Bee Culture

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Bee Culture

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JANUARY 2003 VOLUME 131 NUMBER 1

FEATURES

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Winter hives in Northeast Ohio.

photo by Kim Flottum
hives by Buzz Riopelle
setting by Mother Nature

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MAILBOX

Mystery Solved

As a third year beekeeper, I read with interest Dr. James Tew's article on "Disappearing Disease" in the November issue.

I, too, was visited by "Disappearing Disease" this Autumn. It came in the night, had black fur with white stripes, and set out to depopulate my colonies one at a time leaving not a bee on the hive entrance, yet leaving full stores of honey. After trapping and removing the critter, I quickly experienced "Disappeared Disease." Mystery solved!

Dan Imhoff
Andover, MN

Monitoring GMOs

The recent appearance of corn that had been genetically modified for bio-pharmaceutical use in a field of Nebraska soybeans meant for human consumption demonstrates how susceptible our food crops are to unintended cross-contamination. The fact that USDA inspectors discovered the cross-contamination less than 24 hours before what could have been a repeat of a Starlink-like episode, altered corn in food products, should give us pause.

Many have suggested that these genetically modified crops should be banished from food producing states altogether. The reality, though, is that farmers and farm-belt states can benefit economically from this new type of crop. Additionally, as more biotech products are developed and people come to rely on them more, it may be impossible not to grow these altered crops in food states because of growing demand.

Technology may hold the key to dealing with this challenge. Currently, space-based and airborne remote sensing technologies, like those used by NASA and NOAA to track El Nino, have the potential to identify outbreaks and monitor the spread of genetically modified crops while they are still in the fields. These technologies could do this by seeing the "spectral signature," or the way various crops absorb light. While much work still needs to be done, the technology has the potential to help safeguard the quality of our food supply as genetically modified crops become more and more commonplace.

Over the next few years, commercial companies will be launching satellites and providing data to farmers, NASA and other government agencies with even greater capability to detect crop characteristics than those currently operated by the space agency. More sophisticated remote sensing data, as well as ancillary information such as weather factors and geography, will help us identify crops more accurately. Working with the biotechnology industry, we may even be able to develop "markers" for genetically modified crops that will allow satellites to see the modified crops more easily and to stop cross-contamination early.

A partnership between the biotech, food and remote sensing industries with the USDA and FDA may be one way to approach this challenge. If we do not adopt some sort of comprehensive monitoring, we will be playing Russian roulette with our food supply.

Dennis Dunivan
Denver, CO

Ed Weiss & 200 More

I have been reading *Gleanings/Bee Culture* since the 70s. During the 80s I was living in Milford, CT and keeping bees in South Jersey – near Atlantic City. I was getting supplies from Ed Weiss and found both Ed and Anita to be some of the most gracious people I have met – inside or outside beekeeping. Congratulations on reaching 200 and best of luck for 200 more.

Robert Spalding
Melbourne, FL

Brave or Fool Hearted

I am a second year beekeeper and keep bees as part of an urban farm education and nutrition program in Detroit, Michigan. I have a few hives in the city with most about 33 miles north of Detroit in Washington, MI.

I am loving beekeeping as a hobby, as an educational tool and a source for spiritual growth and reflection. It's great! I've been stung here and there over the past two years without any problem until this past September when I had a systemic reaction to a bee sting (hives and blood pressure drop). Being stubborn, I continued my work and just went back to the friary. I was fine in four hours. I did go to an allergist for a venom check for allergies and found that I am now allergic to honey bee, wasps and hornets. Depressing, very depressing!

I've decided, if I can afford it, to go ahead with desensitizing therapy. The doctor said that I should be in pretty good shape by Spring and then begin maintained level treatment for the next five years. Am I crazy to continue? Is this a noble cause?

I would really like to talk to those brave hearted or fool hearted beekeepers (if there are any alive and still keeping bees!) that are in my kind of situation or have gone through this process.

Br. Rick Samyn, OFM Capuchin
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313.579.2100, ext. 211

Duplicate Meeting?

It is of interest to note your announcement of the January conventions "Awesome Meetings." The agendas appear to be quite

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good. BUT, they are not awesome because there are two of them. "Insane" is too flip a description of the virtual duplication, but the environment is clearly "counter productive."

I was at the Minneapolis ABF meeting when controversies caused the 'walk out' and the formation of the AHP (96). Glenn Gibson, over coffee, begged me to persuade the ABF "powers that be" to reduce the influence of the Sioux Honey Association. Actually, Mr. Robert Banker was elected president, and was probably the least militant Co-op member one could find. Thus the AHP. It is true, of course, that the Co-op thrust continues to cause misunderstandings, as "return on invested capital" is not, as such, a co-op objective. So be it. But it would seem that the differences between AHP and ABF are now less pronounced.

Surely a reconcilement is possible. It cedrtainly should be accomplished:

Maybe 'both sides' should give up their name (suggest *American Apiary Association* – triple A).

Clearly having two meetings dilutes the reporting of research. The AHP has been the better in the process of corrdinating meetings and research presentation, but the separate meetings has minimized the benefits.

The duplication of meetings (and it is quite close to duplication), hampers the ability to have the presence of outside resources (**YES – EVEN PACKERS**)

Of course, the biggest drawback with two institutions is the diluting of pursuing public policy matters. And, almost worse, it fosters the struggle to "claim credit." All efforts, no matter how trivial the issue should be free of this 'downer. That would be avoided by the existence of just one NATIONAL organization.

There are other benefits depending on the agenda.

It is long since time to pursue reconcilement and singleness of purpose. The leaders need to get busy and get after it – and engage such outside individuals who can enhance the process.

John W. Straub
Winnetka, IL

Give Russians A Chance

First of all I would like to thank Tom Rinderer and his team At the Baton Rouge Bee Lab! I think the research they have done is outstanding and that much progress has been made with solving the problem with some of the honey bees most troublesome pest. The *Varroa* mite is a most worth adversary for our team of researchers. But the plan put together at the Baton Rouge Lab is working. The work with the Russians was not supposed to be a quick fix or completed over night. Beekeepers need to study the plan and follow the plan of action to conquer or control *Varroa*. We were told that the research would be a project that would take some years! How soon we forget and we always want a quick fix without paying our dues.

Our choice is to work the plan set forth in published materials given to us when the project first was announced. Our other choice is to keep buying those Italians every spring, using chemicals and using so called integrated pest management tools and gimmicks that most of the time just don't work and are just Band-Aids that are very expensive. But if you have plenty of money and love to visit the bee supply store we can continue on the road we have been traveling.

I am very disappointed in some of the so-called scientists and bee experts who continue to write articles and make statements without having full knowledge of the Russian project. Before writing articles that state Russians are mean I think they should check with several beekeepers that have Russians. And also make sure the hives being studied are Russians. Not several generations removed. I keep seeing queen suppliers advertising Russians that truly are misleading people! The Russians have not been in the field long enough to have much or any truly pure Russian stock! Let's try to be truthful and realistic. Some of this so-called Russian stock is a discredit to the work the Bee Lab is doing! Lets make sure what we are selling is what we say it is or not say it at all!

We have purchased Russian breeder queens in successive years and the Russians are performing. I am not silly enough to say the work is finished or that we do not have to continue bringing new stock into our breeding program every year. We plan to continue the project as the Bee Lab team has prescribed.

I am a beekeeper first of all not a scientist or genetics expert as most beekeepers are not. I see what works in the bee yard! And I think this is the goal of the Russian project!

Contrary to what some of the experts have published, the Russians are not as mean as I have heard the Africanized bees are. I go into the breeder queens with bear hands to remove newly hatched larva and I constantly remove frames of brood to make splits and nucs. Maybe some people should practice their bee handling skills!

Another advantage of the

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Russian line is they tend to survive on very limited stores. They are very efficient! Cluster size seems to be smaller in the winter but when spring comes they build very rapidly and catch up with those Italian colonies in size. They will swarm if the colony is not managed. So make those splits as early as possible.

And to the real reason we keep bees! The Russians are great honey producers! I have seen no drop off in honey production with the Russians. If the flow is there the Russians will do their job. If the flow is not there they are very frugal. With the drought conditions in the southeast and other areas this year the Russians are even a better bee to weather tough times.

So don't let the rumor mill influence your opinion on the Russians. Give them a chance! The Baton Rouge Bee Lab is continuing the good work so let's support them and add value to their research and a better honeybee will be the end result!

Ray Revis
Revis Russian Apiaries
Marion, NC

New Book From France

L'élevage des reines *(Breeding Queens).* Gilles Fert.
O.P.I.D.A. ISBN 2-90581-12-0, 4th Edition, 104 pages, $20.00. Postpaid.

Queen Rearing in France

Monsieur Gilles Fert, a successful queen breeder in the Pyrenees region of France, first published his book on queen rearing in 1988. Now in its fourth edition, this text appears to be the fundamental work on this subject in the French language. A decent English translation is also available from the author.

Monsieur Fert's skill in breeding queens should not be altogether surprising given that his large commercial queen breeding operation includes production of a triple hybrid, wherein Italian queens are artificially inseminated with Caucasian drone sperm, and then the mating the hybrid daughter queens occurs naturally with drones from the indigenous black bees. In addition to his book, Fert sells queens and queen cells directly from his Internet web page, and accepts VISA in payment.

This text contains many interesting citations from bee literature as well as observations of the author about the production of quality queens. For example, one such insight is that by keeping the breeder queen in a small colony, where she will lay fewer eggs per day, the queen may produce eggs of larger individual size, allegedly giving larger and better quality larvae for grafting. Another such observation is that in a mating yard with similar-sized nucleus colonies, once the first new laying queen is located, the other new queens will often be found in approximately the same location in the combs of the other colonies a majority of the time. Fert also suggests looking first on the sunny side of the nucleus to find that newly mated queen.

The text discusses the European geographic races of bees in great detail, and how they may be crossed for hybrid vigor. As Monsieur Fert resides in a locale with a native bee, *Apis mellifera mellifera* (native black bee), and in a continent where most of the other major races are naturally occurring, he would have to possess some first hand insights about bee races. The breeding principles are clearly influenced by the writing of Brother Adam, based on selection within these races of bees and then cross-

ing the races to get the most productive colonies, aiming to gain the greatest benefit from combining the highly selected lines.

Monsieur Fert is clearly a practitioner of Doolittle's grafting system. Fert's book pictures the use of a very fine grafting brush, in addition to metal and plastic transfer tools, to move the tiniest larvae from the natural cell to the queen cup. Understandably, the Doolittle grafting process is certainly the way to go for a commercial producer of large numbers of queens.

The text gives only brief outline to alternative queen rearing methods, including Miller's production of natural queen cells from eggs and larvae laid by the breeder queen along the edges of newly drawn foundation strips and Alley's use of a sliced strip of comb then downward-positioned for cell production with eggs and larvae previously laid naturally by the breeder queen. The Miller and Alley methods differ significantly from the Doolittle grafting system in that the bees produce queens from non-transferred larvae. The text also summarizes larval transfer with a plastic, tubular cutter, transferring the newly-hatched larva with a small piece of the beeswax cell base into a queen cup. More development of hobby-oriented procedures by Monsieur Fert would further improve this otherwise excellent book.

The text also contains detailed instructions on how to produce fertile queens through artificial insemination and how to produce package bees in season. The author praises the Italian honeybee for package production due to its early and strong brood production.

To Get the Book

Monsieur Fert's Internet address is: <www.apiculture.com/fert/fert_fr.htm>. He is also listed along with a host of other international contributors and vendors at the Apiservices web site, at: <www apiculture com/index_fr.htm>.

As noted, the book can be ordered very easily by credit card. The purchase is billed without complicated exchange rates, at $20.00 in American funds. I suggest you repeat your American address in the remarks portion of the order form, as French addresses are not composed quite the same way as ours, and the form seems to lose the American street name and number somewhere in translation.

Demandez ***L'élevage des reines****, s'il vous plâit. Voici un livre trés intéressant et pratique!*

Steve Burt
Roseville, Michigan

INNER COVER

Greed. Sloth. Anger. Lust. Envy. Pride. Gluttony. There they are, seven sure fire ways to reserve a private suite in Hades. Extreme central heat and ghastly neighbors guaranteed. Air conditioning, running water and favorite pets not included.

Not improved since first penned way back when, a growing number of serious thinkers are urging believers to consider the addition of a, though not new, equally heinous offence to the list above increasing the capitol, if you will.

What crime compares to those seven deadly deeds above? Let me expand.

By Thanksgiving this year snow had come twice, and stayed. That's twice more than all of last year. And though wet last Fall, it stayed warm until past New Year. This year October was too cold to enjoy, mostly. There were days though. Days with sun and warm breezes. Days with Goldenrod still blooming and Fall flowers in the yard and on the deck in full glory. Those days were like all of Fall last year. It was easy to think it will be again. I was lulled. I was fooled. I dallied with what needed to be done with the bees, with the garden, and the garage, with everything outside.

So bee work didn't get finished. (I didn't even get mouseguards on!) Plants barely got moved inside before too-early frosts. And, the new felony in question reared up when the last task began. Imagine for a moment a 75-foot, three-quarter inch hose loosely laid around the periphery of the deck. Imagine it frozen, solid. Try and imagine getting it downstairs, into the basement.

My vote is yes for the newest deadly sin procrastination, that felonious thief of time.

•

I was at the Texas State Beekeepers meeting in November and happened to meet Jason Schickendanz and Nathan Van Noord, who work for AgriLogic, a company that studies risk management in agriculture. In beekeeping, like all of agriculture, risk is an everyday experience. But managing it on an organized level is something we haven't had much experience with, yet. Mostly, beekeepers that depend on the income made from their bees are going to be interested in what Jason and Nathan do. But no matter the size of your operation, seeing how risk is managed, and how much it will cost, will be instructive. Here's what they had to say.

Prior to the 2000 Farm Bill, the USDA was responsible for the research and development to lay the ground work for crop insurance. Simply put, they studied the crop in question, the producers, the amount of risk involved in crop loss (due to weather primarily, but to other factors as well), the variance in production over time and what caused the changes. Then, they made recommendations to others on how to set up a crop insurance program for the crop in question, and the probable cost of such a program. After the new farm bill came to be, the responsibility for this research was farmed out, so to speak, to independent companies like AgriLogic. They now do the work and make the recommendations. They contract with the government to do this, so there is an incentive to be accurate, fair and fast. For some reason the previous parties lacked some of those attributes.

So the powers that be now feel that risk management is something beekeepers should be interested in. Actually, risk management is a way the government wants to use to get around dealing with subsidies, with disaster payments and loans. All the bad things that can happen to a producer get put under one umbrella, and depending on how it's worked by that producer, some or all of them are covered, at least to some degree. Income (yes, getting paid less than you thought you should can be covered), loss of crop due to weather, accidents and the rest can all be covered and are being studied for this program.

To start this process, AgriLogic is meeting with producers to find out what risks are actually involved with keeping bees. That should keep them busy for awhile. They will be studying our craft in six areas, California, Texas, Florida, New York, South Dakota and Hawaii. These states, and those surrounding them cover pretty much our industry...honey production, pollination and queen and package production. They will be having these meetings this spring. Using what they find, they will retire to the back office and put together a program that they think will work for both producers and insurers. Then, this summer they go back to the producers to see if they got it right. They'll fine tune the wording and all that, but more importantly, they'll be asking if they got the numbers right (are yield numbers realistic, are revenue guesstimates in the right ball park and the like). More specifically, they will be asking producers "Would you buy this?"

If the direction seems positive they will proceed. About a year from now they will be able to go to the government and to insurers and say, "Yes, this program is feasible and we should proceed" Or not. If yes, then in about two years the underwriting, the actual sales by companies, pricing, training and the rest will begin.

This may be the best way I've seen to separate the big operations from the small operations. It seems obvious doesn't it? That guy is big, that one isn't.

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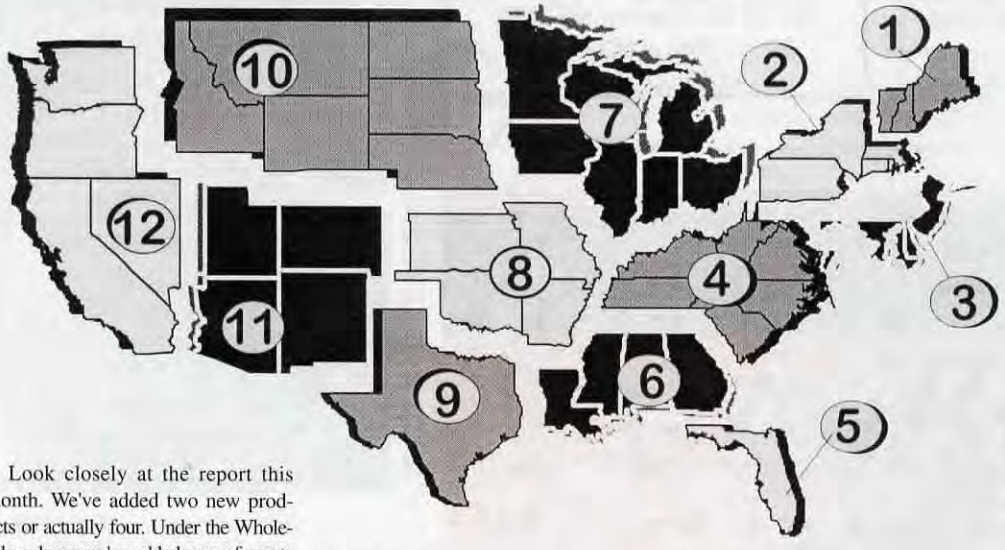
Procrastination; Risk; and Land Use Troubles

JANUARY – REGIONAL HONEY PRICE REPORT



Look closely at the report this month. We've added two new products or actually four. Under the Wholesale column we've added case of quarts and pints, and the same at the retail level. Since we haven't had these before there are no past prices to compare to.

Region 1

Pails down a bit since last month. Wholesale is up a bit and retail is steady.

Region 2

Pails way up since last time, wholesale rising fast and retail right behind.

Region 3

Pails have dropped since last month, as has all of wholesale. Retail is beginning to rise though.

Region 4

Pails up since last month, but the rest of wholesale down. Retail picking up.

Region 5

Pail prices have increased some since last month, but other wholesale prices are down. Retail steady.

Region 6

Pail and wholesale prices steady since December, but retail up a bit since then.

Region 7

Prices for 60# pails way up this month, wholesale prices decreasing though, and retail showing a strong advance.

Region 8

Pail prices way up but wholesale case only up a small amount. Retail actually down since last month.

Region 9

Pail prices climbing, but wholesale only steady. Retail, though shows a big bounce up.

Region 10

As high as they are, pail prices are down, wholesale steady, but retail climbing fast.

Region 11

Steady is the word for pails, and the same for the rest of wholesale, but retail tending down some.

Region 12

Pails down, and both wholesale and retail only steady since last month.

	Reporting Regions												Summary		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last	Last
Extracted honey sold bulk to Packers or Processors													**Range**	**Avg.**	**Month**	**Yr.**
Wholesale Bulk																
55 gal. Light	0.98	1.50	1.23	0.65	1.23	1.60	1.46	1.23	1.23	1.53	0.91	1.25	0.65-1.60	1.23		0.69
55 gal. Amber	0.96	0.95	1.12	0.96	1.12	1.40	1.37	1.12	1.00	1.44	1.16	1.00	0.95-1.44	1.13		0.61
60# Light (retail)	82.00	99.18	75.00	80.00	97.31	80.88	105.33	100.25	113.33	88.33	101.00	82.50	75.00-113.33	92.09	90.88	72.14
60# Amber (retail)	74.56	89.21	70.00	76.75	81.80	79.38	94.60	87.50	82.50	83.75	96.00	60.00	60.00-96.00	81.34	89.06	68.02
Wholesale Case Lots																
1/2# 24's	35.46	33.85	34.13	33.07	34.13	25.50	30.14	34.13	34.13	31.38	25.00	35.90	25.00-35.90	32.23	38.86	30.68
1# 24's	47.66	48.82	48.00	43.87	50.11	48.00	49.78	50.00	55.67	59.43	56.33	56.30	43.87-59.43	51.16	51.35	44.58
2# 12's	46.26	51.19	47.00	43.50	51.69	38.00	45.47	46.20	51.00	58.92	47.00	48.00	38.00-58.92	47.85	43.63	45.07
12 oz. Plas. 24's	42.43	42.78	24.00	36.13	44.43	44.00	39.38	42.90	50.00	47.44	50.50	40.93	24.00-50.50	42.08	41.14	36.00
5# 6's	49.42	42.81	57.00	43.10	49.66	48.50	50.00	42.00	78.00	51.57	22.00	61.50	22.00-78.00	49.63	52.80	43.32
Quarts 12's (**NEW**)	65.29	80.40	69.00	53.73	65.29	62.75	64.29	66.90	68.75	68.52	72.80	66.24	53.73-80.40	67.00		
Pints 12's (**NEW**)	39.49	42.98	39.49	33.00	39.49	40.50	29.42	40.53	42.39	44.72	48.00	39.00	29.42-48.00	39.92		
Retail Honey Prices																
1/2#	2.09	2.20	2.50	2.20	2.50	3.05	1.98	2.15	2.50	2.22	3.01	2.30	1.98-3.05	2.39	2.19	1.87
12 oz. Plastic	2.65	2.85	2.95	2.36	3.00	3.16	2.71	2.66	2.54	2.90	3.05	2.41	2.36-3.16	2.77	2.73	2.25
1 lb. Glass	3.54	3.24	3.10	3.02	3.00	3.65	3.29	3.12	3.08	3.98	4.18	3.40	3.00-4.18	3.38	3.15	2.83
2 lb. Glass	5.46	5.01	4.75	5.90	5.23	5.49	5.35	4.86	5.79	5.38	5.06	5.80	4.75-5.90	5.34	5.16	4.45
Pint (**NEW**)	5.92	5.00	5.92	4.05	5.92	5.50	4.17	3.98	4.35	6.13	5.23	5.00	3.98-6.13	5.10		
Quart (**NEW**)	7.25	7.63	10.76	6.33	10.76	9.03	8.27	7.21	7.33	10.00	6.42	8.23	6.33-10.76	8.27		
5 lb. Glass	12.13	9.85	12.50	11.45	10.00	10.50	11.65	10.99	12.40	13.61	10.77	13.99	9.85-13.99	11.65	11.85	9.79
1# Cream	3.84	4.27	4.82	3.93	4.82	3.73	3.49	3.44	5.00	4.38	5.13	3.46	3.44-5.13	4.19	4.11	3.22
1# Comb	4.88	3.94	3.95	4.60	4.75	4.00	4.86	3.75	5.00	4.50	7.00	5.25	3.75-7.00	4.71	4.98	4.46
Ross Round	3.45	4.09	3.60	4.15	3.51	3.75	4.25	3.41	5.00	5.00	4.88	3.50	3.41-5.00	4.05	4.29	3.88
Wax (Light)	2.56	3.88	2.25	1.93	3.03	2.53	1.99	3.00	3.25	3.03	1.93	3.27	1.93-3.88	2.72	1.51	2.29
Wax (Dark)	2.56	15.80	2.08	1.60	19.94	2.38	1.78	3.00	2.33	19.94	1.75	2.00	1.60-19.94	6.26	1.78	1.99
Poll. Fee/Col.	46.00	40.67	37.50	35.33	25.00	41.00	40.86	40.00	20.00	41.68	50.00	41.67	20.00-50.00	38.31	37.99	38.43

INNER ... Cont. From Pg. 10

Pretty black and white. But is 10,000 pounds of honey a year big? To me it's huge, but to some in the industry, it's what they spill on the truck bed on the way home, so it's not a big deal. What crop insurance does, and this is crop insurance, is make available to those who depend on bees (weather selling queens, pollinating almonds or making honey), a way to guarantee that no matter what, they will be in business next season.

Don't kid yourself. There will be premiums to pay for this service. Hence the word *risk*. How much are you willing to bet that next year will be good? And, how much good is good enough? Is getting at least 50% of your normal income enough? 60%? 90%?. And at what price?

There won't be thousands standing in line for this I'm sure. Maybe not even hundreds. And the cost may be just too prohibitive for all but the biggest and the richest. But it will be interesting to see what these folks at AgriLogic come up with. How much are we worth, really?

•

Farm land is disappearing. You knew that because every day you see things that weren't there before. New malls, new roads, new houses, new stores, new, new, new. And all sitting on what was once a corn field. Or a soybean field. Or cotton. Or citrus. Or apples. That Wal-Mart isn't a volunteer weed in the middle of a field. It's an intentionally-placed multi-acre slab of blacktop covering fertile soil. And the honey plants that once grew there.

I wanted to know how much land was disappearing. So I checked in with those who know in Ohio. Between 1992 and 1997, Ohio has lost, are you ready for this, 114 acres of farm land a day, 365 days a year. That comes to just over 40,000 acres a year. No other state except Texas has lost as much, as fast. Other numbers – during those same years, the U.S. lost six million acres of farmland, which comes to two acres a minute, everyday; since 1994 10+ acre housing lots have accounted for 55% of the land developed; during this time, the U.S population grew by only 17%, but urban land use increased 47%.

The watchdog group who found all this, and worries about it even more than I, The American Farmland Trust, conducted a survey of the threats to farm land. The Kellogg Foundation, New York Community Trust, USDA and others sponsored the cost for the study. They looked at the quality of land, and specifically the threat of development to that land all across the country.

Interestingly, but not surprisingly, they found that the best farmland, almost always, is close to urban areas. That makes sense because originally small towns grew up in areas near lots of farmers. Small communities supported farm kids with schools, for the families there were churches, shopping, supplies, opportunity for social encounters, as well as places to sell what was grown, banks for financial stability, and other support businesses. I grew up in a town just like that.

But it's not that way any more. Smaller farms sell to larger farms and fewer farmers live outside of town. There just isn't that much 'farm life' out there anymore for communities to support. So instead they support businesses like manufacturing, the service industry (can someone explain what that means, really), and other non-farm income generators. They have to, to stay alive. But even so, many of these small communities have folded and gone away.

Nevertheless, many haven't, and have in fact grown to support larger and newer businesses within their confines. Others, like Medina here in Ohio, have grown not because of local business, but have become distant, but commutable bedroom communities that support a finer lifestyle than either Cleveland or Akron can afford for those who work in those nearby cities.

In any event, these towns and cities are growing, and, as they continue to grow, the land they consume can only be farm land, and much of it is still productive. Farmland Trust found that, when looking at urban-influenced farmland, a big chunk of what we eat was growing on it. In fact, 86% of our fruit, 86% of our vegetables, 63% of the dairy, 39% or our meat and 35% or our grain lies directly in the path of imminent urban development (for more information – www.farmland.org).

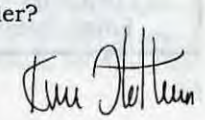
As a result of this sprawl, others besides farmers are becoming concerned, or perhaps more concerned is a better description. But not being farmers, they look at lost land a bit differently than you and I. These groups are interested in future land use, for sure, but as open space, green space, parks and recreational areas. Preserved for humanity's use, rather than saved for food production. Some are working to save the farms from future development by buying the land now, and keeping the farm going until the farmer or land-owner retires or gives up the land.

Farm land preservation is a good thing, no matter what the ultimate use, but from a beekeeper's perspective, once land is no longer farmed its potential for use as a beeyard, or as a honey crop is diminished. Certainly a park will provide more forage for a nearby hobby beekeeper than a Big-Box-Store parking lot. And it's a lot more attractive. Additionally, any past problems with pesticide applications will probably be history, which is certainly good news.

But with the staggering loss of six million acres in five years (that study was finished in 1997 and the rate has not decreased significantly since then, so you can safely double those numbers if you wish) the continued, and accelerated loss of beeyard locations and forage will take its toll.

We did a survey of our own awhile back, counting beekeepers. We found, during the same time this land use study was conducted, that there was a reduction in the number of beekeepers of just about 30%. True, like the farmers, the big operations got bigger during that time. But they constitute a very small percentage of the number of people who keep bees. No, the greatest loss occurred among the rank and file hobby beekeepers. It is those beekeepers who generally live right in town or in the suburbs, or on the edge of towns and cities and commute to their bees that seem to be most affected by this land grab. And most of them live in the east, or at least east of the big river. Not surprisingly, much of the land in question is east of the Mississippi. Less land? Yes. Fewer beekeepers? Yes.

Is it any wonder?



RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"A fishy story . . . and some other tidbits."

This issue marks the beginning of my second year writing "Research Reviewed" and I'd like to take a portion of this month's column to discuss a common thread found in research papers from scientific journals. That is the use of controlled experiments to test hypotheses. In plain language – it means that researchers have to set-up experiments in ways that allow them (and others) to determine that the effects they measure are due to a given treatment rather than some unknown factor. This is perhaps more easily explained by an example. Imagine a bee meeting where an excellent beekeeper stands up and reports that in the Fall he dipped shop towels in fish oil, placed them in all 2000 of his colonies and found very low levels of *Varroa* mites in his colonies the following Spring. He argues forcefully that fish oil is a great thing and he will forever use it for *Varroa* control. What is wrong with the beekeepers conclusion? Actually, based on the design of his "experiment", we are unable to determine whether the Spring mite levels were low due to the fish oil treatment or any of a number of other factors (weather, bee or mite genetics, low initial mite populations, or an unknown component of the shop towel material itself). Why? Because there were no "controls" for the experiment, *i.e.* all the colonies received the fish oil "treatment." Therefore, there is nothing against which to measure the supposed effect. Perhaps the mite levels in those particular colonies in that particular Spring would have been low regardless of the fish oil treatment. However, if the beekeeper had treated 1000 colonies with fish oil+ shop towels and 1000 colonies with shop towels alone and then found a significant difference between the two treatments, he would be on much firmer ground to support the claim of a possible new *Varroa* treatment. Other beekeepers and researchers could then repeat the experiment to confirm the results; some researchers would begin to look for the active compounds in fish oil and at some point we would all work toward the EPA registration of fish oil.

While the details of the fish oil story are imagined – most of us have heard similar sorts of testimonials at bee association meetings and other gatherings of beekeepers. The fact is – most beekeepers are not interested in publishing scientific papers and do not feel very concerned with setting up controlled experiments. However, as readers of Bee Culture, all of us are faced with evaluating the content of written articles, letters and advertisements. Recognizing the limitations of "research" that does not explicitly describe the controls of the experimental set-up is an important skill that will improve your ability to evaluate fish oil stories. As you read this column in the future, realize also that description of the experiment set-up and the controls are mentioned to provide a basis for which you, the reader, can evaluate the conclusions of the author(s).

Speaking of *Varroa* – the following are taken from abstracts presented by bee researchers at the 49th meeting of the Association of Institutes for Bee Research in Celle, Germany in March of 2002. These are typically brief reports of ongoing research by the authors, but furnish an interesting glimpse into the topics of interest to European bee researchers.

Varroatosis-disease complex: is there any interrelation? (O. Boecking, P. Aumeier, W Ritter, D. Wittman.). The authors note that *Varroa destructor* infestations have often been associated with secondary infections. These authors report the results of two years of data collection on 75 *Varroa*-infested colonies of bees that included high (>1500 mites) and low (<170 mites) infestation levels and 8 distinct genetic strains of bees. They documented the occurrence of symptoms of secondary infections such as sacbrood, Nosema, chalkbrood, American foulbrood spores, tracheal mites, acute paralysis virus (APV) and deformed wing virus (DWV) in relation to the *Varroa* mite infestation level and genetic origin of the bees. They found no relation between *Varroa* infestation levels and sacbrood, Nosema or chalkbrood. Tracheal mites and AFB spores were not present. While the presence of deformed wings was correlated to high levels of *Varroa* mites, there was no relation between *Varroa* mite levels and DWV or APV. Their conclusion: "The presence of secondary infection of the bee colonies in these investigations was independent of the mite infestation level and genetic origin of the colonies." The answer to the question posed in the title? No.

(Note that AFB is very rare in Germany, where destruction of AFB-infected colonies by burning is the rule and no antibiotic treatments are permitted. Thus, while this experiment found no AFB spores, it did not show

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RESEARCH ... Cont. From Pg. 17

that mites could not transmit AFB. See the abstract below).

Do *Varroa destructor* mites transfer European foulbrood (*Melissococcus pluton*)? (G. Kanbar, W Engels, G. Winkelmann). The authors pointed out that *Varroa* mites that enter a brood cell bite into the larva and pupa to feed and keep the wound open for some time. They used an electron microscope to examine the mite feeding wounds on a number of hosts and reported that 15% of the sites contained a large number of bacteria. These bacteria were identified as *M. pluton*, the causative agent of European Foulbrood. Spores of this bacterium were also identified on the bodies and mouthparts of the mites and the authors concluded that they were "clearly transferred to honey bee larva...during biting and feeding." The take home message: in addition to the well-known oral means of foulbrood infection caused by nurse bees feeding larvae, *Varroa* mites constitute a second route of infection. Thus, the answer to the question posed in the title? Yes.

Mites can tire males: wind tunnel test with *Varroa destructor* parasitized drones (P. Duay, W Engels) The authors first note that in Germany one method of *Varroa* treatment is the use of drone combs to trap the mites. However, this practice results in a diminished population of drones and the remaining drones are likely to be more highly parasitized. In an experiment designed to test the effects of mite parasitism on drone flight capacity, the researchers used a wind tunnel to compare the performance of unparasitized drones to those that had been parasitized by one or two mites. The 12-day old drones were flown "until exhausted" and flight durations were compared. They reported that the parasitized drones flew less than the control (unparasitized) drone group. However, one-third of the drones parasitized by only one mite were able to fly as long as the unparasitized drones and thus might be suitable for mating. The authors caution that they did not yet determine whether the slightly parasitized drones have sufficient sperm or can orientate adequately to the drone congregation areas. BC

Reference: Association of Institutes for Bee Research Report of the 49th seminar in Celle. 2002. Apidologie 33: 459-519

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Mark Winston

On Being Wrong

"As I read their manuscript, it quickly became apparent that our predictions were wrong, way wrong."

Last month's column ended on a soaring note ("That, after all, is where the best science gets done, with its feet in the furrows and its mind soaring through the heavens"), but before I could come down from the heavens my mood of sentimental inspiration was reinforced by a manuscript my students had written and given to me for comments.

I began reading it with a sense of relief, as in "At last, they've finished the first draft after much prodding on my part," but my mood soon moved into the agitated zone. Yes, dear readers, it's true: their results didn't fit my predictions, and I was wrong.

"Agitate" is the right word, and not always a bad thing, as in "to perturbate, to stir up interest, to cause to move with sudden force." I was jarred, jiggled, and vibrated by their findings, but not downcast, because in science there is no happiness greater than good data that contradicts your expectations. Being wrong is one of the deepest pleasures that science provides for its practitioners, because it is in a rejected hypothesis that we learn the most about the world around us.

The manuscript was the end result of our two-year "Once Upon a Bee" project, which regular readers will remember as a study about bees in the city of Vancouver that was inspired by two delightful high school students, Alice Miro and Désirée Tommasi. To recap: they had heard a talk by Jim Cane from the U.S. Department of Agriculture bee laboratory in Utah about the diversity and abundance of wild bees in the city of Tucson, Arizona, and immediately realized that their calling in life was to study bees in Vancouver.

They came to me for help, and I suggested they write a grant to see if they could obtain sufficient funds to do the study properly. I didn't think I would ever see them again, but a few days later they returned with a proposal that knocked my socks off. We submitted it to a few Canadian foundations, and received about $70,000 in funding from the EJLB Foundation and Canada Trust Friends of the Environment, a pretty unusual achievement for two students who had yet to graduate high school.

They did graduate, and both have gone on to do well at university, but also have spent much of the last few years conducting the project. In addition to research, their project had an education component designed to teach the public about bees and encourage conservation of bee-friendly habitats in urban settings. Over the years they developed an extensive public presence, gave innumerable talks, presented programs at schools, passed out thousands of booklets they designed, brought a vibrant booth to environmental fairs, and developed an exhibit for our Vancouver science museum.

They also spent endless hours collecting wild bees in various habitats throughout Vancouver. They, and I, fully expected their collections would confirm our hypothesis that urban areas were dead zones for bees, polluted by backyard pesticide use, with nesting sites limited by asphalt and concrete, and deprived of sufficient forage to sustain a healthy bee population.

As I read their manuscript, it quickly became apparent that our predictions were wrong, way wrong. To our surprise and delight, wild bees are thriving in and around Vancouver, with a diversity and abundance considerably greater than had been found previously in nearby agricultural and natural areas outside of the city.

The numbers are impressive. They collected thousands of bees, representing 56 species, and at some sites collected up to one bee every minute. These results are roughly equivalent to collections from urban sites in Arizona, but even higher numbers of species were reported in a study from Berlin, Germany, where 262 bee species were collected. To put Alice and Désirée's collections in perspective, only 13 and 38 species were found in two studies outside of Vancouver, and even fewer species were collected in the Okanagan Valley of British Columbia, about a four-hour drive away.

The distribution of their collections also revealed some interesting patterns that suggest why cities can support high wild bee populations. They collected from diverse habitats, including backyard lawns and gardens, flowerbeds, rights-of-way, parks, botanical gardens, and "naturescape" habitats that grew out of a British Columbia program to encourage diverse backyard plantings of native vegetation.

The naturescape plantings hosted the most diverse and abundant bee populations, but no one habitat jumped out as statistically superior to the others. Thus, it was

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"Bee-friendly urbanites, municipalities, and landscape architects can contribute to preserving biodiversity by considering these observations when planning residential, recreational, and industrial areas."

not a particular habitat but the range of diverse habitats that led to our finding a robust wild bee population in Vancouver. The Vancouver area apparently provides abundant nectar and pollen resources throughout the spring and summer, sufficient nesting sites such as old logs, sandy soil, weedy patches, and bark-mulch substrates, and an environment that is unpolluted enough for bees to thrive.

Another unexpected aspect of their results was the strong showing of wild bees compared to honey bees. Most sites at most seasons had higher numbers of wild bees than managed honey bees, in spite of the many beekeepers in Vancouver who keep colonies tucked away in backyards and on apartment balconies.

There are no wild honey bee colonies in our area, so all the honey bees we collected would have come from managed colonies. While honey bees were predominant in late summer, when colonies reach their population maximums, our collections were mostly wild bees for the rest of the year. Unfortunately, we have no data from ten or twenty years ago about bee densities in Vancouver before *Varroa* arrived, but my best guess is that honey bees would have swamped wild bees if we had collected in pre-*Varroa* days.

These results surprised me, because like most scientists who work with bees and pollination I expected our data to support the commonly held belief that pollinators are in "crisis." However, hypothesized declines in wild bee populations remain largely undocumented, although the widespread practice of growers renting honey bee colonies for managed pollination in many crops suggests that wild pollinators in agricultural areas are insufficient to supply pollination services.

This is a far cry from crisis mode, though, and to date broad declines in pollinators have not been detected by the few studies that have focused on this important question.

Interestingly, human activities may not be exclusively detrimental to wild bees. While it's true that excessive pesticide use, nesting habitat destruction in extensive monocropped acreages, and over-asphalted urban neighborhoods might be harmful to bees, other aspects of human impact can be beneficial.

For example, logging creates sunny, well-flowered areas where bees can forage, wood fencing provides cavities where bees can nest, and the planting of nectar-rich blooms present bees with valuable shelter and food sources. Also, most bee species can thrive in fragmented habitats, since bees do not require large tracts of land or continuous bee-friendly territory as long as there are sufficient food sources reasonably close to adequate nesting sites.

It will be revealing to see if these patterns hold up after future studies in other regions, and ironic if it turns out that cities are important refugia for wild bees. We think of nature as outside of urban areas, but for bees one of their most significant habitats may become the urban jungle as we continue to expand agricultural acreages and harvest forests.

This is just one study, and I hesitate to conclude that we are or are not witnessing a pollinator crisis based on limited data. I am intrigued, though, by a result that runs counter to intuition and the word-on-the-street, both of which had influenced us to predict a lack of wild bees in Vancouver, a hypothesis that was not supported by the numbers.

There is a good lesson here for all scientists, and one that is important enough to overcome my embarrassment at being wrong. Indeed, I am thrilled to know that my home town is immersed in bees, and humbled to realize that nature still holds unexpected results and unanticipated data that are revealed when we query the world around us.

Alice and Désirée's results suggest that the heterogeneous habitats found in Vancouver can support high bee populations, particularly if there are diverse blooms spread throughout the season and assorted nesting habitats in which wild bees can build their nests. Thus, bee-friendly urbanites, municipalities, and landscape architects can contribute to preserving biodiversity by considering these observations when planning residential, recreational, and industrial areas.

And I'd bet the farm I'm not wrong about that one. BC

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Sue Cobey and Her New World Carniolans

Malcolm T Sanford

Every Thing You Wanted To Know About These Bees

There's something about *Apis mellifera carnica*, the Carniolan honey bee. This child of the Balkans, originally from Slovenia, the future site of the 2003 Apimondia Congress, holds a special place in the hearts of many beekeepers. Although a minor component of U.S. bee stock, it is the majority in other parts of the world from Egypt to Chile. It has a panopoly of characteristics that are increasingly important to beekeepers, including gentleness, less-than-average propolis collection, and little inclination to rob, the real bugaboo of its cousin, *Apis mellifera ligustica*, the Italian honey bee. It is known as the "Spring" bee for it builds population rapidly early in the active season. More importantly it closes down its brood rearing quickly when environmental conditions deteriorate, resulting in less food consumption and a potentially increased Winter survival. It is considered in many parts of the world as the best bee stock in which to find resistance or tolerance to the *Varroa* mite. Some of the first evidence of *Varroa* tolerance, in fact, came from a population of Carniolan bees in Yugoslavia described by Dr. Jovan Kulincevic, an associate of the late Dr. Walter Rothenbuhler of The Ohio State University. This bee was subsequently introduced into the U.S. and is known as the "Yugo" bee.

Carniolan behavior, therefore, is equivalent to the "holy grail" in some beekeeping circles, and the raison d'etre of the New World Carniolan® Breeding Program, run by Susan W Cobey at The Ohio State University. Sue is easily spotted in a crowd, as I recently noticed at the airport in Santiago, Chile. She is tall. This and her long blond locks stand out in Latin America, but it is her expertise and enthusiasm for bee breeding that beekeepers of that region and around the world really take notice of, and with good reason. Not only does she run one of the premier honey bee breeding programs in the U.S., but she is also the only person to my knowledge who is training others in this important arena.

Sue and I sat down in her office on the Ohio State University campus and her home in the environs of Hilliard, OH to discuss her career and aspirations. It is immediately apparent that, although greatly influenced by those at institutions of higher learning, she is not an "academic." Sue is one of those rare people who easily spans the gap between the ivory tower of higher education and down-to-earth beekeeping. Her entomological career began early, when tent caterpillars she collected escaped to terrorize kindergarten class. She switched majors at the University of Delaware to entomology. A student exchange program provided her first honey bee experience with Dr. Michael Burgett at Oregon State University, where she enjoyed working outside and actually rearing insects, instead of a focus on controlling them with pesticides.

Sue Cobey

Her training really began doing commercial beekeeping work at Wenner Apiaries, where she learned practical beekeeping management from Clarence Wenner himself, who she says was "a true naturalist." Sue's mentors in bee breeding include Dr. John Harbo, who taught her instrumental insemination, and Drs. Robert Page and Harry H. Laidlaw, who inculcated her with the philosophy of the closed population honey bee-breeding protocol that bears their name.[1] She also had ample opportunity to participate in breeding programs as a technician at the now defunct Genetic Systems, Inc. in Labelle, FL, as well as those of the University of California at Davis and the USDA Bee Breeding and Stock Center at Baton Rouge, LA.

Enter her husband, Tim

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1 R.E. Page and H.H. Laidlaw. 1985. *Closed Population Honey Bee Breeding Program.* Bee World, Vol. 66, pp. 63-72.

"The Page-Laidlaw closed population breeding program is the heart of Sue's program."

Lawrence. They first met in bee veils, as he was the head queen man at Wenner Honey farm. He continues to encourage her as she travels the world teaching queen production and instrumental insemination. Together they developed the "idealistic dream" of their own beekeeping and fruit producing business in California's Vaca Valley. However, they were victimized by unpredictable change that so often afflicts agriculture. Closure of the Canadian border in the 1980s because of discovery in the U.S. of both tracheal and *Varroa* mites meant loss of major key customers. At the same time, the Kiwi fruit market collapsed. Yet, establishing this business was an experience they both cherish. By then, Sue had developed her passion for instrumental insemination, the basis for true bee breeding, and began to do and teach this on a limited basis, identifying a "niche market" for this activity. She assisted Dr. Orley (Chip) Taylor at the University of Kansas in his efforts to understand honey bee mating behavior, and was invited several times to Mexico, as that country attempted to confront the challenges of the introduced Africanized honey bee.

Uprooting themselves out of one of California's finest valleys and moving to the U.S. heartland was difficult for both Tim and Sue. But a steady income and the opportunity to continue her breeding program at the Ohio State University was an enticing opportunity. So in 1990, Sue became the Staff Apiarist at the Walter C. Rothenbuhler Honey Bee Research Laboratory, where she coordinates research projects and also is able to continue her passion by producing New World Carniolan (NWC®) queens, as well as conducting classes in queen rearing and instrumental insemination. It seems somehow fitting that one of the best honey bee breeding programs in the U.S. is now administered from a building that bears the name of perhaps the greatest of apiculture's genetic pioneers.

Indeed, as we discussed the status of breeding programs around the world, I thought Walter Rothenbuhler would have been proud that many of the necessary links he described in his seminal paper on the topic have been put in place in the facility that bears his name.[2] In addition, he would also be happy that the University he worked at for over two decades now supports an innovative bee breeding program that is available nowhere else. And that it could be a model for a "new wave" of queen production, via true breeding, that might help the beekeeping industry recover Phoenix-like from the ashes of a potentially disastrous session on the pesticide treadmill.

Sue and I agree, while queen producers are masters of large scale queen production, the vast majority do little breeding. This is not a criticism; producers must concentrate on production as their livelihood depends on sales out the front door. The driving force in the market is price. Beekeepers have been lulled into a false sense of security that good queens should be available relatively inexpensively. Although economical queens were readily available when there was a relatively large genetic base, which also included feral honey bees, and no exotic mites, that is no longer the case. The appearance of antibiotic tolerance (Terramycin®-resistant American foulbrood) and resistance by *Varroa* to fluvalinate and coumaphos, along with appearance of a totally new organism, the small hive beetle (*Aethina tumida*), has turned U.S. apiculture on its ear. The long-range solution to these problems must come from bee genetics (breeding) and the resulting queens will not be cheap. Stock improvement is expensive and labor intensive, but the result is well worth the effort.

The results of Sue's New World Carniolan® Program are positive and encouraging. She has been able to develop bees that require no fumigillin for nosema control, no tracheal mite treatment and minimal chemical application for *Varroa*, and no antibiotic treatment for foulbrood. Sue and I agree that *Varroa* is the biggest problem facing beekeepers today. The most important task for any beekeeper in the present environment is to control this mite first. All other concerns must take a back seat.

The basis for any breeding program is stock selection. Thus, Sue and Tim, originally collected bees from across the U.S. and Canada to establish their base population in the Vaca Valley of California. This breeding stock moved to Ohio with Sue, a very different environment (comparatively) with harsh Winters. The stock has now become adapted to those specific conditions over time, and Sue continues to look for and test genetic material for potential incorporated into the program.

It is important to realize that Sue's program is based on traditional Carniolan behavior, not the vaunted *carnica* subspecies itself. This at first seems confusing, given the name. No morphometric, allozyme, cuticular hydrocarbon, nor DNA analysis is routinely performed to verify the bee she uses is indeed *Apis mellifera carnica*. Nevertheless, Sue continues to select for traditional Carniolan traits. The primary focus of selection is general performance, not specific individual traits, like hygienic behavior or SMR (suppressed mite reproduction), although these have been added to the criteria in the selection process. As she says, when describing her stock "there's no Russian, no Yugo and no SMR." Sue prefers to keep this separate, providing another alternative to beekeepers, as genetic diversity is important.

Again, it is the behavior that Carniolan honey bees are known for that is of utmost importance in the New World Carniolan® Breeding Program. These include productivity, gentleness, and specifically for a northern climate, Winter hardiness. Since traits for "mite resistance" or "tolerance" are common, but often rarely expressed or shown, they can be selected for in almost any stock, and so this has also been

2 W. C. Rothenbuhler. 1980. *Necessary Links in the Chain of Honey-Bee Stock Improvement.* American Bee Journal, Vol. 120, pp. 223-225, 304-305.

incorporated into the program. Sue feels it is important for the industry to have choices via a variety of specialty stocks, of which hers is but one. A description of several, including New World Carniolan®, is found in an article by Dr. Stu Jacobson in the November 2002 issue of *Bee Culture.*

Sue's secrets are simple. The keys are assiduously keeping records and controlling gene flow through instrumental insemination and a closed breeding population. The selected traits that are part of the New World Carniolan® Bee Breeding Program are the following:

Industry: Honey producers and pollinators. Those found susceptible to disease or mites are eliminated, as are those that dwindle in Winter, which is a final selecting criterion.

Rapid Spring Buildup: The signal trait of the Carniolan honey bee.

Gentleness: Calm, gentle and a pleasure to work with no matter the size of the population.

Overwintering: Efficient use of Winter stores and Winter clusters having a high tolerance for severe cold and that build rapidly in Spring.

Pollen Collection: Efficient pollinators that work in cool and drizzly weather.

Brood Viability: Solid brood patterns to maintain the integrity of the breeding population.

Resistance to Parasitic Mites: Undetectable levels of tracheal mites; reduced levels of *Varroa.*

Hygienic Behavior: High uncapping and removing of brood killed by freezing.

Sue looks at the above criteria at a rather gross level, overall general performance. These estimates or evaluations are something any beekeeper can do. She has and continues to give her talk on the specific details of her system at many different venues across the world. These are also available on the World Wide Web.[3] Importantly, colony evaluation is preformed annually, and each year a new generation of New World Carniolan® queens is instrumentally inseminated and evaluated in the field. The top performing colonies are selected as breeders to establish the next generation in accordance with the Page-Laidlaw Closed Population Breeding Program.[4]

"Queen Rearing, Instrumental Insemination and Bee Breeding classes are held every Summer in Columbus."

The bottom line, according to Sue, is annually producing a test population of 200 instrumentally inseminated queens. The better performers are selected and used as breeders and provided to cooperating New World Carniolan® producers, who sell open-mated daughters to the beekeeping public. This brings in income to support student labor, buy supplies and further develop the program. Clearly, it is heavily supported by the University, which in the final analysis is providing a subsidy to the beekeeping industry.

Sue realizes there is no way her program can supply the necessary quantity of stock to an industry hungry for a selected honey bee that will enable it to gracefully exit an increasing chemical dependency. Thus, she sees her future in educating a cadre of individuals who will take on the task using the tools she and others have developed. Surprisingly, her message has been heard in other countries far more than in the U.S. Thus, she has worked mostly with producers in Mexico (Enrique Estrada, Ernesto Guzman), Chile (Alberto Poch), Argentina, Australia, South Africa, Egypt, Costa Rica, Jamaica and Canada.

The cornerstone of Sue's training program continues to be the courses she has developed in queen rearing, instrumental insemination and bee breeding offered each summer at The Ohio State University. These have been well attended by an able and willing corps of students, again mostly from outside the country, presumably aided by advertisement via the World Wide Web.[5] In the future, she hopes to be able to deliver packaged courses on site that incorporate all of the pieces that now comprise her breeding program.

In conclusion, Sue Cobey's goal is to help beekeepers develop more professional and responsible beekeeping practices. As she said at the latest Eastern Apicultural Society meeting at Cornell University (August 2002), step-by-step beekeepers are emerging from the "hype" and "hyperbole" of crisis management, which has resulted in maintaining susceptible bees through chemical treatment. In the future, therefore, we must increasingly let the honey bee rely much more on its own devices through the results of conscious, committed breeding like those of the New World Carniolan® Bee Breeding Program. BC

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3 New World Carniolan Breeding Program, accessed November 12, 2002 <http://iris.biosci.ohio-state.edu/honeybee/breeding>

4 Cobey S. and T. Lawrence. 1988. *Commercial Application and Practical Use of The Page-Laidlaw Closed Population Breeding Program.* American Bee Journal, Vol. 128, Vol. 5, pp. 341-344.

5 The Ohio State University Honey Bee Breeding Program, accessed November 12, 2002 <http://iris.biosci.ohio-state.edu/honeybee/breeding>

BEES IN THE FOREST, STILL

Tom Seeley

"I believed that wild colonies of honey bees had vanished."

"There are some who can live without wild things, and some who cannot." These words, the opening line of Aldo Leopold's classic tribute to nature, *A Sand County Almanac,* were on my mind last August as I began hunting in a forest near my home for wild colonies of honey bees. I love the bee colonies that I keep in hives at the university, for they are easily worked and studied, but I am in love with the bee colonies that live wild in the woods. They choose by themselves their tree cavity homes, build as they see fit their beeswax combs, gather all their nourishment from far-flung flowers, and fight without aid every predator and disease that crosses their lives. In short, these wild colonies tap fully that wonderful array of morphological, physiological, and behavioral adaptations we call the biology of honey bees.

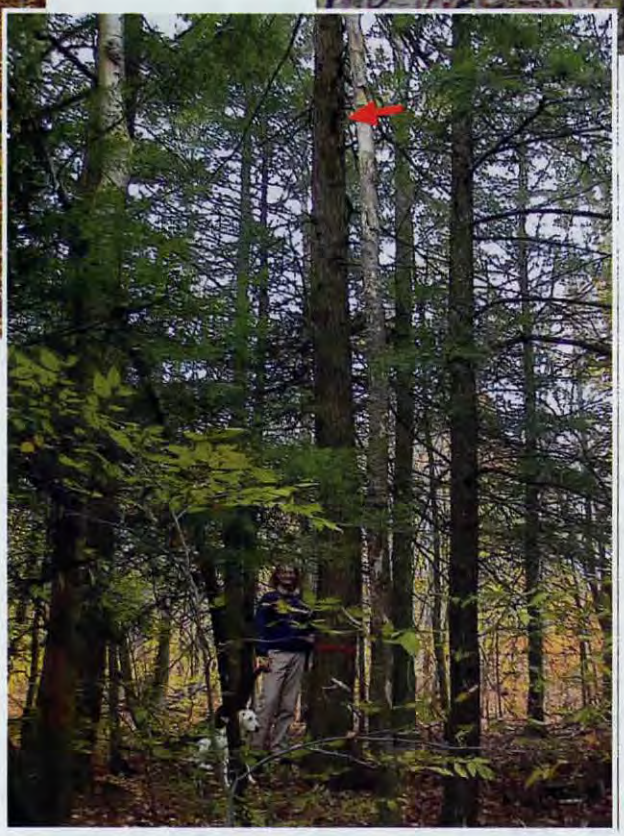
Wild colonies of honey bees have lived in the forested regions of the eastern United States for over 300 years, ever since they began to be introduced from Europe in the 1620s. Until the mid 1990s they surely outnumbered the managed colonies of beekeepers in this part of the world. Sadly, the number of wild colonies in the eastern forests has fallen in recent years, due to a bit of human carelessness: the introduction of the parasitic mite of honey bees, *Varroa destructor.* This mite is native to Asia, where it parasitizes, but rarely kills, colonies of the asian hive bee, *Apis cerana.* Now that it has been spread beyond Asia, this mite also parasitizes colonies of our familiar honey bee, *Apis mellifera.* Most colonies of our bees lack potent defenses against *Varroa,* so unless a human intervenes on the bees' behalf, an infestation by this mite usually dooms a colony to an early death.

The wooden beebox and stand that I use in bee hunting. The beebox has a hinged front door and a sliding middle door that separates front and rear compartments. At the back of the rear compartment is a window (not visible) that admits light for luring captured bees from front to rear compartment. The cover of the window slides up and down, like the middle door. The stand is painted bright yellow to make it conspicuous to the bees. The small toolbox on the ground contains the other items used in bee hunting: bottle of sugar water, paint set, bottle of anise extract, compass, notebook, and pens. (Seeley photo)

I have no doubt that over the past decade, in the woods around my home, the number of wild colonies has declined. One sign of this appears each spring when the dandelion flowers erupt in every field and lawn: I see few honey bees on these otherwise cheery blossoms. Another sign comes shortly thereafter, during the swarming season: I receive just one or two telephone calls announcing a swarm free for the taking. It used to be that I'd tally 20-30 such calls between May and June. Perhaps the strongest sign of the decline of wild colonies hereabouts is what I witnessed after the Summer of 1994, which is when I first noticed *Varroa* on my bees: nine out of 10 of my colonies perished during the Winter of 1994-1995. I fear the same happened to the colonies under Mother Nature's care.

Given these experiences, I believed that wild colonies of honey bees had largely, if not completely,

Two of the bee trees found in Arnot Forest. Left, bee tree B; right, bee tree H. An arrow points to one of the entrances. (photo by Jun Nakamura)



vanished from the forested hills around my home in Ithaca, New York. And as one who cannot live without wild things, I mourned their passing. I figured that at best there might still be a few wild colonies out in the woods, but each the issue of some cossetted beekeeper's colony that cast a swarm unnoticed, and each a short-lived creation doomed by *Varroa*'s fearful virulence.

Simultaneously, however, the inner voice of curiosity kept posing the question, is it really true that the wild colonies are gone? My busybody curiosity asks me many questions, far more than I can tend to, so most of them get ignored, but I could not ignore in good conscience this one about the wild bees. Nearly at my doorstep lay a unique opportunity to get a solid answer, at least for my neck of the woods. Cornell University owns a 4,200 acre research forest, called the Arnot Forest, and 24 years ago, long before any live *Varroa* mite set feet in North America, Kirk Visscher and I censused the wild colonies living in this forest (Visscher and Seeley 1982). We found nine bee trees back in 1978. In repeating this work, how many would I find in 2002?

I took several measures to conduct the new census in a manner as close as possible to the old one. One was to do my bee hunting in the *same season* as before, from mid August to late September. Another was to hunt in the *same way* as before, that is, using the no-nonsense methods described by G. H. Edgell in his peerless book on bee hunting, *The Bee Hunter,* published in 1949.

I start each hunt for a wild colony by going to a clearing that is good sized (the bigger the better) and well stocked with flowers. An old field sprouting goldenrod is ideal. Next, using a small apparatus called a beebox, I capture bees foraging on the flowers and introduce them to a square of dark, old comb filled with sugar syrup. The bees fill their honeystomachs, groom briefly, and fly slowly home, each one resembling a tiny lantern as her swollen, translucent abdomen glows golden in the sunlight. Almost always, some of these bees return to the small cornucopia I'm operating and eventually they bring along hivemates. Once the bees have made several trips to the comb, and so have grown accustomed to it, they fly homeward along beelines. With a magnetic compass, I note their vanishing bearings, which tell me the direction to the bees' home. I estimate its distance from the minimum round-trip times of a few bees that I've labeled with a paint mark or two. Often, working from a single flowery clearing, I discover that I've initiated beelines pointing toward two or more colonies. In such cases, I steer my search in the direction of the strongest line. To follow a line to its source, bees visiting the comb are trapped inside the beebox, carried along the beeline a hundred or so yards to another clearing, and there released. Vanishing bearings from this new site are noted, thereby sharpening the arrow pointing to the bees' home. By patiently repeating such moves, I eventually find my way to the stand of trees that is the bees' neighborhood, to the particular tree that is their dwelling place, and ultimately to the one knothole that is their front door.

I began the new census on the

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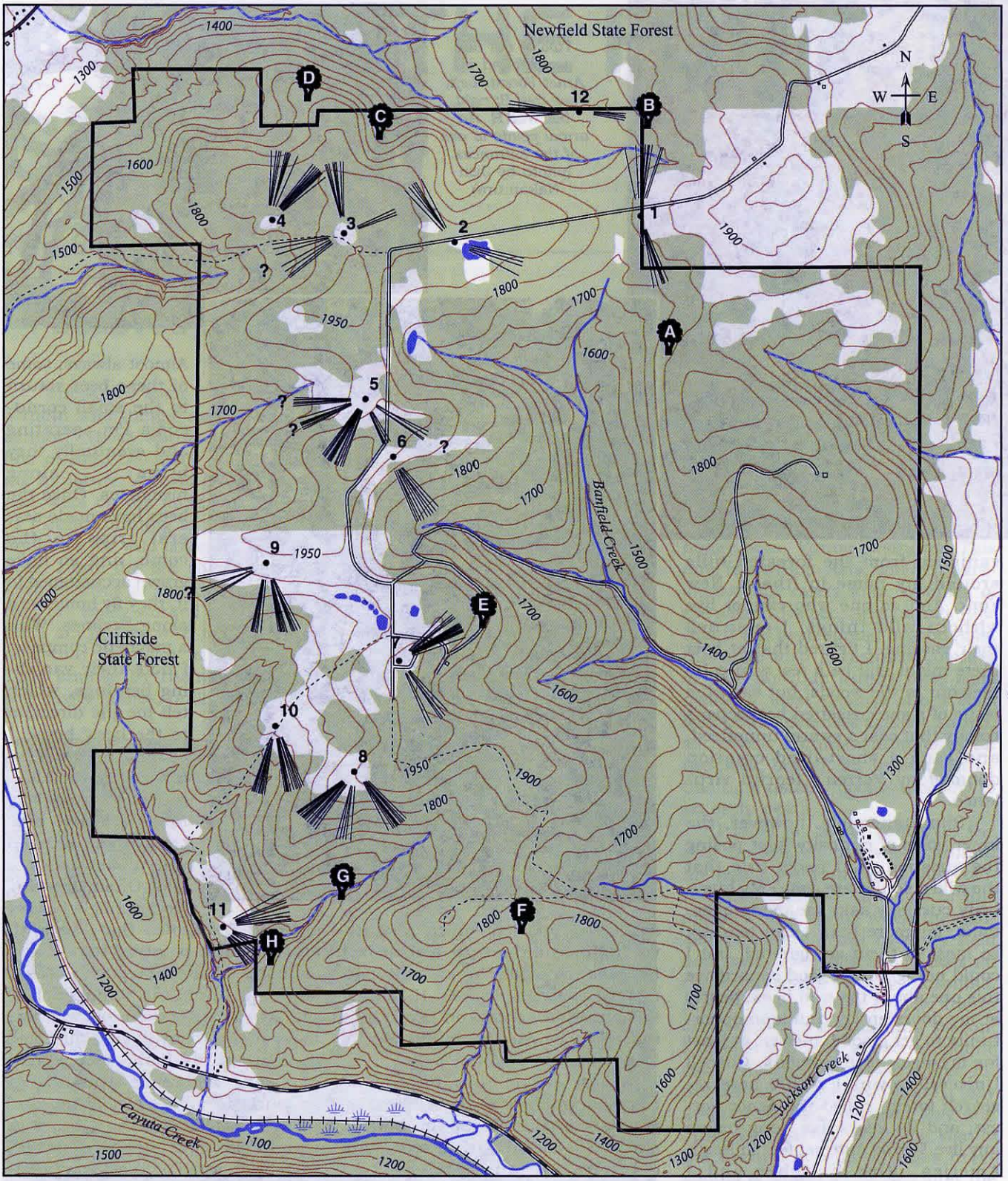

Map of Arnot Forest. Shown are the locations of the bee trees (8) found and of the feeding stations (12) used to establish beelines that led me to the bee trees. Feeding stations are numbered in order of use. The lines radiating from each feeding station depict vanishing bearings of bees leaving the station. Note that most of these lines occur in clusters which pont toward one of the bee trees; the clusters that do not are marked with a question mark and evidently indicate an unidentified colony.

afternoon of August 20, 2002, going to a field of goldenrod at the back entrance to the Arnot Forest, the same spot where I had begun the previous census (on August 26, 1978). The day was sunny and hot, and although no rain had fallen for several weeks, many of the goldenrod plants had unfurled their flashy yellow flowers, so things looked perfect for finding bees. But would there be any bees to be found? I presumed the answer would be no. As I climbed from my truck, I imagined that I would spend this afternoon searching for bees, find none, and return home with only the conclusion that yes indeed, evil *Varroa* has killed off the wild colonies of the Arnot Forest. For the first 10 minutes, this hunch seemed correct. I saw no honey bees, though numerous bumble bees, whose presence told me that despite the drought the goldenrod flowers were offering nectar and pollen worthy of a bee's labors. Then, atop a lush clump of goldenrod, I spotted a honey bee. A few seconds later she was buzzing furiously inside my beebox. Several more minutes of searching revealed another honey bee and yielded a second prisoner. Within an hour, I had spied, boxed, fed, and freed six bees.

This success in finding bees told me that there were still bees foraging in these woods. But where were they coming from? A bee tree in the Arnot Forest, or a beekeeper's hive outside its boundaries? By the end of the afternoon, I knew the answer, for by then I had two rip-roaring lines of bees leaving my comb, one pointing north and one pointing south. Both indicated locations in the woods, not places where a beekeeper would have hives.

For the next six weeks, until the wildflowers ceased to bloom, I devoted every available hour of every fair weather day to hunting bees in the Arnot Forest. Classes at the university started in late August, and my midday class on animal behavior met on Monday, Wednesday, and Friday, so many days I hunted for only a few hours in the afternoon. Also, the nights soon started to grow chilly, so most days the bees appeared on flowers only late in the morning. In my favor, however, the drought persisted, sunny weather prevailed, and the bees, apparently not finding rich forage in the flowers, mobbed my feeder comb whenever I dripped it full of sugar syrup.

"I did find wild colonies. How can this be?"

Altogether, I hunted in the forest for 117 hours spread over 27 days, during which time I started lines from 12 clearings spread over about two-thirds of the forest). Thus I did not quite complete a forest-wide census, to match the one of 1978. (Back then, I was a freshly minted Ph.D., a so-called "postdoc." This is a stage that most scientists go through, a kind of academic adolescence that lasts a few years, when one enjoys freedom from nearly all professional responsibilities except pressing on in your scientific work.) Even though my new census did not survey the whole forest, I did find eight wild colonies of honey bees. Each had taken up residence in a sturdy, live tree: two sugar maple, two white ash, one eastern hemlock, one white pine, one quaking aspen, and one red oak. To have found so many trees occupied by bees surprised me, for it shows that there are as many, if not more, wild colonies living in the Arnot Forest in 2002 as there were in 1978.

How can this be, given that *Varroa* has been in New York State for most of the past decade? One possibility is that these forest-dwelling colonies live in such isolation that they have not been exposed to *Varroa*. The fact that few of my beelines pointed out of the forest (just those pointing west from sites three, five, and nine, shown in photo) indicates that there are few, if any, managed hives located just outside the boundaries of the Arnot Forest, so perhaps the colonies in this forest are not much exposed to *Varroa*. Another possibility is that these wild colonies have been exposed to *Varroa* and, as usual, will soon be dead. A third possibility, and by far the most interesting to me, is that these colonies have been exposed to *Varroa* and have evolved, through natural selection, resistance to this parasite. If so, then the wild colonies in the Arnot Forest may be an important resource in the breeding of a hardy, *Varroa*-resistant honey bee. Time, plus considerable toil (i.e., further studies of these bees), will tell which possibility is the reality. My hopes are pegged on number three, for I would like these bees to give as much delight to you, in your beekeeping, as they have to me, in my bee hunting. BC

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HONEY

The Way I Get Rid Of It

James E Tew

Marketing honey is not beekeeping

I have always loved beekeeping. Assembling equipment, installing packages, requeening, hiving swarms, worrying about mites, and processing the honey crop are aspects of beekeeping that I have always enjoyed. However, I must confess that a major part of beekeeping that has not interested me is marketing honey. I don't feel like a beekeeper when I am trying to determine what style of jar in which to bottle my honey or how to pack candles so they won't scuff when handled. These tasks, and all the others like them, have nothing to do with beekeeping per se but someone must do them if honey is to be sold. (*I know. I know. These tasks really are a part of beekeeping, but they don't* ***feel*** *like beekeeping to me. They feel like marketing.)*

No secrets

I have no special secret to give you that will sell your crop. In fact, the question, "How do I sell my honey?" must have several thousand answers. At the Ohio State University Wooster Bee Laboratory, we have developed one answer that works reasonably well for us – not perfect, but reasonably well.

Some history

We have always taught general beekeeping techniques at OSU, Wooster; therefore, we have always had honey crops needing disposal. For better or worse, honey marketing has always been an important aspect of our general bee program. Twenty years ago, we simply bottled honey in common sizes, set up a small table on the Wooster campus and waited for money to come our way. It did – again reasonably well. However, after just a couple of years, people frequently asked, *"Do you have anything else? I still have the honey I bought last year."* So we began to make a few candles and experiment with different packaging possibilities. For a while, that worked well.

After only a few years, we honey-soaked our small Wooster market, so about 14 years ago, we moved our honey sales program to the main campus of OH State at Columbus, where there are about 58,000 students, faculty and staff. We have yet to "soak" that market.

Our procedure

Without boring you with all the evolutionary steps, we now go to OSU for four consecutive days before Thanksgiving and for four consecutive days after Thanksgiving. Sherry, the bee lab coordinator has named the sale the *OSU Holiday Honey Sale.* We sell from 10:00 – 5:00 and move to a new pre-determined location each day. Our table set-up has grown to five full tables and we carry more than a hundred inventory items – a significant increase when compared to our modest inventory twenty years ago. We have a diversified inventory mix of liquid honey, creamed honey, honey gift boxes, candles, and honey candy. We use table drapes so we can store extra product beneath the tables. We label all the products with a plain, but tasteful, OSU Honey label.

Vehicles

Honey is heavy. For the sales, we use a small box freight truck, a covered pickup truck and a car. We use two small, wheeled platform dollies to move the product from the trucks to the sale tables. As we frantically set up, we immediately have customers who want to browse and purchase. In the past, it would take nearly two hours to get the entire product line out so we now use the pickup to stock a mini-sale. We unload the pickup first and quickly get a few of all the items on display for the early customers. As one worker manages the initial sale, other workers, usually two, finish putting the larger inventory in place. We sticker price everything and use a cash register to manage the money and to monitor inventory. We have found that small shopping baskets are helpful to some customers. As various items are depleted, we make frequent trips to the larger truck for replacement product.

Product pricing procedures

All you business people should begin cringing at this point. We know our costs for each product listing and we have some idea of the demand for the established products. We generally mark up the price from our costs to 25% 50%. Our costs vary within a wide range. Though it is a respectable sale, we are definitely small volume, so our

costs for containers, labels, and supplies are not the lowest. To offset this, we buy in quantity as much as possible. Generally, that will be enough to supply us for 2-3 seasons. Therefore, the particular year that we buy supplies means that our income for that year is significantly lower. That year we essentially work to pay the bills.

As much as possible, we sell OSU-produced products, but due to the wide spectrum of our university customers, we also buy honey varieties not produced in Ohio. Orange blossom and blueberry are examples of honey we sell but do not produce. Prices for these varieties of honey vary from year to year. In fact, some years, we can't even get some varieties.

This season, we plan to begin accepting credit cards. Currently, we accept checks and cash. Though we get the occasionally bad check, this has not been a serious problem for us.

Pre-orders and off-season sales

We maintain our product listing on the bee lab web page. Also, we have a cadre of repeat sale customers. We maintain most of the product listings throughout the year, but the annual sale is our primary focus. We accept pre-orders that people pick up on the day of the sale. These orders are filled in the lab, labeled with the purchaser's name, and hauled to the sale site for distribution.

Volunteers

We would nearly be inoperative without supportive volunteers. Select members of the state beekeeping group and local beekeepers have always been gracious enough to help with the myriad tasks that must be accomplished when preparing for the sale. I would estimate that 15-20 volunteers are involved in a year's preparation.

Product development

Dave, the lab apiarist, is responsible for new product development and product inventory Creamed honey and various honey crates are examples of successful products developed in the past. This season, he found wooden baskets that he filled with selected products to make a new listing to our inventory. Just as in years past, we have found that customers need product changes to keep them stimulated enough to part with some of their money. Strangely, we have difficulty predicting what honey varieties and what inventory listings will be hot. Selling honey products is a lot like fishing. Some baits work some times and not at other times.

The OSU Honey Sale.

Candles and wax products

Candles and wax products are a big part of the sale. Select volunteers are responsible for making candles and Christmas ornaments. As with the honey sale itself, candle-making is a task related to but not restricted to beekeeping. The people who help us make candles frequently have absolutely no beekeeping experience. All candles are wrapped in tissue paper and boxed. There are no seconds. They are all melted and poured again.

Some personal numbers

On a good day, we will average about $3000 in sales. We gross about $25,000 per year. Our actual income depends on our costs. We use the income generated to main-

Orange blossom and blueberry honey in labeled squeeze bears.

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Gift packs, honey crates, and creamed honey products.

The candle display.

tain the University bee colonies, truck repairs, and to purchase computer equipment. While not a fortune, it is needed funding to help maintain the laboratory.

Preparation for the sale

The procedures for preparing for the sale could be an article in itself. It takes about two to three months to fully prepare and accumulate all the necessary components. Ordering labels, jars, honey bears, candy, crates, paper bags, getting change for the cash register, coordinating sale sites, and reserving vehicles are some of the many tasks that are required. Even though I would still consider this to be a small sale, it is a lot of work and requires a lot of organizational effort. We get tired and tempers get short, but the sale must go on.

Why do we conduct this sale?

We do this for several reasons. We move our own honey crop at a price higher than wholesale. We need the money to support our lab's activities. We garner marketing skills and come face to face with the non-beekeeping honey-buying public. We accumulate experience in purchasing and packing honey that is useful in making recommendations to other beekeepers. Finally, everyone has a question about bees and beekeeping. The sale gives us the opportunity to promote honey and beekeeping and answer bee-related questions.

Quirks of our honey sale

- In order not to compete with other beekeepers, we only sell to the university community.
- The OSU label is instrumental in selling much of our product.
- We strive mightily to maintain the highest quality and cleanliness standards. We take this very seriously.
- We are not the real marketing world and we realize this. We depend on volunteers. Our real costs are higher than would be profitable in the real world.

As an aside - a strange complaint

A strange problem that I would have never anticipated in marketing honey is our fingernail cuticles are essentially destroyed. Pulling countless jars from cardboard cartons knocks our nail cuticles down. After days and days of doing this, everyone's nail cuticles are sore and angry. Wearing gloves does not help. Pulling honey straws from containers also angers nail cuticles. Just one small complaint from the hundreds that I could have cited.

Summary

Products from our honey sale have been used as gifts by the OSU President's office as well as other university administrators. Last Christmas, one of our candles was used as a small gift to state legislators from OSU administrators. The sale is frequently highly visible and promotes our program. The sale is about as large as we can maintain. Anything larger would require a dramatic increase in our processing equipment. It is a lot of work, but it is consistently rewarding. BC

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Poplars & Bees Don't Mix

Tim & Jan King

Beekeepers & Sprayers tangle in a Minnesota Poplar Grove

Alexandria, Minnesota, Hybrid poplar producers in Central Minnesota are illegally spraying the insecticide Sevin, a group of honey producers from the Minnesota Honey Producer's Association and the American Beekeeper's Association angrily told Minnesota Department of Agriculture (MDA) officials at a gathering in Alexandria in June, 2002. That spray is killing honey bees and forcing some producers to leave the area, and the MDA isn't doing anything about it, the beekeepers alleged. The insecticide is being used by poplar producers to control an outbreak of the cottonwood leaf beetle.

Following the Alexandria meeting not much changed during the rest of the 2002 season, according to Jeff Anderson, an Eagle Bend, Minnesota beekeeper who has sued not only the State of Minnesota but International Paper company, the owner of extensive hybrid poplar plantations in Central, Minnesota, and also an aerial pesticide applicator.

"This Summer they did try to stay more toward evening and morning and do it at night but we still have records of spraying until ten or so in the morning," Anderson says. "When it is 10 in the morning and 80° the bees have been flying for three hours, long before they quit spraying."

Anderson, and other beekeepers, assert that applying Sevin when bees are flying in an orchard or plantation flies in the face of the warnings on the insecticide's label and is thus illegal. He directs those who are inclined to question his reading of the chemical's label to the web site www.greenbook.net where chemical labels can be down-loaded on your computer. The Sevin label is not ambiguous about it's danger to bees.

"This product is highly toxic to bees exposed to direct treatment or residues on blooming crops *or weeds*," a section of the label under the heading of Bee Caution for the product Sevin XLR PLUS reads. The label goes on to say that the residual effect of dried Sevin XLR PLUS, as compared to the effect of directly spraying foraging bees, is less than that of other Sevin products.

"For maximum honey bee hazard reduction apply from late evening to early morning or when bees are not foraging. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area," the label warns.

"The label clearly states that you can not spray Sevin XLR over blooming plants while bees are foraging," Steve Otis, a Barrett beekeeper, told Department of Agriculture officials at the Alexandria meeting in June. "But that is what is being done."

Spraying Sevin XLR PLUS can be done during foraging periods, the product's label proposes, if the bees are confined to their hives or the hives are moved "beyond the bee flight range" of the treatment area.

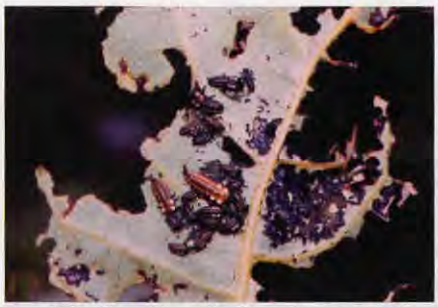
Those kind of precautions, beekeepers assert, would require timely warnings from chemical applicators or the owners of the hybrid poplar plantations.

"I've only received one notification from anybody since they've been doing it," Jeff Anderson says. "They claim they started with Sevin in 1998 to control cottonwood leaf beetle (CLB). I saw problems in 1998 but I didn't nail down what it was until 2000."

Precautions regarding bees on the label of Sevin XLR may make it crystal clear that the product is hazardous to bees. For a pesticide regulator, however, the label has ambiguities.

"From a beekeeper to a regulator to a newspaper writer a reading of the label could result in any number of impressions," says Paul Liemandt, Enforcement Section Manager, for the Minnesota Department of Agriculture. "There's language on the label that the U.S. EPA and the Minnesota Department of Agriculture with *mandatory* language. Mandatory label language typically requires or prohibits something such as use at certain dosage rates. On the other hand there is language on the Sevin XLR label that EPA considers to be what is called *advisory*. It is intended to guide or prevent problems that may be known to happen with the product but does not have the force of law."

Advisory language would generally include language on the time of day to use a chemical,


Eggs, Larva and Adult Poplar Leaf Beetles. Note feeding damage to leaves. (University of WI photos)

according to Liemandt. The Department can issue an *advisory notice* if a pesticide applicator isn't following a label's advice. An advisory notice has been issued to at least one applicator who was applying Sevin XLR during mid-day. In Minnesota there is the possibility that not following advisory language can put an applicator on the wrong side of the law.

"I can think of one case where advisory language wasn't followed and drift occurred that damaged an off-target crop," Liemandt says. "That damage is in and of itself a violation of our law and would be an instance where there would be a slight difference between federal advisory language and enforceable state language."

For years state agencies, such as the Minnesota Department of Agriculture, Minnesota Department of Natural Resources and the University of Minnesota, as well as the U.S. Departments of Energy and Agriculture, have promoted hybrid poplar production in Central Minnesota as a source of biomass for electricity production and, later, as a solution to a possible shortage for pulp wood for paper. In 2000 the Legislature got in the act with a $200,000 loan and additional grant funds. The Department of Agriculture, which is responsible for pesticide regulation, manages the state's loan fund for hybrid poplars.

The result of the boosterism has been that over 25,000 thousand acres of fast growing hybrid poplar have replaced crop fields in a broad swath of farm land through the central part of the state. Estimates are that as much as 26,000 acres of hybrid poplar could be planted in the state annually to meet demand for pulp and timber.

What enthusiastic poplar promoters may not have envisioned when they created densely packed plantations of nothing but poplar trees is that they would cause an outbreak of the cottonwood leaf beetle. The small cream and black colored beetle, and its larva, feed on cottonwood, aspen, and willow leaves from Mississippi to Alaska. It is a close relative of the potato beetle. It was seen in Minnesota hybrid poplar plantations eating leaves and new growth as early as 1998. Although little research has actually been done, scientific literature suggests that the larva of the beetle can eat a lot of leaves pretty quickly. That slows down the fast tree growth producers are after. In response the producers are spraying insecticides. Although beekeepers have suggested options the only two chemicals being used are Sevin and a biological insecticide called Bt.

Sevin, which does not mention hybrid poplar on its label, appears to be the chemical of choice. And beekeepers say it's killing lots of bees.

"It's not only the bees directly sprayed with insecticide while foraging on the poplar orchard floors that are killed. The worst damage is done within the hive by foraging bees returning with pollen poisoned with Sevin," says Jeff Anderson, whose hives are dispersed throughout a three county area in the center of the growing hybrid poplar industry.

"We think the main problem is the Sevin will get on the flower of the weeds grown on or nearby the plantations and contaminate the pollen," Anderson says. "Bees then bring the contaminated pollen back to the colony. A number of bee experts say that colonies that are contaminated with pollen with Sevin in it can be disrupted for up to three years. That occurs when they spray a grove and it contaminates the pollen for two or three days. The bees get into that and some of them die from the actual spray event. Then some of that contaminated pollen gets stored in the colony. Then the insecticide dissipates and the bees continue to collect fresh pollen that's not contaminated. Since there is fresh pollen coming in the colony's bees aren't eating the stored, contaminated, pollen, and the kill quits. Then we might haul the hives to California and weeks, or even months later the bees will use that stored, contaminated pollen and there will be a second kill."

Jim Whitlock, an Alexandria, Minnesota beekeeper who takes his bees to California to pollinate almond orchards during the winter, says he may have lost bees in California due to Sevin poisoning of the hives while they were in Minnesota.

"I had 53 hives dead of a total of 240 in California even though I was 35 miles from the nearest orchard where they might have been spraying," Whitlock said in June 2002.

Greg Buzicky, of MDA's Division of Agronomy and Plant Protection, said that his inspectors had investigated the alleged bee kills last season and found no evidence of bees being killed by Sevin.

"We don't mind charging somebody," he said. "There just wasn't any evidence."

The MDA did charge Terry Ricks, of Ricks Aviation, during the 1999 season when he managed to kill bees belonging to Steve Ellis, a Barrett, Minnesota beekeeper, while making aerial insecticide applications to a poplar plantation. One of Ricks' problems at the time

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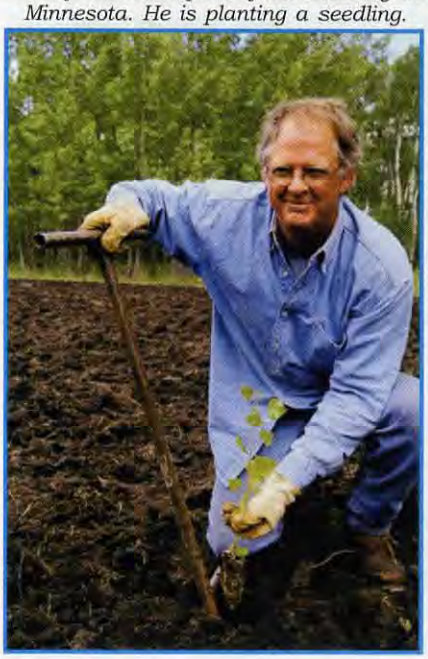
A Poplar grove next to a corn field. (photo by Jan King)

was that he was applying an insecticide with a lapsed Minnesota applicators license. Ellis has since filed suit against Ricks, the Minnesota Department on Natural Resources, and Champion International Corporation (now International Paper Company) for $50,000 in damages.

Anderson submitted some of his dead bees from the 2001 season to Meddallion Labs, a private laboratory, and, in at least one case, that lab found the active ingredient of Sevin XLR, carbaryl, in dead bees.

Dr. Edward Wene of AURI (Agricultural Utilization Research Institute) has been one of the developers of the industry in Minnesota. He is planting a seedling.



Anderson accuses the MDA of poor lab technique as well as giving the bee inspections a low priority.

"I challenge any lab to meet our high level of quality control," MDA's Buzicky said. "Our laboratory does forensic investigations and to my knowledge we've never been challenged on our lab results."

Quality control, not merely who can measure the smallest amount of a chemical, is likely at the heart of the difference between MDA's lab findings and Meddallion's.

"In a deposition the head lab person at MDA said don't worry about the Meddallion sample. We can't detect that low. Because of our low (MDA's) rate of recovery and because it's a fairly low find we could have missed it," Anderson recalls. "What bothers me about that is that they are basing their whole premise as to whether they do anything about actually changing the spray program based on a flawed system at their lab."

MDA's Buzicky, who says his department only has 11 pesticide investigators for the state and is suffering from budget cuts, acknowledged that initially his agency could have given the bee inspections higher priority during the 2001 season. They are very much a high priority now, he says. At the same time he charges that the bee keepers waited too long to make their complaints. As a result it was difficult to do an investigation.

"That was based on our own ignorance," Anderson agrees. "This had never happened before and we didn't know how to respond."

Initially Anderson, and other effected beekeepers, suspected that what was happening was that aerial drift from the airplanes and helicopters that sprayed for the Cottonwood Leaf Beetle was effecting honey bees foraging in weeds on the margins of poplar plantations. Anderson has been observing hybrid poplar plantation management since he begin suspecting they might be associated with dying bees in his hives. He's observed two things. Insecticide application seems to have become more precise in the last few years. And the problem may well be within the plantations and not in the weeds on their margins.

"I think bees do forage in poplar plantations," Anderson, who says poplar plantation owners cultivate their plantations as much as four times a years, says. "If you till once during the season you're going to have some weeds but if you till four times during the season you'll have nothing but weeds. They'll cultivate, spray herbicide, and insecticide all at the same time."

"With cultivation they probably do knock most of the weeds out between the tree rows but they can't touch the ones in the tree row themselves," Anderson continues. "So in the rows it will take a while for the flowering plant to die and at the same time they put either a bt or Sevin application on the tree tops. Most of that insecticide hits the tree tops but some will filter down and get on the blooms."

Anderson also contends that the intensive cultivating and herbicides use isn't getting all of the weeds in the plantations. That contention was borne out in an independent inspection of three central Minnesota hybrid poplar plantations in October. Although nothing was blooming at that time of the year all three plantations had numerous goldenrod, thistles, and asters, that had bloomed and gone to seed. There was also a wide variety of grasses that had gone to seed. There was no evidence that those plantations had, or had not, been treated with insecticides for cottonwood leaf beetles.

In Minnesota Cottonwood leaf

beetles (CLB) are active from the middle of May until the middle of September, according to Jeff Schnurr, a research associate with entomologist Vera Krischik of the University of Minnesota. Krishik, Schhnurr, and U of MN graduates are trying to get a handle on CLB biology so they can possibly recommend an IPM approach to its control.

Schnurr said the creation of large monocrop plantations of hybrid poplar likely was a cause for the outbreak of the CLB. He also said that the particular variety of hybrid poplar currently favored by International Paper NM6, the major grower of the tree in Central Minnesota, happens to be favored by the CLB.

"NM6 is a very adaptable high yielding clone and International Paper is planting a lot of it," Schnurr said. "Unfortunately it also seems to be a preferred food source for the beetle. That has something to do with the chemicals from the leaves and the chemicals the beetle produces for its own defense."

Larval and adult CLBs can feed on the leaves of NM6, and other hybrid poplar varieties, and significantly reduce growth and, in some cases, kill a tree.

Dr. Edward Wene, a researcher and hybrid poplar breeder with Minnesota's Agricultural Utilization Research Institute in Crookston, MN, agrees that NM6 is highly palatable to CLB. Wene, who has been involved in research on hybrid poplar for over a decade, says there are new varieties in the breeding program that are being evaluated for disease resistance and vigor as well as insect resistance.

Since the threat to poplar plantations from insects is significant the U of M's Krischik and Schnurr are studying CLB biology, predator insects such as the lady beetle, biological pesticides, and insecticides that won't harm bees. Schnurr said he has been looking particularly closely at a commercially available fungus call *Bavaria* which has had some success with Colorado Potato Beetles. He's also discovered a possible insecticide that may not harm bees.

"Imidacloprid is a new chemical and is not supposed to be toxic to bees," he said. "It's been submitted to EPA for licensing and is currently available in other parts of the world and is known as Calypso."

Note the weeds between rows of trees. These are, beekeepers suspect, why bees visit. (photo by Jan King)

Calypso will take a while to move through the EPA registration process. Meanwhile the law suit filed by Steve Ellis, and another filed jointly by Jeffrey Anderson and James Whitlock, plod through the courts. The two suits accuse the plaintiffs of negligently damaging the beekeeper's bees, of a nuisance causing damage to their property, of unauthorized trespass via aerial and tractor spraying, of taking and destroying the beekeeper's property, and of violating Minnesota pesticide regulations.

The lawsuit accuses the Minnesota Department of Natural Resources, the state agency that the beekeepers sued, of designing the land management programs that led to the spraying. Landowners, the suit alleges, have to follow DNR pesticide guidelines to obtain their cost share dollars from the government.

While the lawsuits and potential new chemicals move glacially through the legal process some beekeepers are simply moving out of the area.

"I've moved all my bees out of Douglas County, says Tim Venis a beekeeper who summers in Eagle Bend, MN. "It's more expensive to drive to bee yards further away but I see it just as another cost of doing business."

Jeff Anderson wonders if the people and regulatory agencies in Minnesota actually want beekeepers. The laws, and people, of California recognize the pollination services of beekeepers and treat them respectfully, he says.

"The question I have," Fred Holte, president of the Minnesota Honey Producers Association, said at the June meeting with beekeepers and MDA officials "is do we even have the right to exist?" BC

Tim and Jan King raise organic produce for market and work as journalists from their home near Long Prairie, MN.

FROM TOP TO BOTTOM

There are many ways to construct these parts, but standard joints look better and last longer.

Peter Sieling

Telescoping covers and bottom boards are similar in construction. Both consist of a frame (four sides on covers, three on bottom boards) and the platform (floor or ceiling) which fits into the frame. There are many ways to construct these parts. Some people nail shims to plywood. Square ended ends and sides can be nailed together. These work well for awhile, but standard bee hive joinery looks better, lasts longer and requires less future maintenance.

It's always better to make multiple parts at once. A few parts can be cut carefully by hand. If you want to make your own equipment frequently, take extra time to make accurate jigs that fasten to your own tools and automatically position the parts for milling. Label them for use later. Six months from now you'll never remember what that block of wood with the mysterious groove and pencil lines was for unless it says something like "cover end rail notch".

Floor and ceiling stock

The floor and ceiling can be made from random width lumber. While sorting through the lumber, pick out material with clear cuttings suitable for the frame or rail parts and use the knottier portions for the floors and ceilings. If you have time, you can shiplap or tongue and groove the floor with the appropriate cutters on a shaper or router table. You can also use a dado cutter on a table saw. The floor or ceiling boards can just be butted. If the floor boards shrink and the cracks between them open up, the bees will seal them.

For ship lapping, straighten both edges of the surfaced lumber. Set the dado cutter width to 3/8" and position the saw fence 3/8" from the blade. Raise the blade to 3/8" Mill out as many pieces as needed for the number of bottom boards (See photo Bottom board step 2).

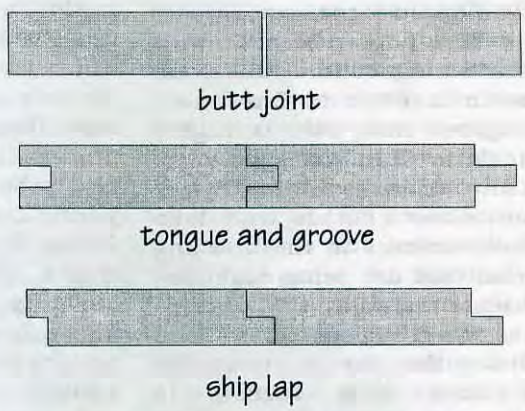
BOTTOM BOARDS

Bottom boards often have a short life expectancy. They suffer the most from moisture damage because they are close to the ground. A rot resistant wood can be used such as cedar, cypress, cherry or hemlock. Some people treat bottom boards with preservatives. Nonresistant woods will last as long as the rest of the hive without preservatives if the bottom board is painted, kept at least 12" off the ground and weeds are regularly cleared away,

The bottom board is reversible. One way provides a 3/8" opening. Turning it over provides a 7/8" opening for extra ventilation during the summer honey flow. Most beekeepers leave it one way or the other. Both positions violate the bee space between the floor and the frame bottoms, but extra comb under the lowest frames doesn't create a serious problem. Dr. C. C. Miller, one of the most famous of innovators of the late 1800s used a 2" space above the bottom board for ventilation, sometimes inserting a slatted rack.

Bottom Board Bill of Materials

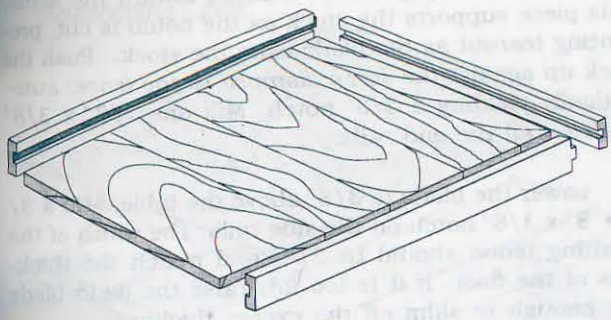
Description	Dimension	No. Required
Side Rails	3/4"x 2"x 21-5/8"	2
End Rail	3/4"x 2"x 16-1/4"	1
Floor	34"x 21-5/8"x 15-1/2"	1
Galvanized Spiral Thread Nails	6d 2"	approximately 12

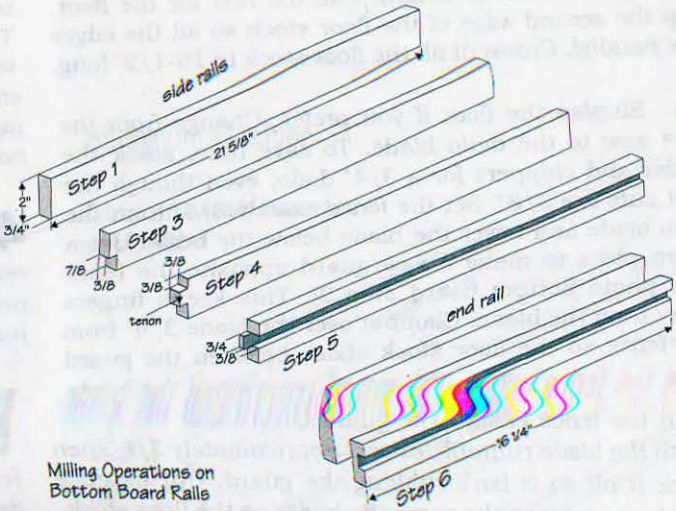


Bottom boards require approximately three board feet (BF) of lumber. Telescoping covers require four BF Low grades such as #1 or #2 common work fine. It is easy to find clear narrow stock for the rails. Small tight knots can be left in the floor and roof and even fussy woodworkers will find lots of short clear material without too much waste. The most common woods available in the Northeast are yellow poplar, basswood, and white pine, but nearly any species will work, depending on cost, availability and personal preference.

Procedure:

1. Plane the lumber to 3/4". Straighten one edge. Rip the 2" side and end rails from the clearest

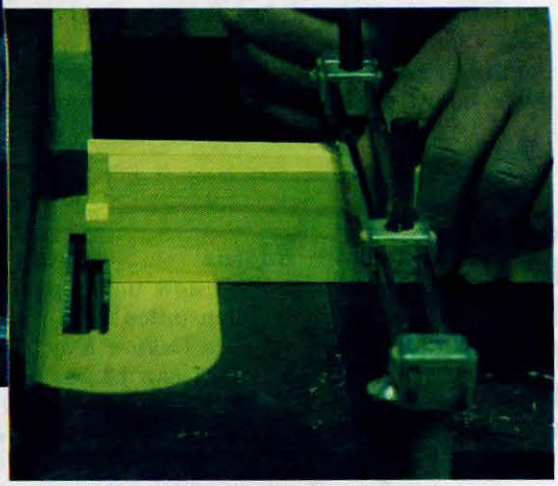




Milling Operations on Bottom Board Rails

Bottom Board Step 2 – Cutting shiplaps.

Bottom Board Step 3 – Cutting the large notch on the side rails.



Bottom Board Step 4 – Cutting the small notch on the side rails.

Bottom Board Step 5 – Milling the dado on the end and sides.

Bottom Board Joint close up.

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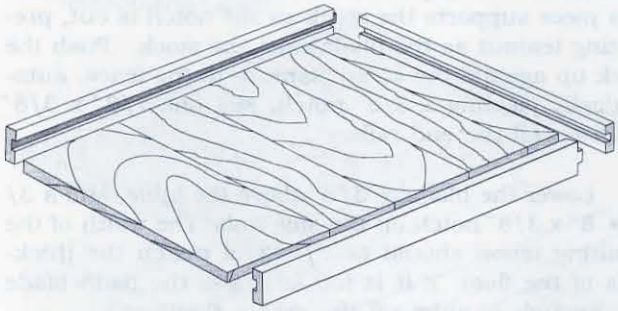

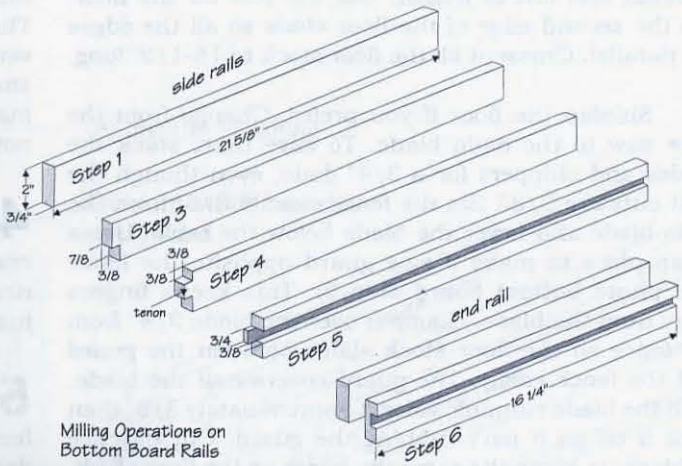

Milling Operations on Bottom Board Rails

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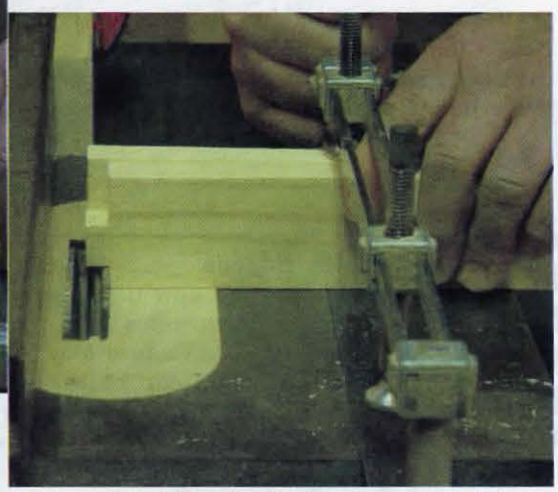


Bottom Board Step 4 – Cutting the small notch on the side rails.

Bottom Board Step 5 – Milling the dado on the end and sides.

Bottom Board Joint close up.

Continued on Next Page

material and cut to length. Use the rest for the floor. Rip the second edge of the floor stock so all the edges are parallel. Crosscut all the floor stock to 15-1/2" long.

2. Shiplap the floor if you prefer. Change from the saw to the dado blade. To save time, stack the blades and chippers for a 3/4" dado, even though the next cuts are 3/8" Set the fence exactly 3/8" from the dado blade and lower the blade below the table. Use a scrap piece to make a saw guard opposite the fence (see photo bottom board step 2). This keeps fingers away from the blade. Clamp it over the blade 3/4" from the fence so the floor stock slides between the guard and the fence easily. The guard covers half the blade. With the blade running, raise it approximately 3/8" then back it off so it isn't rubbing the guard. Cut practice shiplaps on scrap the same thickness as the floor stock, readjusting the fence until the boards are perfectly flush. The fence is left in this position for the rest of the milling steps and should be exactly 3/8" from the blade. Mill the shiplaps on the floor stock.

3. Remove the guard. Raise the dado blade to 7/8". Clamp a piece of 3/4" scrap wood to the fence on the infeed side (see photo: bottom board step 3). Fasten a board to the miter gauge positioned so it just touches the scrap piece as it slides toward the blade. This piece supports the stock as the notch is cut, preventing tearout as the blade exits the stock. Push the stock up against the scrap clamped to the fence, automatically yielding a 3/8" notch. Mill one 7/8" x 3/8" notch on all the end rails.

4. Lower the blade to 3/8" above the table. Mill a 3/8" x 3/8" notch on the side rails. The width of the resulting tenon should be 3/4" and match the thickness of the floor. If it is too fat, raise the dado blade just enough to skim off the excess thickness.

5. Remove the miter gauge and scrap block. The fence, still 3/8" from the blade should line up perfectly with the tenon left on the side rails. Mill a 3/8" deep dado the length of the side rails. The left and right side rails are mirror images of each other. Half should be milled with the tenon or back of the rail first. The other should be milled square end or front first.

6. Mill the dado on the back rail.

7. Assemble the bottom boards with 6d 2" spiral thread galvanized nails. Trim the last floor board flush with the ends of the side rails.

Screened Bottom Boards

A lot of beekeepers are now using screened bottom boards to prevent fallen mites from returning to the hive (for plans, see *Bee Culture* May 2002 p36). The traditional bottom board can be easily modified. Replace the floor with a frame approximately 1" wide on three sides and 3 or 4" wide on the front. Staple 1/8" mesh hardware cloth on the frame. A sticky board or sliding tray can be added for monitoring the mite drop by increasing the side rails to a 3" width and cutting a groove under the screen to fit a sliding panel or tray.

TELESCOPING COVER

Covers are a little fussier than bottom boards. Save one perfect side and end rail and use as templates the next time you mill up a batch. It will save a lot of measuring time.

Step 1. Starting with 3/4" stock, straightened on one edge, rip 2-1/2" widths for the side rails and cut them to length.

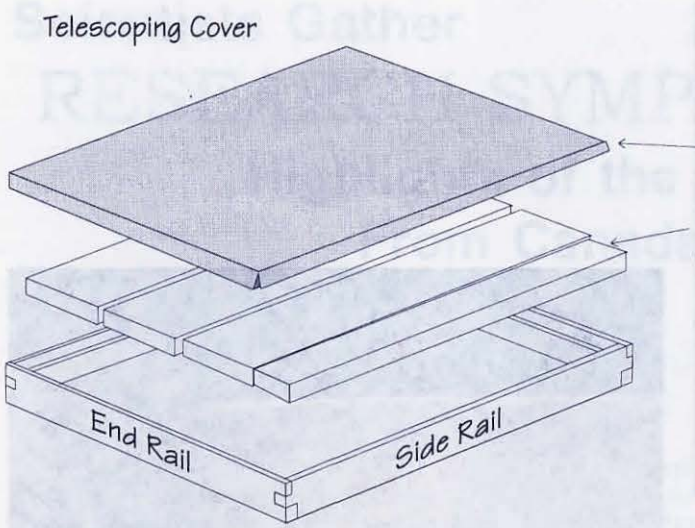
Step 2. With the dado blade, cut a rabbet 3/4" deep and 3/8" wide.

Aluminum flashing works beautifully for the metal top. It is available in various sized rolls at the local building supply store. Aluminum is easy to cut and bend and it never rusts.

Step 3. Cut the notch on the ends of the end rails. If you are making multiples, you can save time and increase accuracy by making a jig and attaching it to the miter fence (see photo: cover step 3) Set the dado blade height to 3/4" Cut the notch so it lines up perfectly with the bottom of the rabbet from step 2.

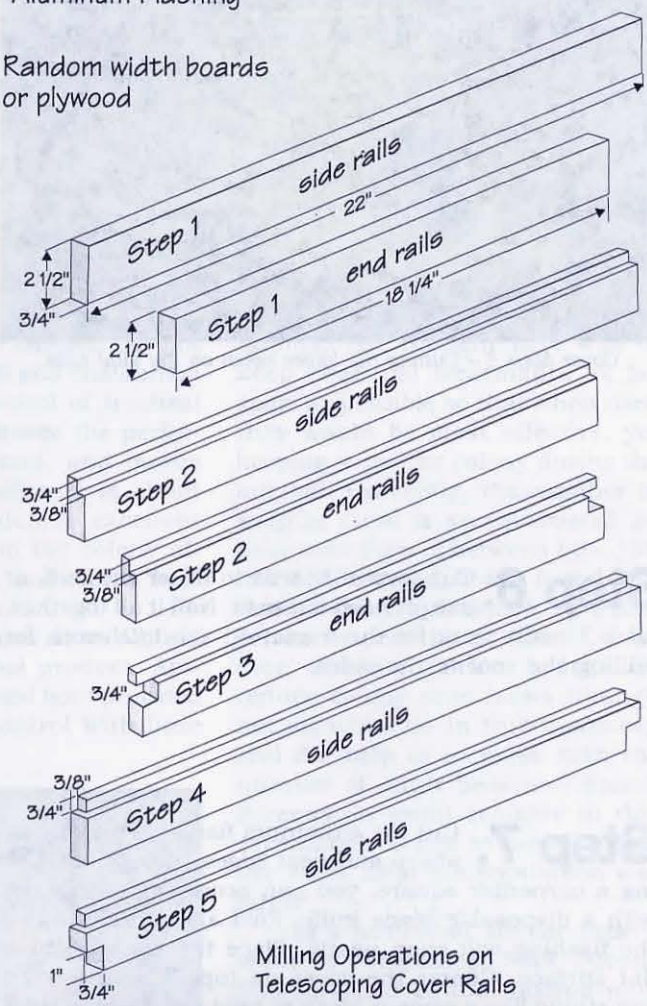
Bottom Board Bill of Materials

Description	Dimension	No. Required
Sides	3/4"x 2-1/2"x 22"	2
Ends	3/4"x 2-1/2"x 18-1/4"	2
Top Panel	3/4"x 17-1/2"x 21-1/4"	1
Aluminum Flashing	20"x 23-3/4"	1
Galvanized Spiral Thread Nails	6d 2"long	approximately 8
Nails	4d 1-1/2"long	approximately 40

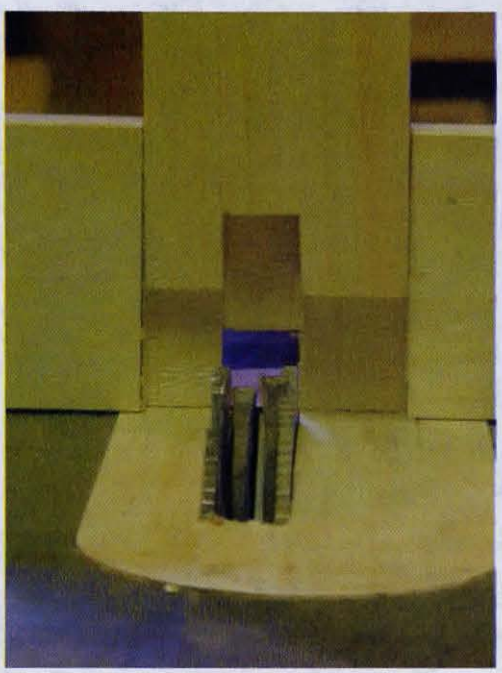


Step 4. Cut the top notch on the side rails. Using the jig from step 3, slide it over until the dado blade removes 3/4" and fasten it to the miter fence. Lower the blade to 3/8" and cut.

Step 5. Cut the lower notch on the side rails. Clamp a stop block on the miter fence just touching the blade. Raise the blade up to 1" Cut one end and check the fit with the end piece. You'll probably have to fiddle with the height and stop block position for a perfect fit. The joint should slip together with light to moderate hand pressure. All mating surfaces should be flush.

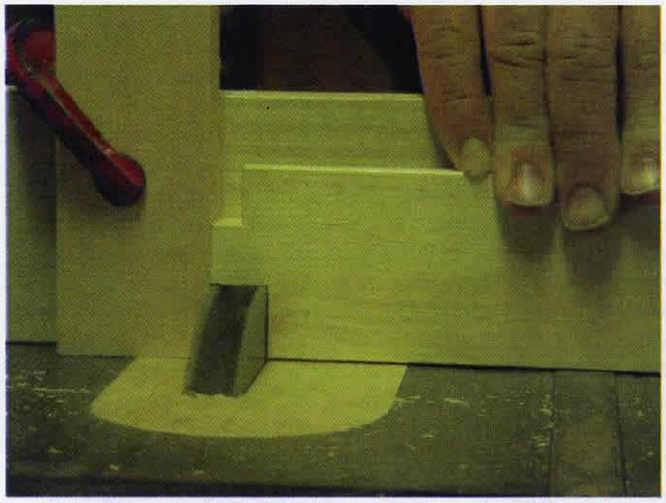


Milling Operations on Telescoping Cover Rails

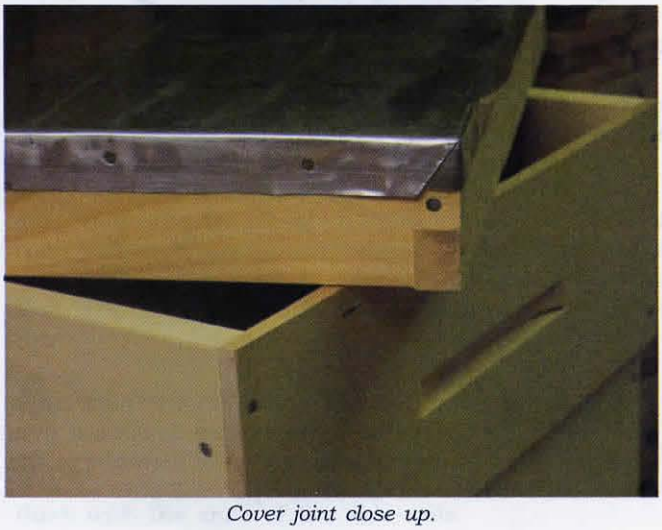


Cover Step 3 – Cutting the end rail notch.

Cover Step 4 – cutting the top notch on the side rails.



Cover Step 5 – Cutting the lower notch on the side rails.



Cover joint close up.

Step 6. Cut several boards to fit for the roof, or use plywood cut to fit. Nail it all together. 6d x 2" nails work for the frame. 4d x 1-1/2" work for nailing the roof to the sides.

Step 7. Cut the aluminum flashing, making as sharp and neat edges as possible. Using a carpenter square, you can score the aluminum with a disposable blade knife. Fold along the cut and the flashing will snap neatly. Place the flashing on a flat surface. Center the cover on top. Weight it with something like a cement block to hold the flashing tight and flat. With a wood block force the flashing up with a sharp fold. Wear leather gloves and be careful. The aluminum is sharp. Tuck and fold the corners neatly and nail or staple in place. BC

Finished hive.

Peter Sieling makes all manner of beekeeping equipment, including tops and bottoms, in his workshop in Bath, NY. He is a frequent contributor to these pages.

Scientists Gather
RESEARCH SYMPOSIUM WRAP-UP
Highlights of the Latest Research From Canada & The U.S.

Kim Flottum

Nearly 500 people attended the North American Apicultural Research Symposium held on the Canadian side of Niagara Falls in early December, 2002. Many, of course were part of the program – scientists, inspectors and other presenters. A variety of vendors were present, though mostly from the Canada side, which was interesting since there were so many people there.

In any event, I sat in on most of the talks and looked at most of the posters, and following is a summary of those that I found interesting and useful. It goes fast, so read slow to get all the details. The abstracts of these articles will be published sometime in the future, and perhaps even some of the articles. But by then the news will be old, and the information already well distributed. Read it here first.

Session 1 dealt with IPM for North American Beekeeping.

The first paper, by Robyn Underwood, from Univ. Manitoba, dealt with treating indoor wintered colonies with formic acid vapor that filled the whole room to control mites. Several concentrations were used (20 ppm for 28 days, 45 ppm for 11 days and 60 ppm for 9 days). Good *Varroa* control was achieved, as was good control of tracheal mites and nosema. Some queen loss at the higher rates was observed, and it seems honey absorbed, then outgassed the vapor over a long period of time, extending the exposure in the hive.

Max Watkins, from Vita (Europe) talked about Apiguard, a thymol gel based compound used to control *Varroa*. It works by both inhalation and contact as the bees clean the compound from the colony. It has some control, but not much, for AFB, EFB and chalkbrood and gives good control of tracheal mites. The gel improves the performance of the thymol, and leaves essentially no residue. It is about 93% effective, which is excellent control. It is put on the colony after super removal, and works best in warmer weather.

In a similar paper, it was found that another thymol product, Api-Life Var, and Apiguard both provided excellent *Varroa* control with little difference in mite drop and negative effects on early spring bee population. Both offer good news for people with *Varroa* resistant to other controls.

Pat Westlake, OBA organizer.

Keith Delaplane is looking at establishing a useful economic threshold for treating *Varroa*. He looked at adding isolation (to reduce reinfestation), hygienic behavior to help remove mites, and screened bottom boards to help reduce infestations. The thought here was to keep chemical treatments as far apart as possible so that when used they would be most effective, yet keeping a healthy colony during the interval. Currently, the number to keep in mind is an unassisted 24 hour mite drop of between 60 – 190 mites. At the end, it was found that none of these techniques, by themselves helped the problem. However, screened bottom boards did reduce colony mite levels (though not significantly in this instance), and did help to increase both the number of adult bees and brood. Screens on small colonies in this experiment tended to have a negative effect until the population was larger.

In a somewhat similar experiment in Tennessee, SMR queens and screened bottom boards were used. However, this experiment was rife with disasters and the only good data to come from this was that SMR queens and open bottom boards were effective in reducing *Varroa* populations.

Mike Hood, from South Carolina is working on an inhive trap for small hive beetle. So far, he's found that vinegar and mineral oil are both attractive and lethal to the beetle. Next up...a trap.

Session 2 dealt with Colony Management

A team from the Univ. Of Guelph found, not surprisingly, colonies with lots of stored, or fed pollen in the spring do better than those without. Colonies were set up with hardly any, some and lots of pollen. Those with lots had 4 times as much sealed brood as those with hardly any and twice as much as

Continued on Next Page

"Even more evidence surfaced that using screened bottomboards is beneficial."

those with some. Bees with lots of pollen lived on average 36 days, those with some 27 days with those with little only 21 days. Colonies with hardly any pollen collected, on average by mid-summer 64 pounds of honey, those with some pollen 110 and those with lots 128. By season's end the numbers were 120, 200 and 226 lbs of honey collected. So, though you already knew that

Medhat Nasr, recently from NJ, now back in Canada.

healthy bees did better, now you have the numbers.

There was lots of noninformation on blueberry pollination. Basically, more bees, whether honey bees, or other wild bees, meant more blueberries. Wild blueberries and cultivated were studied. The take home message was that for wild blueberries the maximum fruit set was achieved, kind of, at 4 colonies per acre. Another, quieter message to come from this, mentioned by some of the attendees was that as long as researchers can't find the right answer, or any answer, they still have a job. There's something to be said about that.

Another study, by Tom Webster, showed that colonies with screened bottom boards were effective in controlling *Varroa* mites in two ways. First, just losing mites – after a summer, mites falling per day were 70% higher from colonies without screens than those with. And second, he found that those mites that fell during an Apistan treatment were less sensitive to the chemical that those that fell before. This means that with screens, you can, (probably) increase the time between treatments, thus decreasing treatments, and moreover, many of the mites resistant to a chemical are removed from the scene and will not reproduce. This is good news.

Jerry Bromenshenk, of training bees fame among other things, discussed his project of training bees to find explosives. The interesting part of this was that he has found that the best trained dogs can detect in the range of 500 parts per trillion (yes, with a T), and bees can find explosives at only 50 ppt. It also takes two years to train a dog, and only 3 hours to train a colony to find explosives. Imagine training a colony to find almond pollen?

Jeff Pettis, AAPA organizer.

Session 3 dealt with Queen and Bee Stock Issues

Geoff Wilson, again from Guelph, looked at the dynamics of Russian Bees and Ontario bees, and the crosses between them. Attributes measured were mite fall, hygienic behavior, and grooming behavior. Without question, the Russians, and the Russian hybrids showed better adaptive behaviors,

Ed Levi from Arkansas, congratulates Bart Smith, retired from AIA.

though sometimes not significantly better. Hygienic behavior was better; SMR traits were stronger, grooming behavior better and mite fall as good as or better than all treatments. Russian bees had reduced mite population build up and higher hygienic behavior than the Ontario stock tested. We all need to keep working with those Russians it sounds like.

Wyatt Mangum's paper on the effects of attendant bees in a queen cage and the outcome of introduction was productive. Basically, queen introduction is influenced by many factors...time of year, size of colony, type of bees, presence of laying workers, a second queen, drifting bees...all manner of things can get in the way of successful introduction. Wyatt found that the attendants in a queen cage did have a negative influence on the outcome of introduction. He also measured different typed of behavior of the bees in the accepting colony Chronic balling (over a long period of time); chronic, stopped and then reversion to chronic balling; slow decline of balling behavior; and slow and then reversion to balling behavior. These occurred in 3 to 5 days after introducing a cage with atten-

The view of Niagara Falls from the hotel.

dants into a colony. Although other factors were considered, the take home message from this paper is...get rid of the attendants if you want better introduction.

Jeff Pettis and Reg Wilbanks tested the effects of pesticide residue in wax used in queen rearing colonies. They tested wax with 1, 10, 100 and 1000 parts per million (ppm) coumophos in wax used in queen cups used by grafters at the Wilbank's operation. Employees there grafted larvae into cups with the different levels of residue and the cups (actually bars with cups) were put into starter colonies and from there to finishers until mated. Employees then rated them as mature and well bred, or not...a very economic and real world rating. What they found was that from the controls (no pesticide) they got 78% acceptance, from 1 ppm 83%, 10 ppm 75%, from 100 ppm 50 % and from 1000 ppm no acceptance. Larvae in ripe queen cells from the 1, 10 and 100 showed little difference in weight. After 21 days, employees rated the queens for mating, and worth selling. The control, 1 and10 ppm queens came in, on average as 65% mated and salable, while the 100 ppm only made 58% mated and salable. These queens are now heading colonies and will be evaluated this spring.

Dr. Ingemar Fries, from the Swedish Univ. of Ag. Sciences asked if beekeepers, and bees were drug addicted? He offered some interesting insights during his invited talk, and highlights are presented here.

He examined the major problems of honey bees...Nosema, tracheal mites, AFB, EFB, sacbrood and of course *Varroa*. He looked at the ways these problems spread and ways to reduce this spread. For instance, nosema, and its drug fumagillin. Fumagillin has no effect on spores of nosema, and only removes the symptoms. It saves the colony, but doesn't remove the disease. Hygienic behavior helps, as does clean wax (read new wax here),

Wyatt Mangum, awarded the speaker with the coolest hat.

and good locations (not defined here). Minimize early brood rearing to reduce stress, feed uninfected food and keep clean comb. Nosema is a management problem, not a medication problem, he says.

For AFB, drifting, robbing and moving combs are the greatest source of infestation, but swarming from and infected colony to a new home is also involved. However, a colony that swarms is healthy enough, apparently, to stave off the disease, to offer resistance of some sort. Certainly old comb was left behind.

Terramycin removes the symptoms, not the cause of both EFB and AFB. For AFB it saves the colony but resistance and residues increase, as does the cost. Burning, on the other hand, quickly selects for resistant bees, and removes diseased colonies. There is no residue problem, no resistant problem, selects for the least virulent strain of the disease and is a long term sustainable solution. Using terra is an ostrich solution according to Fries. I have to agree.

What about *Varroa*? To start, chemicals are highly efficient, offer mostly low labor costs, but are expensive, leave residues, create resistance and are ecologically unsound. So, how many mites are tolerable? One mite per day, natural fall, equates to 120 – 130 mites in a colony. Several researchers have made this observation.

How do you get rid of mites? Removing drone brood is one way. Highly labor intensive, but effective. Not a good choice perhaps for large operations, but, says Fries, larger operations should not determine the needs of smaller operations. This goes for many types of treatments.

Removing drone brood, on a two frame rotational basis (one in, one being killed in a freezer), as early as possible in the spring, did not effect honey production and helped reduce swarming somewhat. It does, however, select for *Varroa* that moves into worker brood (which would be a positive influence on the SMR bees that involve *Varroa* and move into worker brood), and in either case would significantly slow *Varroa* build up and population growth.

Dr. Marla Spivak, Univ. of Min-

Continued on Next Page

"Using Resistant Queens is good, if only you could find them."

nesota, gave the featured talk for the Queen and Bee Stock Issues session (sponsored by *Bee Culture* magazine). Her talk, entitled Nothing Less Than A Revolution: Radical Changes or Just Full Circle, looked at some things similar to Dr. Fries topics...namely, reducing chemical use, and using other methods to control diseases and pests in a bee hive.

She started with an interesting observation. We are pesticide applicators, but we don't need a license (or at least most of us don't). We generally hate pesticide applicators, but we don't hate ourselves, and, most importantly, pesticide applicators sometimes don't follow the label, causing problems, but then neither do we, causing problems.

We, as beekeepers, generally have reflex actions...we see a mite, we treat. And we treat our colonies like we treat ourselves. Some of us use prescriptions drugs at the first sign of a problem, others try herbs and natural remedies and still others medicate only as a last resort. Bees can use the same approach.

She adds that for many, total eradication of every mite in a colony is necessary, or, if we can't see it, we ignore it (such as tracheal mites), and/or we may always assume it's always there, and always treat. Not good, according to Spivak.

Hygienic behavior has been available for over 50 years, but really, nobody is using it. Yet, it's a solution, and a good one, for chalkbrood, and a good control for EFB and AFB. But, antibiotics are used because beekeepers can't get hygienic queens, and drugs are easier.

What about drones? Spivak does not consider them a passive member of the colony, but rather a STUD (any male animal used especially for breeding; a virile, sexually promiscuous male), and should be considered not passive in future.

Some terms. Trait – a distinguishing quality or characteristic, such as red hair. Line – bees derived from an Italian subspecies. *Apis mellifera carnica* is a race, or a subspecies. Carniolan is a common name, but New World Carniolan is a line. On the other hand, hygienic behavior is a trait, and you can add, or incorporate a trait into a line to add to the characteristics of that line. You can make a hygienic New World Carniolan.

Other traits. Grooming behavior so bees can rid themselves of tracheal mites, or for that matter *Varroa* mites. Not easy to set up an assay (a test) to see if it is part of the line, but it can be done. What about the SMR line? Simply, mites enter a cell (primarily worker cells – see above), and die, or they don't lay eggs, or they lay eggs, but too late for them to mature. They don't reproduce in other words. A fairly easy trait to measure, to assay, and it has been done. And *any* bee breeder can do it.

Speaking of which. Breeding has a goal. Not many breeders out there. Queen production however, is simply producing individuals. Lots of them out there. There are good breeders, and good producers according to Spivak, but for the most part the producers are NOT maintaining and propagating the lines that breeders are creating. That's a real problem for her, and for beekeepers in general. And even more so for the researchers who do the initial work, only to see breeders screw it up, and beekeepers not bother to try it. Between the lines here, Marla was saying, if you won't use the products produced by researchers, then why bother having them, and, more importantly, don't complain about the work they do. Good advice and a stern warning. I couldn't agree more.

Problems with queens recently? Supercedure for instance. Maybe it's always been there, but now we are looking at it more closely. Maybe queens aren't selected for longevity. Maybe it's the chemicals used in queen rearing colonies (see above). Maybe they were mated in bad weather. Maybe tracheal mites or nosema are part of the problem. Is there a pheromone problem when all those chemicals are used?

IPM, for Marla, has a somewhat different slant...for her it's Integrated Pet Peeve Of Mine (her words, not mine). She starts with Integrated Prevention Measures. For instance, NOT using an antibiotic at first sign of a disease...select bees that actually resist the problem (see above). Spivak urges all of us to use bees that actively resist problems, not merely tolerate them. Toleration does not reduce a problem. Toleration does not remove a problem. Toleration simply accepts the fact that it's there. Rather, she says, help with cultural controls for all the problems we face...screened bottom boards, comb replacement and others. Then, and only then, use therapeutic measures. It's an IF – THEN approach she says. But you need to know those Economic Injury Levels so you know how much, or how many before you treat.

It's a self-defense world out there she adds. If AFB or chalkbrood show up use hygienic stock, replace combs, shake AFB bees onto clean comb, burn infested colonies and combs BEFORE you resort of chemicals. Then, and only then use them.

For *Varroa* and tracheal mites, use bees bred for resistance to start with. Don't kill 100% of the mites because your colony can easily handle what's left after a 50 – 90% kill. You will lose susceptible colonies, yes, but if you do the above you WON'T lose all of your colonies (which *will* be susceptible if you don't) in a *Varroa* crash.

Think first, Marla urges. As a last resort, use chemicals. But help bees help themselves first. BC

How-To-Do PETTIS RESISTANT TEST

The Pettis test for Apistan® (fluvalinate) resistance can be used to determine mite resistance when a beehive doesn't appear to respond to chemical mite control measures. The test uses Apistan®, but it can easily be modified to test for resistance to Coumaphos.

The following materials are required:

- pint jar with 2 piece lid (canning jar);
- light metal mesh lid for the jar (8 mesh to the inch hardware cloth);
- 3 x 5 index card, staples & sheet of white paper
- 3/8 x 1 inch piece of *new* Apistan® strip;
- ¼ cup measure to scoop up bees;
- 25% alcohol solution or windshield washer fluid;
- nylon straining cloth and ½ dozen clothespins;
- plastic or rubber gloves;
- 1 gallon feeding pail or small pail;
- sugar cubes

Step 1

Staple a 3/8 x 1 inch section of an Apistan® strip to the center of a 3 x 5 card. Make sure to handle the Apistan® with gloves. Place the card in the jar with the section of Apistan® strip facing inwards. Place a sugar cube in the jar.

Step 2

Shake bees from one to two brood combs into an upturned hive lid, a bucket or box. Scoop up ¼ cup (about 150) and put them in the jar, being careful not to damage them.

Step 3

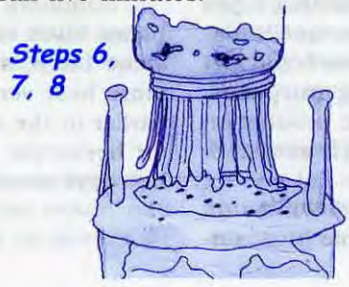
Replace the solid, round metal section of the canning jar lid with a piece of wire mesh and screw the lid onto the jar to stop the bees from escaping. The holes in the mesh should be large enough to easily let *Varroa* through. Place jar in an incubator or a warm (80°F) dark room for 24 hours. Make sure the lid isn't covered so air gets into the bees.

Step 4

After 24 hours, hold the jar four inches above a piece of white paper and turn it so the mesh lid is facing downwards. Hit the jar with the palm of your hand three times. Record the number of mites that fall on the paper.

Step 5

Knock the bees to the bottom of the jar. Remove the index card with the attached strip and fill the jar halfway with the alcohol or washer fluid. This should be done outside using gloves. Remove the mesh lid and replace with the original solid lid for the jar. Shake the jar vigorously for a full five minutes.



Step 6

Remove the solid lid and replace it with the mesh lid. Pour the fluid into the straining cloth clothes pinned to the pail. Refill the jar with fluid, swirl the bees around and pour through the strainer again.

Step 7

Count the number of mites recovered on the cloth. If the total number recovered in both samplings (Apistan® plus fluid) is less than five, results should be discarded.

Step 8

To calculate the percentage of mites killed by Apistan®, divide the number of mites that initially fell on the white paper before the bees were killed by the total number of mites recovered (both on the white paper and the straining cloth). Percent kill by Apistan® = initial kill / (initial + final kill) x 100. If less than 50 percent of the mites were killed by the Apistan®, the mites may be resistant and should be tested with a more sensitive laboratory test.

Critical Factors For A Successful Test

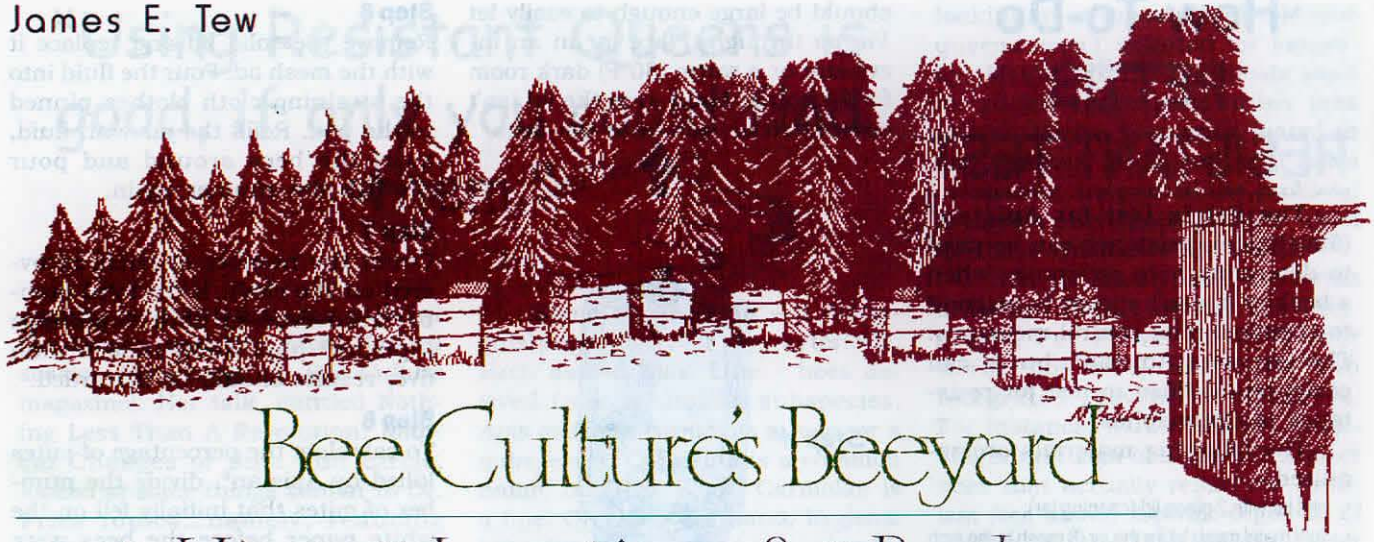
Prescreen hives using the ether roll technique (250-300 bees) and test only those hives yielding five or more mites. This test gives meaningful results only when performed on hives with adequate mite levels. Do not expect levels of resistance to be the same among hives. Select 12 hives per apiary. More is better. This test is not designed to identify individual hives showing resistance. Use apiary averages to assess the results.

Perform the test exactly as described. Jar size, size of Apistan® pieces and temperature are important.

Ensure that bees are mobile in the jars so they contact the strips. Cool temperatures may cause bees to cluster away from strips. If using a darkened incubator it may be helpful to open the incubator periodically to admit light and fresh air to encourage bee movement. Do not reuse strip pieces or index cards. Wash jars between tests.

Do not expose jars with Apistan® pieces to sunlight for any length of time. It is best to keep the jars in storage boxes before and after filling until they are incubated. Sample bees from brood frames, and avoid the queen. For accuracy and to avoid bee injury, use a measuring scoop. Do not scrape bees into jars. BC

James E. Tew



Bee Culture's Beeyard

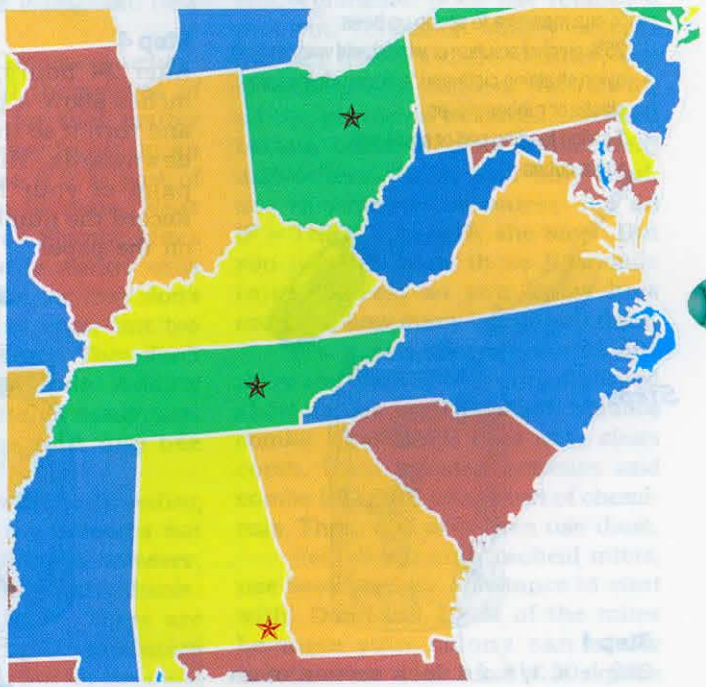
2 Hives, 3 Locations & 3 Beekeepers

I have two younger brothers – Don and Dwight. We are all, in one way or another, involved in beekeeping. Don lives in southeastern Alabama, near Dothan. Dwight lives in Franklin, Tennessee, near Nashville. I live in Wooster, Ohio, near Cleveland. Though the three of us keep bees, we keep them under very different weather conditions.

What if?

What if I took two hypothetical hives and compared them under the three different climatic patterns that my brothers and I experience? What's the same? What's different? Which of the three of us has it the best?

For the sake of discussion, my imaginary hives are established in two deeps and are producing colonies. They are in standard equipment and are kept for general honey production and some occasional pollination work. The hives are managed in traditional ways for each area.



Don, in Alabama

Alabama's temperate climate ranges from the cooler northeastern Appalachian foothills to the subtropical coastal plain. Summers can be hot and humid (90°F with some hotter days). Normal Winter temperatures range from lows in the mid 20°F to highs in the upper 50°F. Daytime highs reach 78-85°F with evening lows of 50-69°F (Data from Yahoo.com). Don is in the subtropical coastal plain in SE Alabama – particularly hot and humid.

Winter

By my Ohio standards, these hypothetical hives never have to withstand real Winter weather in SE Alabama. Rarely does a week go by when Don could not open these hives for general beekeeping purposes. Splits can be made much earlier and queen production can run later in the season and can begin earlier in the Spring (Probably in mid-February).

In theory, our two special hives could Winter on smaller honey crops when compared to Ohio hive consumption, but since they can fly much more often, they can use too much honey on fruitless foraging trips so hives should be left with similar amounts of honey stores as colonies in colder climates. However, if Don's hives run low, due to the exceptionally warm climate, they can be fed much easier, plus the colonies are not as stressed by cold weather.

Summer

Summers are hot and humid. If possible, our Alabama hives should be in the shade. If the hives become large, supers should be staggered to allow for more heat ventilation. The colonies should be worked earlier in the morning or late in the afternoon – mainly for beekeeper comfort. Stings from strong colonies on hot days seem particularly painful.

These two hives can be productive nearly anywhere.

Nectar and pollen flows

The primary nectar flow comes in March and April from Tupelo, Gallberry, Tulip Poplar and wildflowers. Though goldenrod blooms profusely, there is not an impressive Fall flow. There is absolutely no nectar flow in the hot Summer and very little pollen. Even in cold months, there is a scant pollen flow, from what I don't know – possibly Camellias. Though the climate is great for beekeeping, this area is not known for its honey crops. Strange, isn't it?

Pests and Diseases

All the common pests and predators are present in SE Alabama. Control for mites and American Foulbrood is the same as in Tennessee and Ohio. But there are some different challenges to be addressed.

Cockroaches These guys are amazing. A wintering hive can have hundreds. They scurry all about as Don opens our hives. I can't tell that they cause problems, but they are obnoxious. They are in both the hives and in stored equipment. They particularly love inner covers.

Fire Ants If you don't live in an area with established fire ant populations, it will be impossible to describe them to you. They build incubation mounds next to and beneath the hives. They are small and their numerous stings are painful. Oddly, as they scavenge about the hive, they keep things cleaned up. Though other beekeepers will vociferously argue with me, I have never known of fire ants to kill productive colonies. In fact, I suspect they may be advantageous in suppressing wax moth populations. Since we can't eradicate them, I suppose I am trying to find some reason to want them.

Wax Moths The "moth" is present at all times. At least in cooler climates, we can take a wax moth break in cooler months. Don must deal with them year-round.

Chiggers (Known as "Red Bugs" to Alabamians) Chiggers are very small spiders that burrow beneath your skin for a blood meal. The itching they cause is annoying and lasts for several days. Unfortunately, they are in many of our yards, waiting for us.

Poisonous snakes They live here, too. Don must keep a watch for them all year, though wintertime is reasonably safe.

Commercial Pollination

Cucumbers and watermelons require commercial pollination in SE Alabama. In theory, Don would rent our two hypothetical hives to commercial producers for much of the Spring and Summer. Otherwise, pollination concerns are similar to Tennessee and Ohio.

Dwight in Tennessee

Tennessee tends to be hot and humid in the Summer, though the higher you go into the mountains, the cooler it gets. Temperatures range 66-90°F in June-August. Expect thunderstorms in Summer, especially in July in the Smoky Mountains. Winters are mild (seldom below 10°F), but they're often wet. Snow rarely lasts more than a few days except in the mountains. April-May temperatures range 53-87°F, though Spring weather can be unsettled (data from Yahoo.com). From a beekeeping weather stance, Dwight has it good, but not as good as Don.

Our two hives

If we moved our two hives to Franklin, Tennessee, they would be in a suburban area – lots of people, but lots of open areas; overall, a very scenic place. Whereas Don's location was much more rural, even agricultural – like me in Ohio – Dwight is an urban/suburban beekeeper.

Winter

Winter months are more pronounced, though still not severe. Snow comes occasionally and is only useful, primarily, for photographic purposes. Dwight could probably work our imaginary hives during all months except for January and parts of February. Generally, Winter is more of a slow time in beekeeping rather than a trying time.

Summer

Summers are hot and uncomfortable when working bees. Working hives in cooler parts of the day applies here also. Bees from strong colonies will frequently beard on the front of the hives, but rarely does Dwight make provisions for extra ventilation.

Nectar and pollen flows

As in our other two locations, the Spring crop is the primary crop for the year. Pollen becomes more scant, even non-existent, in Winter months. The pri-

mary nectar crops come from clovers, some forest tree crops, and wildflowers. The primary crop is produced in March, April and May. Middle Tennessee rarely experiences a fall surplus crop. No part of Tennessee is a major honey-producing area, but the demand for local honey is great. Dwight has no problem finding buyers for his honey.

Pests and Diseases

Tennessee beekeepers contend with all the common bee problems as beekeepers from other areas. Nothing better or worse here. However, I can't tell that Dwight experiences any novel problems, like roaches or fire ants, when compared to Don. The wax moth can't be ignored. However, there is one specialty problem – ticks in the bee yard. Appropriate precautions must be taken.

Commercial Pollination

There is no commercial pollination, though Dwight would not have a problem finding a farmer who would welcome some hives on his farm. However, there is a general appreciation of bees as pollinators. In fact, the State of Tennessee Department of Agriculture offers some monetary support to the state beekeeping group to promote bees and pollination.

Jim (me) in Ohio

NE Ohio Summers are warm, with most areas seeing 90°F temperatures for at least a few days. Humidity can be uncomfortable at high temperatures, though generally not excessively so. Expect more rain in late Spring and early Summer, including thunderstorms and the possibility of tornadoes. Temperatures in my area range 37-70°F in April and May. Fall is the sunniest season, with warm September days running 52-81°F. Winters are cold (17 to 43°F) with plenty of snow, especially in the snowbelt near Lake Erie (Data from Yahoo.com).

Our two hives moved again

Our two hives could essentially be set out anywhere in NE Ohio. Though Summers can be hot, supplemental shade is not required, indeed, not even desired. Though NE Ohio has many city areas, I am located in a rural area – an easy place to find bee yards. Though not in the balmy South, bee colonies are reasonably comfortable here.

Winter

NE Ohio Winters are meaningful. (All of you beekeepers from colder climates are probably beginning to chuckle about now.) January and February are the true Winter months when absolutely no outdoor hive work can be done. Also, December and March are generally questionable. Additionally, Spring is undependable with late season frosts being a common event. While snow is common, a snow covering for the entire winter season is rare. Mud is much more common during my Winter.

Summer

Compared to Tennessee and Alabama, a NE Ohio Summer is a breeze. It gets hot, but not too much (even though Ohioans complain mightily during July and August).

Nectar and pollen flows

If located here, our two colonies would get a good Spring buildup from fruit bloom and early season pollen sources such as maples. As with the other two locations, our primary flow is the Spring flow with an occasional Fall flow coming from Fall asters and goldenrod. Clover is the nectar producing plant standard, but basswood and tulip poplars are good tree-producing nectar and pollen sources. As in Alabama and Tennessee, Ohio is not an outstanding honey producing state, though we do get higher average crops than the other two locations. As is the usual case, local honey sells well.

Pests and Diseases

Compared to Alabama and even to Tennessee, I don't have any novel pest problems. As I have said previously, common pests and diseases are controlled in the same manner in all three areas.

Mice Mice need to be mentioned. Though they are ubiquitous, I would need to take more precautions in NE Ohio than in the other two locations. Honestly, from a pest stance, I have it easy compared to my brothers.

Commercial pollination

Fruit trees, pumpkins, melons and cucumbers require supplemental pollination in my area. I commonly rent colonies for that purpose and I predict that my two roaming hives would do some pollination time in some of these crops. As in the other two locations, gardeners abound and there is a strong appreciation for the pollination services provided by honey bees.

Who has it better?

Of my brothers and I, who has it better? I have fewer pests and work under cooler conditions in the Summer. However, during the Winter, there are long periods of time when I can't do anything in my hives. I envy my brothers' advantage here. But, I make a slightly larger honey crop and don't have to contend with as many pests as my southern brothers.

However, they can Winter smaller colonies and manage them better during Winter months. They can install queens earlier and later and, in general, enjoy beehive manipulations throughout the year. In essence, beekeeping is the same in all areas except for the climate and colony food sources.

After this quick comparison, I feel that it's a draw[1]. There are good and bad reasons for keeping bees anywhere in this country. All we can do is work bees under our individual conditions. **BC**

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[1] A personal message to Don and Dwight, my brothers – Don't believe any of this article. Ohio bees are the best. JET

?DO YOU KNOW?

Honey Chemistry & Biochemistry

Clarence Collison
Mississippi State University

Honey is often described as nature's natural sweetener. In recent years the National Honey Board has investigated and promoted new uses of honey in hopes of increasing honey consumption. Many of these new uses have involved using honey as an ingredient in food or as a part of a drug or cosmetic. Some of these value-added uses have raised concerns in regards to the microbial content of honey. In order to develop new markets and honey products, it is also important to understand the chemical and physical properties of honey. More recently it has been shown that honey contains antioxidants, so health conscious individuals have suddenly become more interested in honey, as well.

Take a few minutes and answer the following questions to find out how well you understand these important topics.

The first ten questions are true and false. Place a T in front of the statement if entirely true and F if any part of the statement is incorrect. (Each question is worth 1 point unless otherwise indicated).

1. ____ Infant botulism spores are killed when honey is heated to kill yeast cells that cause fermentation.
2. ____ Infant botulism is caused by the consumption of a toxin produced by the bacterium, *Clostridium botulinum.*
3. ____ Infant botulism spores can be pressure filtered out of honey.
4. ____ Honey is a product containing minimal types and levels of microbes.

Following are possible reasons why microorganisms normally do not grow in honey.
Please indicate which statements are True or False.

5. ____ Microorganisms cannot tolerate the acids found in honey.
6. ____ Honey's glucose oxidase system forms hydrogen peroxide which is toxic to microorganisms.
7. ____ Microorganisms often require more protein than there is in honey.
8. ____ High sugar content and limited amount of water makes microorganisms shrivel.
9. ____ Oxygen cannot penetrate honey because of its viscosity; many microorganisms need oxygen.
10. ____ Subatomic particles create an unfavorable charge in honey.

(Multiple Choice Questions, 1 point each)

11. ____ The microbe most likely to be able to grow in honey.
    A) Viruses
    B) Bacteria
    C) Molds
    D) Yeasts
    E) Protozoa
12. ____ The predominant yeast found in honey is called:
    A) *Saccharomyces*
    B) *Lipomyces*
    C) *Schizosaccharomyces*
    D) *Zygosaccharomyces*
    E) *Rhodotorula*
13. The non-spore form of a microbe is referred to as the _____ stage.
14. Why are babies under the age of one susceptible to infant botulism and not older children or adults? (1 point)
15. Why is honey blamed for transmitting infant botulism? (1 point).
16. What is a distinct advantage of using honey rather than sugar in the baking industry (1 point).

Honey is known to contain five biologically active enzymes. Please match the following enzymes with their appropriate action.

A) Invertase B) Diastase (amylase) C) Glucose-oxidase
D) Catalase E) Acid Phosphatase

17 ____ Enzyme responsible for the production of gluconic acid and hydrogen peroxide in dilute honey.
18. ____ Responsible for splitting sucrose into glucose and fructose.
19. ____ Enzyme that aids in converting starch to sugar.
20. ____ Function unknown.
21. ____ Regulates the activity and balance of glucose oxidase.

22. The ash content of honey is related to the _____ found in honey. (1 point)
23. Name the two primary monosaccharides found in honey. (2 points)
24. The viscosity of honey is related to the _____ content. (1 point)

ANSWERS ON NEXT PAGE

?Do You Know? Answers

1. **False** *Clostridium botulinum* spores that are responsible for causing infant botulism are the most heat resistant spores known. Boiling at 212°F a full six hours is required to ensure their destruction. Honey is heated at much lower temperatures for a much shorter period of time.
2. **False** In infant botulism the toxin is not eaten but produced by bacteria growing in the child's intestine. In adults, botulism is poisoning that results from the eating of an excess of a toxic chemical produced by the bacterium *Clostridium botulinum* and consequently is known as food poisoning.
3. **False** Spores that cause infant botulism are very small and cannot be filtered out of honey even with pressure filtration and diatomaceous earth.
4. **True** Honey has special properties that inhibit or kill most microbes (microorganisms). However, a few types of microbes can persist (some in a dormant state) in honey. Only certain conditions permit microbes to persist or grow. Ideal conditions for growth vary from one microbe to another. Factors influencing growth include temperature, moisture content, nutrients, oxygen, and pH (i.e., the degree of acidity or alkalinity). When honey is used as an ingredient in a food product, it could contribute either spores or vegetative microbes that might grow in the final product that could contribute to spoilage.
5. **True** The acidity of honey is not conducive to microbial growth.
6. **True** Hydrogen peroxide is formed by the glucose oxidase system, which is active only in unripe or diluted honey that has not been heated. This system inhibits many different species of bacteria, and to a lesser extent, molds and yeasts.
7. **True** The small protein content and high carbon-to-nitrogen ratio of honey are not conducive to microbial growth.
8. **True** Due to the high sugar content of honey, water is drawn out of any microbes that are present and into the surrounding honey causing the microbes to shrivel and die.
9. **True** The viscosity of honey opposes convection currents and limits the entry of dissolved oxygen which is required for growth by many microorganisms.
10. **True** Special sugars in honey (reducing sugars) create an unfavorable 'electric charge' that discourages growth of molds and aerobic bacteria.
11. D) Yeasts
12. A) *Saccharomyces*
13. Vegetative or reproductive
14. Infants do not have a mature defense system in their intestine and hence, *Clostridium bolulinum* spores can attach and grow, produce toxin and cause infant botulism.
15. The spores of *Clostridium bolulinum* can be found in soil and dust all over the world. Any raw agricultural product may be carrying the spores. These spores are absolutely harmless if eaten by anyone except infants susceptible to infant botulism. They are consumed every day and are totally inert. The problem is not that honey contains more spores than other agricultural products but that many mothers are unaware that honey is a raw product (has not been sterilized) and may use it to sweeten baby food and pacifiers.
16. Using honey in the baking industry gives the final product a desirable moist texture and improved keeping qualities.
17. C) Glucose-Oxidase
18. A) Invertase
19. B) Diastase (amylase)
20. E) Acid Phosphatase
21. D) Catalase
22. minerals
23. glucose (dextrose) and fructose (levulose)
24. water or moisture

There were a possible 25 points in the test this month. Check the table below to determine how well you did. If you scored less than 12 points, do not be discouraged. Keep reading and studying- you will do better in the future.

Number Of Points Correct
25-18 Excellent
17-15 Good
14-12 Fair

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A TASTE OF HONEY

Ann Harman

So, really, what does honey taste like?

As you are sitting comfortably on a park bench nibbling a bar of chocolate you notice that a small spacecraft has landed not far away. Soon you are approached by a little green man from Mars (that's what it says on his tee-shirt) who asks "What are you eating?" You reply that you are eating a bar of chocolate. "What does that taste like?"

Well, what are you going to say? What does that bar of chocolate taste like? Remember, the little green man from Mars has never seen or tasted a chocolate bar. Think about this carefully.

If you tell him it tastes "good" then how will you describe how an apple tastes, or a succulent pickle, or a slice of roast beef? We frequently say these foods taste "good." Answering the little green man by saying "it tastes like chocolate" is meaningless. There is no chocolate on Mars. Keep thinking about your answer – he's waiting for it.

We have the same problem when our customers look at our jars of varietal honeys and ask "What does that taste like?" We cheerfully answer with words like "mild and sweet" or "robust" or "strong." What information does that convey? Not much.

Honey producers have much the same problem as wine producers. We read their labels and see such words as "Pinot Noir" and "Chardonnay." Color will give us a clue, as is sometimes the case with honey. But let's look at a few white wines for a moment. There is Chardonnay, Tokay, Riesling, Sauterne, Chablis – some are sweet, some are not, but each one different from the rest. Although we may be at a loss for words to describe their different flavors, the wine industry has created some quite elaborate descriptions.

Let us look at some of the descriptions that the wine industry uses to let us know what taste a particular wine will have. Here is a description of a domestic champagne: "Chockablock with fruit flavor – raspberries, strawberries, cherries, lemon – plus some toast and honey..." Or this one: "Orange, lemon, grapefruit, pear and peach, plus exotic perfumes from rare grapes." Yes, very dramatic descriptions, all designed to make us try that particular bottle of champagne.

Actually the wine industry is not the only one using those dramatic descriptions. Here is a one for Darjeeling tea: "A delicate, silky tea, its taste has often been likened to muscatel, the sweet rich European dessert wine." Or for Earl Grey tea: "An unusual blend of scented Oriental teas producing a delicate liquor of exceptional fragrance much appreciated in all parts of the world." Or one for some Indonesian coffees: "They are characterized by full aroma and body and a deep mellow flavor that lingers long after the coffee is gone."

How are these descriptions created? Do those champagnes really taste like a fruit punch? No. Those descriptions are from professional tasters, people with a special talent who can discriminate between different flavors and aromas. What do professional tasters do?

For one thing, tasters must consider that our four basic tastes – sweet, sour, salt, and bitter – are sensed by 10,000 taste buds hidden in various places not only on our tongue but also in other places within the mouth and nasal cavity These taste buds respond to the various foods we eat. But taste buds are not the whole story In fact what you learned about our sense of taste in school is a much different story today. The sense of taste, coupled with that of smell, is very complex.

We need our sense of smell in order to taste. With your eyes blindfolded and your nose pinched tightly shut have someone feed you a piece of apple and a piece of turnip and then have you tell the difference. Since the texture of

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Not as easy as you thought, is it?

these is similar you will not be able to say which is which. Texture of a food is a clue to its taste, but in our minds we will be making a comparison. Using a piece of apple and a piece of orange in the above experiment will not work. You will detect the texture of the orange and be able to guess without really tasting.

First of all professional tasters smell the wine – or coffee or tea. Odor is a very important part of our taste. Have you ever had your nose completely stuffed by an awful head cold and found that the foods you were eating all tasted like – nothing? Without aromas our taste perception is dulled. Our taste discrimination can also be dulled by temperature, such as the cold of ice cream. If you want to have fun sometime and horrify people, sprinkle a little pepper on a bowl of nice cold ice cream. You will not taste the pepper at all. Your taste buds have been numbed by the cold.

By the way, our man from Mars is still waiting for an answer.

After the sniffing, the wine is taken into the mouth and kept there and swished around to encounter all the areas sensitive to taste – and that includes sensory parts of the inner nose. A professional taster does not swallow all the wine, although many of us would at an informal tasting. Initial tastes as well as aftertastes are carefully noted and described.

It is the description that can be difficult. You see, the only way we have to describe flavors is to make a comparison – a comparison to something we should be familiar with. To say that basswood honey has a minty flavor is making a comparison to mint, a flavor many are familiar with. The buttery taste of thistle honey assumes that we are familiar with the taste of butter. Words like "rich" and "robust" convey certain information but are more descriptive of an overall sensation.

It is true that beekeepers have difficulty describing the flavor of different honeys. When a number of them were asked to describe the flavors of certain honeys, all admitted that it was difficult, very difficult, to find words to do that, even with favorite honeys. Words like "sweet," "mild," "strong" were common. Other terms such as "bland" and "overpowering" were used. Several of them referred to a honey as having an "aftertaste" but were unable to describe it. Some simply said they did not like a certain honey "because I do not like the taste," but were unable to give a description to that taste.

Thus we have a problem describing the flavors of our honeys to those who ask. Should we take a hint from the wine industry and develop very descriptive terms using comparisons to foods that we are familiar with? Or will that confuse the customer who may think we are offering a flavored honey and be quite disappointed that the jar contains just honey, even if it is delicious?

Certainly giving taste samples is one way around the dilemma. But we cannot be everywhere our honey is being sold to hand out samples. We can give our attractive brochures describing our honeys – but what do we say? We cannot promise that each and every varietal is wonderful and delicious because taste is quite a personal response. There are those who love buckwheat honey and those who do not wish to taste it again. You see to those who do not like buckwheat honey, the taste was discovered by tasting, not from descriptive terms.

Actual tasting does hold true for determining which wine, coffee or tea – and even honey – we prefer, in spite of the descriptive terms used to entice us. Here is a quote from a brochure designed to promote tupelo honey. "It has a mild, pleasant flavor..." Although the brochure is a font of information on tupelo honey, those words are the only ones that attempt to describe its flavor. Those words, however, could be used to describe other honeys from all across the country.

The National Honey Board, in 2001, published a study on honey flavors. The six-page paper is called "Sensory Attributes of Honey." An update of this should be appearing on the nhb.org web site. Let's see what some of their tasters said about honey flavors. Clover honey was said to have a spicy cinnamon aroma and flavor. But tupelo honey also had that description. And certainly clover does not taste like tupelo. Here we see flavor being described in terms of another familiar flavor. Avocado honey was deemed to have a molasses prune and metallic flavor. Buckwheat was described as "barny" and having that molasses prune flavor as the aftertaste. Sage honey was described in terms of clover honey – "clover nectar flavor."

Now what do some of these terms mean? For example, what is "barny?" The "barny" flavor was defined as having a barn-like flavor. (Which leaves me to guess whether I should check out the flavor of my cattle shed or the horse barn.) The molasses prune is easier to figure out – a flavor like molasses along with prune or raisins. That describes it better, perhaps. However the flavor described as "clover nectar" is defined as "flavor like clover nectar." That is no help unless we know what clover nectar tastes like. And do all clover nectars taste alike?

I think that after reading these descriptions we can agree with the beekeepers who reported that it is difficult, very difficult, to describe the flavor of a particular honey. We do much better if someone asks us the flavor of a piece of hard candy. We can reply with a fruit term such as orange or lemon, if indeed it is a piece of lemon candy. We would describe the flavor of an apple pie with words like apples and cinnamon. We know what a slice of roast beef tastes like and would never confuse that taste with that of a pineapple. So we describe flavors with familiar terms, words that originate in foods we know. Describing the flavor of a pizza, a complex mixture, is easy. It depends on what you selected to accompany the tomato sauce and cheese on a bread-like crust. But to describe a particular honey, we are at a loss.

OK, it is time to go ahead and tell the little green man from Mars what that chocolate bar tastes like. He's been waiting quite a while. BC

Ann Harman is a sideline beekeeper and international marketing consultant.

Richard Taylor

Bee Talk

"Dr. Tom Seeley is an intellectual descendent of Karl von Frish, and he studies nature in the same spirit."

A few years ago I wrote about some of the extraordinary results of Dr. Tom Seeley's honey bee research. I recently got to wondering what he has been doing since then, so I arranged to have lunch with him. I learned that he has been concentrating on the behavior of bee swarms, and the general picture he set forth quite amazed me. He then sent me some of his scientific papers embodying this research, and these fed my astonishment and wonder still further. I decided that I should try to put all this into the layman's language to which I am accustomed and bring it to beekeepers who find scientific writing as formidable as I do. The papers are filled with graphs and tables and no small amount of technical terminology but are nevertheless, beneath all this, beautifully written, and they manage to convey the author's sense of wonder. Dr. Seeley is an intellectual descendent of Karl von Frisch, (who was awarded a Nobel prize for his studies of bees), and he studies nature in the same spirit.

What I'll do now is describe what happens when bees swarm, beginning with their search and discovery of a new nesting place, and ending with their moving into it.

A potential nesting place, such as a hollow tree, is the discovery of a single worker bee, who has gone in search of it. We tend to think of bees as behaving mechanically or mindlessly going through certain stages, one of which is to gather nectar and pollen. But here is a bee that departs from that set routine, one that, out of the thousands of her sisters, which continue in their set ways, embraces a brand new purpose, to go find a hollow tree.

This does not mean that just one bee from the entire colony goes forth for this. Many others, perhaps hundreds, have quite suddenly undertaken the same goal, so that before long several potential nesting places will have been found, some sooner and some later. But still, the number of bees that have, at that particular point in the history of the colony, set about with this relatively novel purpose is minute in comparison with the total population of the hive, which may be 40,000 or more.

This search bee, who has finally found what might be a suitable nesting place, now recruits others to come check it out. If, however, it is too late in the day for this, then that solitary bee will stand by what she has found and *guard* it. This was described to me by Roger Morse, who found such a bee guarding a newly discovered hollow. When Dr Morse approached, this bee rose up with forelegs extended in a defense posture. If this does not strike you as quite amazing, then think about it for awhile.

Before going back to recruit other bees to come check out this find, the original bee must, of course, first ascertain whether in fact it *is* a suitable nesting place. In particular, she must see whether it is of the right volume, neither too small nor too large. She has, in fact, fairly rigorous criteria, as we shall see shortly.

How does she do that? How does she determine that, for example, the discovered hollow is neither too small nor too large? She cannot just look to see. A bee's eye is not of the right construction to assess volume, and even more to the point, it is dark in there. So how does she do it?

She walks around, much as a person would measure the size of a big room by pacing it off and counting steps. The bee goes around and around, up and down, occasionally taking wing briefly, until she finally, if we can put it this way, has a fairly clear idea of how big that hollow is.

But volume is only one thing to consider Other criteria must be met, and we shall turn to these later.

Having decided that this hollow would be more or less suitable as a new home for the swarm, this bee must bring it to the attention of others. It has to be checked out. Sister scouts have been searching the woods, in the same way she has, and perhaps some of them might have found even better hollows. Somewhere down the line a *choice* will have to be made, and this means that recruits will have to be summoned to these various potential sites and a way found to select the best one, if possible.

The manner of such recruiting is well known. The scout bee returns to the swarm and dances on the surface, the familiar figure-eight dance, in the same manner that foragers are recruited to new nectar and pollen sources. The direction of the middle part of the figure eight

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BEE TALK ... Cont. From Pg. 53

conveys the direction of the discovered hollow, in relation to the position of the sun at that time, and the duration of that part of the dance conveys the distance. If it is a highly desirable hollow, as determined by the several criteria yet to be described, then the dance is very vigorous and long-lasting, suggesting to a human observer a sense of excitement. If it is a less suitable site, but nonetheless an acceptable one, then the dance is brief and sluggish, suggesting a half-hearted recommendation.

Before long, then, while the swarm is hanging clustered and quiescent, several bees will be found dancing on the surface, with the characteristic figure eight patterns at odds with each other, indicating a variety of possible nesting sites, at different directions and distances. It is quite impossible for a human observer to tell, for perhaps several hours, which of these are likely to prevail and which are less apt to do so, but over time some of the dances disappear while others increase in number, and in time, virtually all the dancing scouts are performing the same excited dance pattern, indicating that they are agreed upon one and the same potential site, presumably the best of all the several that have been considered.

Soon thereafter the swarm takes off and flies *en masse* to that hollow, its new home. It is important that the site selected be a good one, for it will be the permanent home, perhaps for years or decades to come.

That is the general picture. The truly astonishing things are in the details, which I have barely touched upon. So next time I'll go into these, and, equally important, I shall describe the experimental procedures Dr. Seeley and his co-workers developed to discover these details. They disclosed more than a few surprises, but much of Dr. Seeley's scientific standing rests upon his ability to ask just the right questions, and then devise an experimental setup that will enable him to answer, unequivocally, just those questions. BC

Richard Taylor is a lifelong beekeeper and philosopher living in the Finger Lakes region of New York.

JANUARY 2003 • ALL THE NEWS THAT FITS

NATIONAL ORGANIC STANDARDS LAUNCHED

On October 21, Agriculture Secretary Ann Veneman launched the implementation of USDA's national organic standards for agricultural products providing consistent labeling on products coast to coast.

The organic industry is reportedly growing by between 20 and 25% annually, and has been for the last several years. U.S. retail sales of organic foods reached approximately $7.8 billion in 2000, with global sales topping $17.5 billion.

"Today, when consumers see the USDA national organic seal on products, they will know that the products labeled organic will be consistent across the country," said Veneman. "Organic agriculture is increasing and organic farmers across the country have been looking forward to the release of these regulations with anticipation they will create consumer confidence in their products."

The standards were developed through extensive industry input and hundreds of thousands of public comments. As of the October 21 implementation date, any organic agricultural product must meet USDA standards in order to be sold as "organic." Along with the national organic standards, USDA developed strict labeling rules to help consumers know the exact organic content of the food they buy. Consumers can tell organically produced food from conventionally produced food by looking at package labels and watching for signs in the supermarket.

"We're very pleased with the work that USDA employees and the Organic Standards Board have done over the years to finalize these regulations," said Veneman. "Today, consumers will begin to see the results of these efforts."

The USDA Organic Seal tells consumers that a product is at least 95% organic. Products with 70 to 95% organic ingredients can say so on the label (made with organic fruit, for example), but they can't display the seal.

"The focus on consumer awareness is just beginning," said A.J. Yates, administrator of the USDA Agricultural Marketing Program. "To coincide with implementation of the standards, we have updated our Web site to make it more user-friendly and provide consumer information through a variety of avenues."

Consumers can access the information at www.ams.usda.gov/nop. In addition, USDA's Foreign Agricultural Service has also upgraded its organic Web site www.fas.usda.gov/agx/organics/organics. The site provides information and resources to organic food and beverage exporters.

Other USDA efforts in the organic arena include an Economic Research Service report released last month, "Recent Growth Patterns in the U.S. Organic Foods Market," that indicates that U.S. organic farmland has increased from approximately 1.4 to 2.4 million acres. The report can be accessed at www.ers.usda.gov

USDA is administering a $5 million, national cost-share program to help defray the costs of certification incurred by organic producers and handlers in all 50 states, the U.S. territories, the District of Columbia, and Puerto Rico.

USDA will also set aside $3 million per year for fiscal years 2003-2007 to administer competitive research grants, largely through Extension.

reprinted from The Vegetable Growers News

Elephants vs. Farmers

BEE OFF WITH YOU

Elephants, proverbially, are afraid of mice. Well, it's a nice story, but don't rely on it to frighten the beasts from your smallholding. Poachers aside, the most dangerous thing an elephant is likely to meet is a disgruntled farmer with a rifle. And farmers have good reason to be disgruntled. In many parts of Africa, farms are routinely trashed by visiting elephants. In this case, therefore, prevention is better than cure for both sides. And some work just published by *Naturwissenschaften* may point the wan, using tiny creatures that elephants really are afraid of: bees.

Although elephants are thick-skinned, they have sensitive patches behind their ears, under their trunks and around their eyes. Sometimes, according to beekeepers, an entire herd can be stampeded by a swarm of bees. So Fritz Vollrath of the Mpala Research Centre and Iain Douglas-Hamilton of Save the Elephants, both based in Kenya, have tested the idea that elephants' visits to farms might be discouraged by strategically placed beehives. It seems they are – and that the hives do not necessarily even have to be occupied.

Dr. Vollrath and Dr. Douglas-Hamilton hung their hives in acacia trees on a ranch in central Kenya. Apiculture is an established industry in this area, and tree-hanging hives of standard design are readily available. The two researchers used six occupied hives, and also 30 empty ones that had been primed with honey in order to smell as though they might be occupied. They deployed them in two well-known elephant foraging areas, where trees are routinely browsed by the beasts. They also chose 36 other trees, similar to those in which they had hung hives, as controls.

Hanging an occupied hive in a tree turned out to be very effective. None of the trees thus protected suffered damage. Trees with unoccupied hives got some protection as well. Although they were subjected to light browsing about as often as control trees, none suffered substantial damage. In contrast, nine of the controls were seriously damaged by the attentions of elephants.

Hanging hives in a farm would not be a cost-free option. Bees attack people, too, so beekeepers would be needed. On the other hand, honey is a valuable commodity, so apiculture might prove a profitable sideline for farmers. If it could be labeled "elephant friendly," it might even turn into a premium product.

reptinted from The Econimist

INTERNET RESOURCES

FDA Guide to Minimize Microbial Food Safety Hazards
www.foodsafety.gov/~dms/prodguid.html

Food and Drug Administration
www.fda.gov

Food Marketing Institute
www.fmi.org/foodsafety/

Food Safety & Inspection Service
www.fsis.usda.gov/

Good Agricultural Practices
www.gaps.cornell.edu/

Government Food Safety Information
www.foodsafety.gov

National Food Safety Database
www.foodsafety.org/

Ohio Food Safety Initiative
www.midamservices.org

reprinted from OSU Vegetable News

UTAH HONORS OWN

Bill and Olive Jones were honored recently for their dedication and service to the UT Beekeepers Association and the Beekeeping Industry in the State of UT. Their influence has been felt far and wide. Although they didn't know it at the time, Bill and Olive Jones began Beekeeping in the 1960's when their son Richard worked on his Beekeeping Merit Badge in the Boy Scouts of America. When Richard and his wife Kathy went to college and needed to sell their 7 colonies to get some money for schooling, Bill purchased those 7 hives and became a beekeeper.

Their hobby has grown from a small hobbyist operation working out of their garage into a commercial business over the last 40+years. Olive retired as an educator, and Bill retired from the Federal Government where he worked for the Bureau of Reclamation. One of their greatest loves is to teach people about Beekeeping and the importance of Honey bees. They both have a great love for beekeepers because they are "down to earth people" balanced in nature and always wanting to learn.

Bill ran over 1000 colonies in his family run operation and understands the commercial side of Beekeeping as well. Olive also worked side by side out in the field pulling honey. Their daughter Liz tells of a memory she has of her father not wearing a bee suit and coming home at night with his eyes swollen shut. He felt that he didn't need to wear a full bee suit because he felt closer to his bees.

Bill and Olive have a vast knowledge of Honey Bees and Beekeeping because of all the research and study they have put into it. They have been involved in the Beekeeping Associations because it was really important to them. Olive has been determined to keep the Hobbyist beekeepers informed and going. They used to drive clear to Montana and California to pick up supplies and Honey bees at a lower cost to help lower the cost of supplies for all beekeepers. Bill and Olive were instrumental in organizing the Wasatch Beekeepers Association, which serves the Hobbyist Beekeepers and Education to the Public. They have loaned out their homes for the WBA at their current location and their former location at 286 Andrew Lane. Many of us still have fond memories from 286 Andrew Lane.

They have provided stability for the UT Beekeepers Assn. for many years and have been Secretary/Treasurer for over 16 years.

SMALL HIVE BEETLE IN AUSTRALIA

Australia has decided the recently discovered small hive beetle cannot be eradicated.

The decision against an attempt to eradicate the beetle was made by the National Management Group, who decided there was a "significant risk that attempts to eradicate would fail because the beetle is difficult to detect in the initial stage of hive infestation," Queensland Primary Industries Minister Henry Palaszczuk said.

The Australian Honey Bee Industry Council reacted by asking the federal and state governments for a A$10-million rescue package over five years.

Council executive director Stephen Ware said A$3.7 million of the package would be used for research into the small hive beetle.

Beekeepers would also be given cash handouts of A$5 a hive to help survive an eight-month drought being described as the worst since European settlement.

"In addition the Queensland government, through the Dept. of Primary Industries, will continue to work with industry to ensure export markets are maintained and acceptable protocols are developed with trading partners."

Ware said the decision to declare the beetle endemic to Australia would create export problems in countries which didn't have the problem.

Already exports of live bees worth about A$4.5 million have been suspended.

The most recent count found 103 infested apiaries in NSW, including 13 feral beehives. Queensland had 15 infested apiaries, including one feral beehive. – *Alan Harman*

TORNADOES STRIKE OH

November 10 an F4 tornado hit Western Ohio. Two lives were lost in Van Wert with many homes and businesses were destroyed and several people injured. The photos above were taken by Darl Stoller of his beeyard. One hive was completely destroyed with various degrees of damage to the other 19 in this beeyard. Forty-eight homes were completely destroyed and another 100 homes were damaged.

CROP INSURANCE THE NEW THING FOR AG PRODUCERS

Ag Secretary Ann Veneman announced, Dec. 2 the awarding of $18.5 million in grants to help provide new ways for producers to manage risks to their businesses, and for outreach and educational opportunities to women, limited-resource and other traditionally underserved farmers and ranchers. "USDA is committed to providing farmers and ranchers risk management tools to build and maintain their businesses," Veneman said. "These projects will help create opportunities for underserved, small and limited-resource producers so that they can become better risk managers."

Meanwhile, USDA officials also announced actions have been taken to assure producers that crop insurance payments and services will continue despite the failure of an insurance company. The risk management tools available to America's producers are delivered by 18 private insurance companies, and USDA's Risk Management Agency (RMA) acts as regulator and re-insurer. Acceptance Insurance Companies, Inc., the parent company of American Growers Insurance Co., one of the Federal crop insurance providers, recently announced a $131 million loss. The NE Dept. of Insurance, the state regulator for American Growers, recently issued an Order of Supervision to guarantee the safe and continuing operation of American Growers. RMA is moving expeditiously in concert with the NE Department of Insurance and company management to ensure that all outstanding policy claims and service will continue uninterrupted. Administrator Ross Davidson said, "Our goal is to have all claims paid in-full and on time."

Display Advertisers

Happy New Year!

Spot And The Bees

Ed Colby

When we moved to the country nine years ago, I convinced Linda we needed a good watchdog. I never thought about a good bee dog.

I asked at the pound what kind of dog Spot might be. The kid who ran the place said, "I know his pedigree. His mother was Rottweiler and lab, and his father was cocker spaniel."

"Impossible," I said.

The kid smirked. "She must have been down in a ditch," he said.

I told him I was looking for a medium-sized dog with a mellow big dog personality. He said, "This is your dog. This little guy is great."

When he opened the cage door, a skinny black dog bounded out. He ran circles around us, then leaped into the arms of his only friend in the world – the kid. Spot weighed maybe 40 pounds. You could see the cocker and lab. Forget what I said about what I was looking for in a dog. I was instantly smitten.

"He's less than a year old," the kid said. "I adopted out his mother yesterday."

Linda came along to the pound to be sure I didn't bring home a silly little poodle, or maybe a wolf. A lifelong cat fancier, Linda loathed dogs. She looked disgusted as I admired Spot and scratched his ears. On the way home, she drove, and Spot rode on my lap. When we got to the house, she said, "The dog sleeps outside." That first night Spot and I slept in our detached studio. He never left my side. The next night we slipped into the bedroom.

It wasn't all roses. We discovered that Spot had a temper and liked to bite. Not big Rottweiler bites, but the cocker spaniel nipping kind. He could also give you that unnerving blank Rottweiler stare. As he began to morph into a dominant male with an attitude, I began to have second thoughts.

One morning while I was shaving, I told Linda, "Well, if Spot doesn't work out, we'll just have to put him down."

Linda turned on her heels. "We don't kill animals at Colby Farms," she said fiercely. At that instant she bonded with Spot, and forever after became his advocate and protector.

I talked to some dog people. Heeding their advice, I got Spot neutered, and we enrolled together in obedience school. He came through both the operation and the training with flying colors, and his behavior improved markedly. He was always a good boy in class, but the teacher never liked him. I never liked her. Maybe it showed. She made the mistake of saying, "Never adopt a pound dog. You never know what you're getting."

More than anything else, Spot likes to ride in the truck. He always used to go with me to the bee yard. The bees themselves didn't seem to interest him, or bother him. That was then. Now he's a bee snapper.

I owned a Rambo hive you know the kind. Those Carniolans belied the placid reputation of their race. Nothing I ever did was right for these gals, and they let me know it. They didn't like to be messed with, but they were excellent honey producers. I learned to put up with them.

Disaster struck on a warm, cloudy, April day, just before the dandelion honey flow. Spot lay by the truck contentedly watching as I checked honey stores.

A couple of hives flirted with starvation, but the Rambo bees waxed fat with hoarded honey. The little darlings appeared industrious, prosperous, placid, even. They had way more honey than they needed. Their upper brood super lay packed tight.

It seemed a reasonable act – to rob the rich to feed the poor. But, like human socio-economic tinkering, this move proved fraught with controversy. I lifted a honey-laden frame from the Rambos, gave it a shake, and instantly became enveloped in a maelstrom of angry bees.

I felt like an American tourist at an al-Qaida pep rally.

Finding myself the center of the bees' attention and the object of their contempt, I stepped back from the hive. Regrettably, this retreat moved me closer to the truck, and Spot. Half the bees that were attacking me instead vented their fury on the dear boy.

Spot snapped and yelped and barked and cried, and he ran and he ran and he ran. The bees followed him 150 yards out into an alfalfa field, where he snapped and howled some more. I hesitated for an instant, because I had my own angry squadron of kamikaze dive-bombers, and I knew if I went to Spot's aid, it would only compound his predicament. But I had no options, so I sprinted over to him and began smashing bees as fast as they landed on his thick, black coat.

Finally the attack subsided, and we dashed back to the truck. We somehow got in without letting in any bees, put our tails between our legs and headed home.

Spot's life changed forever. Now he can't tolerate a bee anywhere around him. Spring is the worst. Bees cruise the yard looking for a flower, and

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