the colony will cast a swarm.

On the other hand, in supersedure situations bees usually modify worker cells already containing larvae into queen cells. These cells are fewer in number than swarm cells and are located near the middle of brood combs.

With the advent of queen cells in swarm preparation, the queen's egg production rate slowly but steadily declines because she is fed less and less, she loses weight and size, and foraging activity decreases. When the swarm is cast, one third to one half of the adult population departs. Colonies that swarm often cast afterswarms, which are accompanied by virgin queens; this further reduces the adult population of colonies. The virgin queen that emerges in the colony that swarmed needs time to mature and undertake one or several mating flights before egg laying can begin. Over the two-week or so period, from emergence to the commencement of egg output, there is no brood production. Over a period of 24 days, therefore, commencing with the reduced laying by the old queen, along with the decline in foraging, the departure of a portion of the colony with the swarm and the hiatus created until the new queen begins laying, the mother colony is weakened and unlikely to gather any surplus honey.

A somewhat similar scenario takes place in the colony that supersedes its queen. She will likely have diminished pheromone output and reduced egg-laying capacity due to injury, disease or simply old age. The time lapse for her replacement (14 days) to begin egg laying, however, remains identical for any young queen that has replaced a swarm or a superseded queen.

Even though swarming is more intense in northern latitudes, it seems that Spring requeening has not been sufficiently promoted as an approach to elimination and/or reducing swarming. The alternative to Spring requeening is to either let nature take its course, put into practice methods of swarm prevention, or, when queen cells (swarm cells) are well underway, employ swarm control practices. These practices are time consuming and may not necessarily provide the outcome intended, which is to keep the colony from swarming. (I've intentionally left out Summer or Fall requeening, to be studied later.)

Compounding the problem created by swarming and supersedure on a colony's population is the infestation of a variety of diseases and parasites in honey bee colonies, in particular the *Varroa* mite (*Varroa destructor*). These mites debilitate bee colonies to the point where, in most cases, unable to cope, they decline and die off. To rescue mite infested colonies, beekeepers have had to resort to a variety of approaches to reduce mite populations.

One approach is to insert into hives, after the honey has been removed in the Fall and again in the Spring before the next honeyflow, miticide strips containing chemical compounds such a Fluvalinate, Coumaphos, and Thymol.

These miticides are effective in knocking down mite populations but not without adverse side effects. Studies by several researchers have shown that these miticides cause a reduction in sperm production and its viability in drones. Sperm with weakened viability, when transferred to the queen's spermatheca, may undergo further debilitation because of the queen's exposure to miticides. It has also been observed that queens reared in environments that expose them to miticides have high mortality rates and are superseded prematurely.

The option to requeen annually can play an important role in the hive's condition and population. It provides an opportunity to introduce different genetic dynamics to the colony. Young queens are likely to out-produce older ones, thereby increasing the hive's population.

As we now know, the virgin queens mate in flight with drones that gather themselves in areas known as Drone Congregation Areas (DCAs). There queens mate with many, many drones averaging between 15 and 20.

Recent research has confirmed that queens inseminated by several genetically different drones produce colonies that outperform those headed by queens inseminated by a single drone; therefore, the greater the diversity of the DCAs, the greater the likelihood that both full-sister and half-sister worker bees in colonies will possess sufficient genetic diversity to enable them to cope with the specialized needs and challenges facing the colony.

Along with the more favorable option of annual Spring requeening, it would be prudent not to obtain all queens from the same breeder, in order to achieve greater diversity at DCAs. An individual with 10 colonies would do well to purchase queens from five different producers (two from each producer) who have not subjected their queen rearing yards to miticide treatments (that may be a difficult order to fill). In fact, beekeepers should urge their neighboring beekeepers to do the same, as well as members of their local organization. Local bee dealers should also be encouraged to obtain queens for resale from different breeders.

The advantages of requeening in the Spring after miticide treatment are many: It will be easier to locate and remove the old queen (bee population is at a low point); new queens have not been subjected to miticide treatment (assuming you are routinely replacing old combs that may have absorbed those chemicals); swarming and supersedure should be eliminated or reduced. With the absence of swarming and supersedure along with the presence of young queens, the population should increase rapidly, positioning the colony to take full advantage of any honey flows. An added bonus to acquiring queens from different breeders is that DCAs in the area will have a greater genetic mix of drones later in the season which will provide virgin queens with a powerful genetic cocktail.

Finally, comes the question of what should be done with the older queens that were removed during the requeening process? If some still remain productive, place them in three or five frame nucleus boxes, with the appropriate number of frames containing brood, honey, pollen and clinging bees. These nucs can stand alone or, if low Spring temperatures slow their development, place them on top of existing colonies above double screens with their own entrances. As the nucs increase in population, they can be used to make increases or to make two queen colonies. BC

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Al Avitabile is a beekeeper and co-author of The Beekeepers Handbook.

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SWARM SEASON

Ann Harman

Hooray! You made it through your first year of beekeeping. It was exciting, frightening, exhilarating, worrisome, entertaining and intimidating. But now you are beginning your second year, confident that you and your bees are coping nicely with the nectar and pollen plants, the weather, and those pesky *Varroa*.

It's March and in much of the temperate parts of the U.S. early pollen and nectar plants are blooming and, when the weather cooperates, bees are taking advantage of them. The queen, last year's arrival with your package or nuc, has been increasing your worker bee numbers. Her progress is just what your books and your bee class instructors said would happen.

In your enthusiasm you have overlooked the roller coaster ride your colony is on. What goes up – in this case, your colony strength – must come down. Swarms happen and your colony strength will go down. Generally your honey crop goes down also.

Over many years, queen and bee producers have decreased the swarming tendency, but not eliminated it. Swarmy bees still exist. You may be lucky in having bees with lower swarming tendencies. But swarming is ingrained in the bee herself so swarming is a natural occurrence.

Books have been written about swarming. Countless methods of preventing swarming have been tried and described. Scientists have studied the biological aspects and the bee's plans towards swarming. But it remains the biggest battle between beekeeper and the bees.

The natural progression of life in a bee colony can be summarized in a few words: winter survival by clustering and eating honey; Spring population buildup followed by swarming; Summer spent in increasing colony bee numbers enough to survive the Winter; Autumn storage of food for Winter survival. Beekeepers have to be aware of the sequence of events in a colony.

Drones, you remember what drones look like, don't you. Well, they have a lot to do with swarming, so now's a good time to refresh your ID skills.

You may have observed various events in the colony's life during your first year. Queen cups are made, torn down and made again. Drones appear but vanish as Autumn approaches. You finally were able to see eggs and very young larvae. You learned the difference in appearance of sealed brood and sealed honey. This year you will have to notice some other events.

In the books you have read and in the beekeeping classes you have attended you may have noticed the long list of reasons why bees swarm. Beekeepers, themselves, usually sum up the reasons by saying "colony congestion," just too many bees in the hive.

You, as a second-year beekeeper, are about to find out what "too many bees" means. Your colony, during its first year was able to build up a sufficient number of bees for Winter survival. You were able to observe and cope with that just fine. When you open your hive this Spring you may be in for a shock. The bees seem to be overflowing the hive. As you take off the covers all you see are bees covering every inch and pouring down the outside of the hive body. How will you ever find out what is going on in there? How can you discover those signs of swarming when all you see are countless numbers of bees?

Let's see. You have a choice. Close up the hive and let them do whatever they want – which will be swarm. But you've promised all your relatives and friends honey from your first harvest. You already bought the uncapping knife and a case of honey jars. It's time to find out what you can do to have that honey harvest.

Determining food supplies, honey and pollen, in a colony is easy. Estimating the size of a colony throughout the year is a bit more difficult but becomes easier with experience. Determining if and when a particular colony will swarm is just plain difficult. Don't ever bet on it!

Bees actually start swarming plans very early in Winter. However, noticing those plans at that time is impossible. So you should assume that your colony will probably swarm. But there is really nothing that you can do in the middle of the cold temperatures, snow and rain of January and February.

At this point you need to review your knowledge of your local nectar and pollen plants, their locations and their blooming. Don't neglect the weather – sun, rainfall, warmth, cold and high winds all affect the plants and the ability of the bees to forage. A good nectar flow and supply of pollen is essential for increasing colony strength. But the bees need good foraging weather. Rain and high winds will keep foragers at home. Ideal conditions – plants and weather – will really get the colony on its way to swarming.

We do know that as a queen ages, her pheromone

production decreases. Your queen, now just one year old, is a young queen and is probably still producing sufficient quantities of her pheromones to circulate through the colony. However, you cannot be certain of that. If, for a number of reasons, the pheromones are declining, that is a perfectly good reason for swarming. You cannot detect her pheromone production but the bees can. So there is no point trying to sniff for her pheromones. Wouldn't it be nice if we could detect those odors?

Those pheromones have to be passed around the colony in order to be effective, reassuring the workers that the queen is present, vigorous and hard at work. But with the huge population – your estimate is a gazillion bees – can those pheromones be passed around the colony? You've been to a big party in too-small-a-room. Remember when you tried to make you way through the crowd to talk to a friend? You were bumped and jostled and finally reached your friend – but your little plate with a deviled egg didn't make it. Although your queen's pheromones are adequate, many bees did not get her message. So we see that a big population of bees can be a signal for swarming. But there may be another earlier signal you can look for, perhaps one that does not require encountering the gazillion bees.

You certainly can look for queen cups. Do you remember what you learned during your first year about those? You will want to look along the bottom bars of the frames. You can inspect each frame or you may have to tip up the hive body so you can see all the bottom bars at once. Watch out – that hive body is probably heavy and definitely full of bees. Bees everywhere. In order to find any cups you will have to gently ask the bees to move away. Careful – they may not want to. And if you did have the courage to look, now can you get that hive body, or even those frames, back in place without squishing many, many bees? You may have made it through your first year with one sting, but you will make up for that during your second Spring.

Suppose you did see some queen cups. Was there anything in them? Anything whitish like Royal Jelly? Oh oh, if so, that cup is being used to make a new queen. Now you can call it a queen cell. Swarming is well on its way to reality. Perhaps you have missed an earlier clue.

At this point you have no idea whether the queen has sufficient pheromones. You know you have a gazillion bees in your hive. Your guess now is that the queen pheromones are not being passed around to reassure the bees that their queen is present. So the bees are going to raise some queens. But you really do not want to plow through those gazillion bees to look for queen cups or cells. Don't worry, you will gain the experience you need during this year

Let's stop and think for a minute. In order for your colony to swarm a new queen will have to be produced. And that new queen will have to be mated in order to produce the worker bees the colony (and you) need. So that means drones must be available. Since the drones from your colony are not the chosen ones, somewhere in your vicinity drones will be produced and available. Bees are not going to start producing queens until drones are available.

Now you have the clue you need. It is one that many experienced beekeepers use as the first visible sign that swarming season has arrived. You want to look for drones. During your first year you learned to recognize drones, even if you had trouble finding the queen.

Drones will be visible at the entrance, particularly on a nice warm Spring day. That's a nice place to watch. You don't have to plow through your gazillion bees, although you can if you wish.

Start watching as early in the Spring as you can. The minute you spot your first drone you can then begin swarm prevention. But that is a topic for another day, another class, another session with a mentor. BC

Ann Harman is chasing drones this season all over Virginia.

HERBAL REMEDIES

Anise Hyssop, Apples & Borage

Abbas Edun

ANISE HYSSOP

Agastache anethiodorum, being a member of the *Lamiaceae* family, is also known as Anise Mint and Liquorice Mint. It is native to North America and the flowers bloom for about a month or two from the middle of Summer, being replaced by nutlets that are oval-shaped and smooth.

The plant is more resistant to drought than many other members of the Mint family.

Its preference is for full sun or very light shade, in a sandy, well-drained loam or clay-loam. It requires lots of moisture and is usually found in open woods, along streams and the shores of lakes, and in wet ditches.

Anise Hyssop has attracted a good deal attention as a nectariferous herb; it is a perennial, easy to propagate and grow, and the flowering period is usually more than 80 days. Some of the earliest settlers in North America reported fine crops of fragrant honey of a light color made from the nectar of its flowers. The honey possesses in some degree the same minty aromatic fragrance as the foliage, and it is slow to granulate. It ranks high as a bee plant in the U.S. – Frank Pellett's book called it the "wonder honey plant." It is estimated that two and a half acres of anise hyssop are sufficient forage for 250 hives of bees. If you want to attract bees to your garden, this is one of the best plants to grow.

The plant has been used for centuries to relieve bronchial and respiratory disorders, such as bronchitis, catarrh of the upper respiratory tract, colds and influenza[1]; it has also been used for infections of the throat, and may, because of its anti-viral activity, be useful for cold sores of the Herpes simplex virus.

Anise hyssop is excellent for easing diarrhea and angina and for treating gastro-intestinal congestion. A poultice of its leaves and stems can be employed to treat bruises, burns, infections, and wounds. A cold infusion of the leaves is used for the purpose of dealing with pains in the chest, e.g., when the lungs are sore from too much coughing.

The major constituent of the essential oil of anise hyssop plants grown in Bangalore, India, was methyl chavicol. This is a biogenic oxygenated aromatic compound that is abundant within and above Blodgett Forest, a ponderosa pine forest in the Sierra Nevada Mountains of California. Its empirical formula is $C_{10}H_{12}O$.

APPLE

The cultivated apple, *Malus domestica Borkh.*, is a part of the *Pomoideae* subfamily of the *Rosaceae*, along with pear and quince. Apples are one of most widely planted fruit trees and grow mainly in the temperate areas of the world. They are best adapted to areas in which the average temperature approaches or reaches freezing during at least two months.

The blossoms are small, profuse, and borne in corymbs with five petals. Some of them are as white as pear blossoms, others have stripes or tints of rose, and a few species bloom with bright red flowers. Apple blossoms have a delicate flavor and aroma; they last for a short time before falling are the epitome of ephemeral beauty.

Apples are self-incompatible; in order for a blossom to develop into an apple, the pollen that is produced by one flower must be transferred to another one. Apples benefit from the interplanting of, and cross-pollination between, two different kinds of trees. It is therefore advisable to plant them in groups of two or more varieties which flower at about the same time. Pollinating insects, mostly honey bees, are essential for transferring pollen between compatible varieties. A tree may produce some fruit without cross-pollination, but it will yield a lot more if there are insect visitors.

Although common pollinators such as native bees, butterflies and birds contribute to pollination, honey bees are more efficient because of the large numbers in a colony. They will forage within a two-mile range of their location. During the flowering season, apple growers usually enter into contractual agreements with commercial operators for pollination services. The latter are migratory beekeepers that move their colonies from one locality to another during the year to take advantage of two or more nectar flows.

The fruit is a firm, fleshy one derived from the receptacle of the flower. It matures in autumn, and is usually about two to three inches in diameter. In the center of the fruit there are five carpels, each of which contains one to three seeds.

Apple blossoms are an important source of honey during the spring; it is light amber in color and is said to be one of the most exquisite and rarest natural sweeteners available. This lovely variety, with its mild fruity flavor, offers all the goodness of an apple.

Research indicates that apples may reduce the risk of cancer of the prostate and lungs. Their fiber content reduces cholesterol and helps to regulate bowel movements and may therefore reduce the risk of colon cancer. There is evidence that apples possess phenolic phytochemicals

such as quercetin, epicatechin, and proanthocyanidin[2], compounds which may demonstrate antioxidant activity and protect us from cancer.

BORAGE

Borago officinalis L., also known as Common Bugloss, Cool Tankard, Ox's Tongue (*Langue de Boeuf*), Starflower and Tailwort, is a hardy annual plant originating in Aleppo, Syria. It is now naturalized throughout the Mediterranean region, and is also grown in Asia Minor, most parts of Europe, North Africa, and North and South America.

From its shallow, creeping root, a hollow stem grows, sometimes as high as three feet (100 cm.). It is hollow, succulent, multi-branched and covered with coarse white hairs.

Borage is also called Bee Bread, a name suggestive of its great affinity for attracting honey bees. Its prolific flowers are highly attractive to them, providing both pollen and nectar in prodigious amounts. The latter is light in color and produces an easy flowing honey with a very subtle flavor. Borage is one of the most reliable plants for beekeepers, often flowering lavishly about two months after sowing and continuing until the first serious frost.

If eaten in large quantities, the flowers and leaves can have a fairly strong diuretic action, encouraging the removal of fluid from body tissue and its excretion via the kidneys. The leaves have a stronger action than the flowers.

Because the plant is rich in minerals, especially potassium, those who specialize in botanical medicine use the flowers and leaves for the regulation of metabolism and to treat hormonal imbalances. There is an increasing need for remedies that will aid the adrenal glands with the stress to which they are exposed, both externally and internally. Borage is one such remedy. It acts as a restorative agent on the adrenal cortex; this means that it will revive and renew the glands after the administration of cortisone or steroids in a medical procedure.

The cooling and soothing mucilaginous substances in the plant account for many of its medicinal uses. The leaves have a fairly strong diuretic action, encouraging the removal of fluid from body tissue and its excretion via the kidneys.

Borage has been known to cool the body, increase perspiration and lower fever, especially during convalescence. It is considered to be an excellent demulcent and anti-inflammatory, soothing to all mucous membranes, including those of the respiratory system. It reduces the discomfort of a sore throat, hacking cough, bronchitis, and bronchial infections, for example, pleurisy and tuberculosis.

The oil derived from the seeds of Borage is one of the richest sources of gamma-linolenic acid or GLA, the omega-6 fatty acid that our body uses to make an inflammation fighting, auto-immune-prostaglandin. It helps to relieve inflammatory conditions such as rheumatism, arthritis, seborrheic dermatitis, psoriasis and eczema and restores smoothness to aging skin. However, because of its price and an oily residue which remains after it is used, it is usually diluted with other carrier oils.

As a mild sedative, Borage is said to be useful for nervous conditions. The herb has also, for a long time, been thought to have anti-depressant effects, reducing melancholy and raising the spirits. It has the reputation of being able to stimulate the flow of milk in nursing mothers and is considered to be a good remedy for premenstrual syndrome.

As the leaves of the plant contain potentially liver toxic and carcinogenic pyrrolizidine alkaloids, care must be taken when they are used internally. A rinse made from borage extract has been used for irritation of the eyes, skin, and mouth. BC

Abbas Edun has been keeping bees in Ontario, Canada since 1979.

[1]The main active ingredient of the plant is marrubiin, a bitter expectorant which is said to stimulate secretion of the bronchial mucous membrane. Marrubiin, being related to taxol, an anti-cancer diterpene, is a member of that family of plant exudates. Research indicates that marrubiin has other interesting biological effects including antiviral and antibiotic action; it may be used for fevers, as it promotes sweating.

[2]These three compounds are flavonoids, a class of secondary metabolites in plants which are largely responsible for the colors of many fruits, flowers, and vegetables.

MAPLES AS NECTAR AND POLLEN PLANTS

Maples are especially attractive to honey bees.

Connie Krochmal

Of the Spring flowering trees, the maples are especially attractive to bees. In some areas of the country, these can begin blooming when snow is still on the ground. Depending on the species, the male and female blossoms can occur separately either on the same or different trees. With five small petals, maple blooms are less than an inch in length. Appearing as pendant umbels or panicles, these provide bees with nectar and pollen. In some cases, maples also provide honeydew.

Twenty or so maples are native to the U.S. In addition, a number of the others are used as landscape plants. The hardiness, growth rate, and preferred growing conditions can vary somewhat from one maple species to another.

Maples have opposite leaves. The Fall color can be spectacular. Mostly lobed, maple leaves can vary widely in size and shape from one kind to another. The edges can be toothed. When ripe, the winged fruits are quite showy.

Though there are some exceptions, most maples grow best in a moist, rich, well drained soil. Most thrive in an acid to neutral pH. Generally, they do well in full sun. A few require partial shade.

For best results prune maple trees from late Fall through mid-Winter. Maples are propagated by seed, grafting, and budding.

Sometimes, maples are attacked by aphids, caterpillars, and scale insects. However, these aren't usually serious. Some diseases can also pose problems. Fungal leaf spots and tar spot occur on the foliage. Maples are also affected by root rot and verticillium wilt.

Maple trees vary tremendously in size. For small gardens, choose Amur, hedge, or paperbark maples. The red and Norway maples are medium sized. Silver and sugar maples are among the largest. Space-saving cultivars of maples are available for small gardens.

Typically, maple honey is white, amber, or light amber. However, it sometimes is slightly pink or green.

Maple honey tends to granulate very slowly. This can be either fine or coarse. With a distinctive flavor, this honey improves with age.

Assuming that it doesn't rain during the blooming period, maple trees can yield a lot of nectar. They can provide a surplus of honey, around 50 pounds or so per colony.

Maple pollen can vary in color from one species to another. This can be yellow, brown, dark greenish-brown, or greenish-yellow.

Of the maples, the following are recommended for bee gardens.

Amur maple (*Acer ginnala*)

Typically, this reaches about 15 to 20 feet in height. Yet, it can grow to 30 feet under good conditions. The spread is equal to the height. Amur maple is a multi-stemmed, bushy plant with a rounded crown. The toothed foliage has three lobes. The yellowish-white blooms open in April and May.

Very hardy, Amur maple thrives in zones three through seven. This tolerates any pH level and soil type. It grows well in light shade and full sun. This species is pest-free. It is native to Manchuria, China, and Japan.

Bigleaf maple (*Acer macrophyllum*)

This goes by various other names, including Oregon maple, California maple, water maple, and white maple.

A vigorous tree, it can reach 90 feet in height with a matching spread. The leaves, which are up to a foot in length, have five deep lobes. The yellowish-green blossoms open in May.

Native from Alaska to California, this is recommended for zones five through nine. It isn't suitable for the eastern U.S. This is considered an excellent nectar source.

Box elder (*Acer negundo*)

This is also known as ash-leaved maple and Manitoba maple. Reaching 30 to 50 feet tall, it can have an equal spread.

A fast growing tree, box elder tends to be short lived. It has a wide spreading, upright growth habit. The leaves are compound with three to nine leaflets. The yellowish-green blooms open in March and April.

It is suitable for zones two through eight. Native to the eastern and central U.S., box elder often self sows. This needs full sun. Adaptable to any pH level, this tolerates wet and dry soils.

Hedge maple (*Acer campestre*)

Usually 25 to 35 feet tall with an equal spread, this slow growing tree has a rounded, dense growth habit. Smaller cultivars are available. The leaves have three to five deep lobes. The green blossoms open in May.

As the name indicates, this is often used for screens and hedges. Hedge maple will withstand shearing. It is recommended for zones five through eight. It can take full sun or light shade. Hedge maple is extremely adaptable, tolerating air pollution, soil compaction, and dry soil. It is suitable for any pH level. This was native to Europe.

Hornbeam maple (*Acer carpinifolium*)

This bushy, vase shaped tree with upright branches is

usually 20 to 30 feet tall. It is less than 20 feet wide. The green blooms occur in May. This has tapered, toothed, unlobed foliage, which resembles that of the hornbeam. The foliage turns yellow in the Fall.

This tree is recommended for zones four through eight. Requiring partial shade, hornbeam maple is native to mountainous regions of Japan.

Japanese maple (*Acer palmatum*)

Reaching 15 to 25 feet tall, this has a matching spread. Japanese maple tends to have a rounded growth habit. The palmately lobed foliage has five to eleven lobes, which can be deep or shallow. The leaves are very finely divided. The purple-red blooms appear in May and June.

The species is suited to zones six through nine. However, some cultivars are hardy to zone five. Native to China, Korea, and Japan, this prefers partial shade. The young foliage can dry out in full sun. In order to thrive, Japanese maple must have a good soil.

Mountain maple (*Acer spicatum)*

Also known as swamp maple and water maple, this small tree reaches 10 to 30 feet tall. Around 15 feet wide, it has upright shoots. Mountain maple is almost shrublike. The three-lobed leaves are toothed. The showy white blooms open in June.

Mountain maple does best in zones two through seven. It is native to colder areas of the eastern U.S. This tree is somewhat particular, requiring moist, acid, cool conditions. It needs partial shade.

Norway maple (*Acer platanoides*)

Though it can sometimes grow to 80 feet tall, it is usually 40 to 50 feet or so. Its spread can be 25 to 50 feet. It is a vigorous, densely branched, rounded tree. Leaves have three to five lobes, and are very pointed. Yellow or yellowish-green blooms emerge in April.

This is suitable for zones three through seven. Norway maple tolerates most soil types and pH levels. An adaptable species, it withstands pollution, ozone, and hot, dry conditions. Native to Europe, it does well in partial shade and full sun.

Paperbark maple (*Acer griseum*)

Growing 20 to 30 feet tall, it can be 10 to 20 feet wide. A slow growing tree, it has an oval to rounded growth habit. Paperbark maple is named for its ornamental, peeling, paper-like bark. This has slender, arching branches. The leaves have three, toothed, palmately arranged leaflets. The yellow blooms appear in long clusters.

This is recommended for zones four through eight. Native to China, paperbark maple is suited to partial shade and full sun. It will tolerate any pH. This tree will even grow in clay.

Planetree maple (*Acer pseudoplatanus*)

Also known as sycamore maple, this typically reaches 40 to 60 feet in height. Under good growing conditions, it can be 90 feet tall. It has a spread of 25 to 60 feet. Planetree maple is fast growing with a rounded growth habit. Its leaves have five lobes. The yellowish-green flowers bloom in May.

Suitable for zones four through seven, this is native to Europe and Asia. Planetree maple needs full sun or light shade. It adapts to a range of pH levels and soil types. This tolerates salt spray.

Red maple (*Acer rubrum*)

Also called scarlet maple and swamp maple, this is native to the eastern and central U.S. It is usually 40 to 70 feet in height. However, it has been known to reach 100 feet under ideal conditions. Its spread can be slightly smaller or equal to the height. This round headed tree has an open crown.

Blooms are usually red. In some cases, they're yellow. These are present from late March into April.

This is suited to zones three through nine. Red maple tolerates most soil types. This does well in wet soils. Preferring slightly acid conditions, it can take partial shade and full sun. This withstands ozone. Because this tree tends to be weak wooded, limbs break easily in heavy storms.

In its native range, this is considered to be an important native nectar tree.

Silver maple (*Acer saccharinum*)

This is also called soft maple, river maple, and white maple. Though it usually grows 50 to 70 feet tall, it has reached 120 feet under good growing conditions. This has a spread of 15 to 50 feet. Silver maple has wide spreading, arching branches. This fast growing tree has leaves with five lobes. The yellowish to reddish-orange blooms open in mid-March.

Very easy to grow, this is suitable for zones three through nine. Though it will tolerate any soil, silver maple prefers a slightly acidic pH. Adapted to full sun and partial shade, this is rather weak wooded. The limbs can break during wind and ice storms. The shallow roots can damage paved areas. It is native from Quebec to Florida and Minnesota to Oklahoma.

Striped maple (*Acer pensylvanicum*)

This is also known as moosewood and whistlewood. Usually growing 15 to 20 feet, striped maple has been known to reach 30 feet or so. The spread is 15 feet or more. This tree has a broad, upright shape. The yellow blooms emerge in May. Named for the green and white stripes on the bark, this has leaves with three lobes.

It thrives in zones three through seven. Native to the eastern U.S., this can be hard to transplant. It requires a moist, well drained soil in partial shade. Striped maple prefers a slightly acidic pH.

Sugar maple (*Acer saccharum*)

Also known as rock maple and hard maple, this is native to the eastern U.S. It usually grows from 60 to 100 feet tall. With a spread of 25 to 40 feet, this slow growing tree is long lived. It has an oval, rounded shape. The leaves have three to five lobes. The greenish-yellow blooms open in April.

Recommended for zones three through eight, sugar maple tolerates full sun or partial shade. It is adapted to most any pH. Sugar maple won't withstand pollution or salt.

Tatarian maple (*Acer tataricum*)

Though it can reach 30 feet under good growing conditions, Tatar-

ian maple is usually only 15 to 20 feet tall. It can have an equal spread. This is rounded to wide spreading.

The leaves are usually unlobed. The greenish-white blooms occur in May. Tatarian maple is suited to zones three to six. Native to Europe and Asia, this has no serious pest or disease problems. It can tolerate poor growing conditions and drought.

Trident maple (*Acer buergeranum*)

Trident maple is also known as three-toothed maple. An excellent small tree, this can reach 20 to 30 feet tall with a matching spread. It has a spreading, rounded crown. This tree is noted for its attractive, flaking, multicolored bark. The leaves have three shallow lobes. The greenish-yellow flowers bloom in May.

This does best in zones five through nine. Native to Japan, Korea, and China, this tree tolerates partial shade and full sun.

Vine maple (*Acer circinatum*)

This small bushy tree reaches 15 to 25 feet tall with a spread of about 20 feet. With branches that can resemble vines, the vine maple has a twisted growth habit. The rounded leaves are deeply lobed. This has showy white and purple blooms that open in late April.

Native to the Pacific Northwest, this thrives in zones six through nine. Vine maple needs partial shade. It is considered an important nectar source in the area. BC

Connie Krochmal is an award winning garden writer and a beekeeper in Black Mountain, South Carolina.

Display Advertisers

Apiholics Anonymous

"Hi, my names Dick, I'm an apiholic." "Hi Dick," murmured through the room. I felt glad that I decided to come. I was only short time away from believing that self-help groups may be all right for some, but not for me. I spent weeks and months denying I had a problem. The trembling of my hands broke through my denial. The only thing that calmed them seemed to be a catalog. Not just any catalog, but a Bee catalog. They must be making the paper thinner because it didn't used to wear out so easy. If the folks at Dadant read this (and why wouldn't they) please send me another catalog. Put two in the package, it will save postage.

I'm not here because I need to be. After all, I was in control all Summer. I was in the beeyard every day with even partial sun but I was sleeping at night. Of course there was that one night I had the feeling there was a bear around and went to check the hives. OK twice.

I started to worry a little when I found myself repainting some equipment that I had just painted. "What, you never did that?" I suppose you never painted daisies on them either! Anyone knows the more paint, the better.

My family worries too much. They think I've invested too much in my hobby. Actually, they think I've invested way too much. But they complained just as much when I started making my own equipment. Of course that meant a new saw, router and an account at the lumber yard. Someday I'll have all the tools I need. I'm sure of it. The Apiholics Anonymous call this cross-addiction.

I was fine when we took the honey off. Extraction kept me busy for awhile. Bottling occupied me, as long as I could check the colonies often. The nausea started when I put them to bed for the Winter. I lovingly fixed upper entrances, insulation and wrapping. The wrapping hurt. How could I take a hive apart on a nice day, if I needed to? It got bad when we had all that rain and I couldn't get to the field. Sleepless nights became common and it wasn't just because I was up until 3:00 a.m. in the Bee chat groups. Then came the nightmares, with images of dead bees moving like zombies.

In retrospect the cellar full of frames was a cry for help. I couldn't seem to stop making them. Besides shipping was free in Dec. One had to buy $50 worth of stuff to get it though. Don't *they* know how to put temptation in your path? By the time I hung up the phone they needed a semi to deliver what I'd ordered. Is it legal to have sales as well as free shipping at the same *time*? There oughtta be a law.

OK, I admit it. I'm an apiholic. It started when I bought my first hive. It was supposed to be a partnership deal. When I ordered the material I ordered enough for two hives. When I prepared the site I made enough bases for four. In a sort of magical way there were eight hives sitting in my field by Summer. And it never really stopped. I'm afraid for next year.

My partner wisely abandoned ship while I was still in the early stages.

If I can save some newbee from going down my path, I'd like to help. I'd be willing to sponsor someone to Apiholics Anonymous. We know all the tricks. Better yet don't start. One gets hooked easily and the way back is hard. Be warned. Don't buy that first hive. Better not to hang out with so called beekeepers. Choose better friends. Don't waste your life and endanger your family. Don't end up like me.

I sit now in front of the computer watching it for new mail to come from the internet bee sites. I belong to several.

Purple Loosestrife

There's a fairly large swamp near my beeyard; I never pass it without slowing down for a look. What I look for is a purple flower; Loosestrife. It came, it saw the fertile places and it conquered. Having made its way from Eurasia it felt emboldened to claim any damp spot as its' own. Like other invaders it gave no quarter.

Native species which had happily provided sustenance to local birds and other creatures were crowded out. Even some fish were evicted as the ever-increasing snarl of roots made impassible the shallows where spawning normally took place.

As a sort of peace offering they were pretty to the eye. The swamps and ponds had a variety of life forms but most of them didn't bloom. I thought they improved the look of things, though to drive along some NY highways and see mile after mile of this new flower would give anyone pause. It gave me pause. But the bees liked them. They yielded a dark, slightly greenish honey; they bloomed for a long time; they filled in when nothing else was blooming.

Small wonder I became sentinel of the swamp. Where is my Loosestrife? Bad enough the farmer didn't plant buckwheat this year but "et tu Loosestrife?" The bees hadn't really become dependent on it but I can't believe they didn't miss it.

In Asia, where Purple-L comes from, there are creatures that make a fine living off this plant. *Galerucella calmariensis*, is a beetle that is so specialized that like the koala bear, it lives on one plant. (Koala's eat only Eucalyptus). The beetle has been thoroughly tested beginning in the 1980s. It apparently doesn't jump species. I certainly hope not. They have been propagated and released in the environment. My little swamp was apparently no exception. There was no purple in it last year and the red foliage that signals Fall has long gone.

I have a sentimental reaction to the ending of anything. I'm going to miss Purple-L. I know myself. I'll keep checking the swamp. I know the bees will too.

The geeks among you can google "Purple Loosestrife, CT" for more.

Dick Marron

Marron's Meanderings