Bee Culture

MAY 1994

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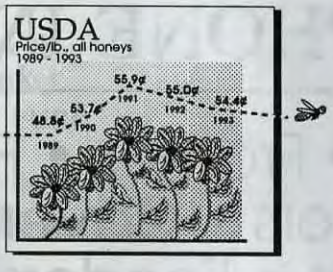

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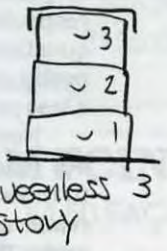

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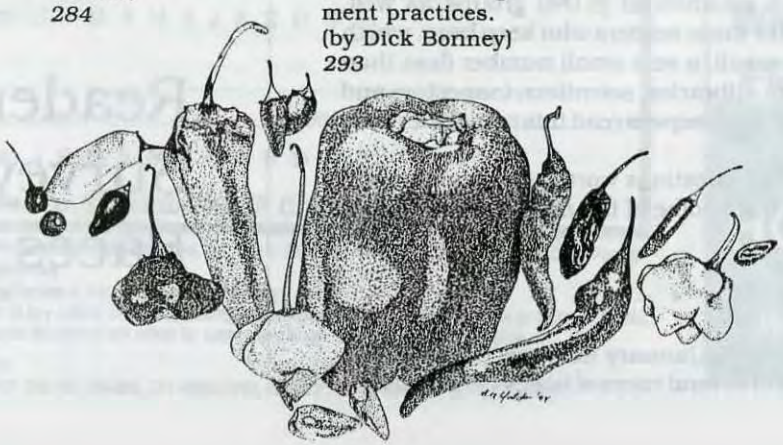

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INNER·COVER

Reader's Survey; Races Update

Last winter we conducted a pretty extensive reader's survey. We sent a questionnaire to nearly half our readers, and over half of them answered the 188 questions we asked. In the end we were able to use information from almost 30% of our current readers. You may have been one we used.

That's a lot of data to absorb, to analyze and finally, to report. We did a survey three years ago, too, but it wasn't nearly this large. Some changes since then are worth noting, however other things haven't changed at all which is worthy of note also.

We're still not done, completely, but we thought we'd pass along some of the preliminary data, the sort that gives an idea of who else reads this magazine. It's pretty basic stuff, I'll admit, but it gives a hint of what's to come.

Not surprisingly, only 9% of us live in what we consider a city. That's compared to 19% three years ago. At first glance it would appear that urban beekeepers are hanging it up. That may be the case. The suburbs have 29% (30% last time) and 39% live in the country. The rest, 23%, actually live on farms. We are, like the rest of the country moving to the suburbs or country and away from the cities. Not surprisingly, though, we still command a rural majority compared to the rest of the U.S. population, who only have about 2% living on farms.

About a year and a half ago we asked each state inspector to estimate how many beekeepers were in their respective states. The number we came up with, though questioned by some, was just over 125,000. We're still pretty confident in that number, though to allow for error a less precise estimate would be between 125 and 150,000.

Nevertheless, when we compared the proportions of our readers that lived in each honey reporting region (1-8) to those numbers, with only a single minor exception, our readership reflects the beekeeping population almost exactly. There was little change from last time, but there has been fluctuations in regions eight and two, both due, I suspect, to mites and/or honey prices. Other questions, which we haven't yet asked the survey may clear up why this is occurring.

The majority of our readers (56%) run 10 or fewer colonies which is significantly different than the general beekeeping population (estimated at 75% or so). And 12% have over 75 colonies, which is still higher than the norm, but not by much. Our strength, it appears, is in the smaller colony number group, but we are well represented in the side line (5.0%) and commercial (6.0%) groups as well. These numbers are for those readers who keep bees, which makes sense. But a small, a very small number (less than .08%) don't keep bees – libraries, scientists, inspectors and the like. It's clear that ***beekeepers*** read this magazine – very clear.

There's more – 188 questions worth. And, as time and space allow we'll forward some of the more pertinent stuff to you. Stay tuned.

•

Races Update. In the January issue we presented an overview of the traits of several races of honey bees available in the U.S. As a comparison we related how those same races, obtained from several U.S. producers fared during last season in northeast Ohio. We started our experiment by hiving packages in May, and closed just after harvest in late August.

To bring you up to date, the races we observed were: Buckfast, from Weaver's Apiaries; Starline, Carniolan and Caucasian from Howard Weaver and Sons; New World Carniolan, from Ohio State University; Italian, from Rossman Apiaries; and a purple and a yellow Cordovan (not true races, but variants of other true races) from Susan Cobey.

Colonies were wintered by making sure each had 50-70 lbs. of stored honey, were fed Fumidil-B and had grease patties, menthol and Apistan strips applied right after harvest. In late October strips were removed, entrance reducers applied and best wishes given for the winter ahead.

And winter was not kind this year. We had serious amounts of snow, extended periods of near 0° temperatures, and essentially no fly days. There were entire weeks when I thought I was back in Wisconsin, or in the Antarctic (the similarities are scary).

It wasn't until late March that the plows got through (I'm kidding, but not by much) and there was a day warm enough to take a close look.

If you'll recall the traits of the races we studied one fact stood out –

Continued on Page 306

MAILBOX

■ Cell Door = Cloake Board

In your issue of December 1993, it was pleasing to see an article about an invention from this side of the globe, instead of the other way around, and I refer to *The Cell Door* on page 651.

In this country and New Zealand, it is known as the The Cloake Board, after its inventor Harry Cloake. He presented a paper on his invention to the Apimondia Congress – Adelaide South Australia in 1977.

Since then his Cloake Board has been used very successfully in this country by a considerable number of queen bee breeders, who raise large quantities of queens for the local market, and for export to overseas countries, including Canada.

Copies of articles from the Australasian Beekeeper, dated January 1990, and December 1990, are available as references, and could be of interest to you and possibly some of your readers.

David Kinnell
Pendelers Beekeeping Supplies
P.M.B. 19
Maitland, N.S.W. 2320
Australia

■ Third World First Rate

I must take issue with a letter written by G.C. Millet in your December issue of *Bee Culture*, titled "Third World Nectar Syrup vs American Honey." In his letter Mr. Millet stated that, "In most Third World countries nectar is taken from the hives daily and allowed to ferment before drying by machine." He then continues to suggest that this honey or nectar syrup could contain bacteria and for that reason you should buy American honey.

I have no problem with North Americans buying North American honey but let us be kind to our Third World neighbors by at least being a little more accurate.

For almost two years I have been a beekeeping extensionist as a U.S. Peace Corps Volunteer here in Paraguay, a Third World or as I prefer to call it, a developing country. I am also familiar with beekeeping practices in almost all South and Central American countries, some of which are Third World.

With a few exceptions, the beekeeping methods used here are very much the same as those used in the United States. That is, honey is not taken off the hives until it is ripe. Beekeeping is done by subsistence farmers who work their fields by hand with a hoe and by a single blade plow pulled by oxen. A hoe, a plow, and a cart are often the only tools they posses. A machine to dry nectar syrup is something I have never seen and I do not know a single farmer-beekeeper who could afford the luxury of time spent taking off nectar daily.

Finally, Mr. Millet, relax! These Third World beekeepers need every litre of honey they produce as a food source for their families and do not export a single drop.

Jack Barrett
Concepción, Paraguay

■ Right or Wrong?

In the January issue there was an article titled "It All Started Like This," by Bruce Filbeck.

He says that he discovered while at a bee school sponsored by South East Michigan beekeepers that it can be injurious to a bee's tongue to "paint" syrup on the cage of package bees.

In the February issue there was an article titled, "Bees in the Upper Midwest," by Marla Spivak.

In the article she mentions a short course on beekeeping by Dr. Basil Furgala on hiving package bees. Under the heading "Care of Package After Arrival" says to spray the cage liberally with syrup as long as the bees will eat it.

Is there a difference in "painting" and "spraying"?

Is it then logical to spray the syrup on the cage and not injure the tongue?

I hope to start one or two hives later this spring and need to know the how with all.

David Anderson
Wyalusing, PA

Editor's Note: Bees' tongues can be injured when 'painting' syrup on a screen by catching and crushing tongue between the bristles and the screen's wires. This is usually not too serious a problem, but spraying is easier, faster and, presumably, safer.

■ Cheap Honey Costs!

I was not amused when I read the comments of David Hampton in the March "Mailbox" section. I take exception to his assertion that the American Beekeeping Federation's appeal for funds was only "to satisfy the narrow needs of the ABF and its resistance to free enterprise and global trade."

Over 76 million lbs. of Chinese "honey" was imported into the United States in 1993, accounting for approximately 25% of total U.S. consumption. In my opinion, this record amount of "honey" was imported only because of its extremely low price, which in turn, has

Continued on Next Page

MAILBOX

lowered the price for U.S. produced honey to levels far below the cost of production. More important, I feel, is the fact that this massive quantity of Chinese "honey" has dramatically lowered the quality and purity of the honey sold to the American consumer. Sioux Honey Association testified at the ITC hearing in December that they rejected 25% of the Chinese "honey" they imported due to adulteration and/or contamination. Chinese "honey" is probably the most serious threat to the quality and purity of honey ever experienced in the U.S. marketplace.

Apparently, Mr. Hampton's home country of Canada is not immune to the Chinese "honey" problem. According to the Winter 1994 edition of *Canadian Beekeeping*, "From May 1993 to December 31, 1993 a total of 41 shipments were inspected and 53.7% were found to be adulterated with 5.0% to 47.0% corn syrup."

Perhaps Mr. Hampton is unaware that the United State's current 1¢ per pound tariff on imported honey is the lowest of any major honey importing country. (Japan's tariff is 30%, Europe 27%, China 55%).

I wonder how the aerospace workers of Seattle would feel if China was in the business of producing jet airplanes and was selling them in the U.S. at prices far below Boeing's cost of production? Further, if these airplanes were made of cheaper, lower quality materials that were contaminated with toxic substances, would this be fair to Boeing, the aerospace workers, or the flying public? Surely not!

The Chinese "honey" problem in the U.S. (and Canada) is real, Mr. Hampton, and the American Beekeeping Federation is attempting to limit further damage to the beekeeping industry and to the market for real honey, the world's finest sweetener.

Gene Brandi
Los Banos, CA

Editor's Note: Gene Brandi is a commercial beekeeper and pollinator.

■ Thanks From Guam!

I just got my January issue of *Bee Culture*. You can see it takes a long time to get it delivered this far out in the Pacific, but it's always a treat when it arrives.

I've already read it cover to cover and want to especially thank Kim Flottum and Diana Sammataro for their terrific "Races" article and pictures. It was the best treatment of the subject I've found; clear, concise, and informative, and the color pictures made the article even better.

Sadly, my beekeeping is on hold for a while until I finish my assignment here on Guam but I still have my hives waiting in Colorado for my return to your side of the planet. For now I have a friend in Colorado who works my bees and maintains the equipment. In the meantime I have to satisfy my beekeeping urge through books and *Bee Culture* since I haven't been able to find a single beekeeper on the island, although I had a letter from Steve Taber in France who said that years ago he sold some queens to a contact here, so there must have been some beekeeping at one time. I suppose it wasn't successful since

MAILBOX

there don't seem to be any beekeepers now, which I find surprising since there is always one nectar source or another in bloom all year long. If I were going to stay on the island for another couple of years perhaps I'd give it a try myself, just for fun

Thanks again for a great magazine that's always a bright sight when I see it waiting for me in my P.O. box.

Lt. Col. Robert L. B. Stevenson
Andersen Air Force Base, Guam

■ Slatted Rack Fan

I would like to request your readers not to take one author's opinion as the perfect answer. I refer to Mr. Richard Taylor's article pertaining to slatted racks (sometimes called false bottoms) and follower boards. The record of this equipment speaks for itself as used extensively by the late Dr. C.C. Miller, Charles Kruse, Carl Killion (my father), and myself. Two world records were established in comb honey production using the slatted racks and follower boards along with good beekeeping practices. So, they couldn't be as bad as Mr. Taylor implies.

One only has to read back issues of the beekeeping magazines to find articles written about the merits of the slatted rack and follower boards. Mr. Taylor failed to mention the many advantages of using follower boards such as the ease of removing the first frame when working the brood nest and the excellent insulation protection from the cold and heat emitted by the outside walls of the hive.

He describes the equipment as "Fancy." I would call it "Dandy."

Gene Killion
Paris, IL

■ How Many Colonies?

We own a farm containing 5,000 orange trees (Valencia), 24,000 Eucalyptus, and 60,000 Caribbean pine. The farm is located in Guatemala. Elevation is 1,400 ft., it has plenty of water year round and the weather is cool in the winter and mild in the summer.

We would like to know from your well-informed readers how many colonies can be sustained on this farm in light of the above mentioned plantings. We have received various opinions as to the size of a prospective apiary from experts in the government of Guatemala and from Americans working here in the honey business. The surrounding farms are coffee plantations.

We shall be very grateful for any information that this letter of inquiry may generate.

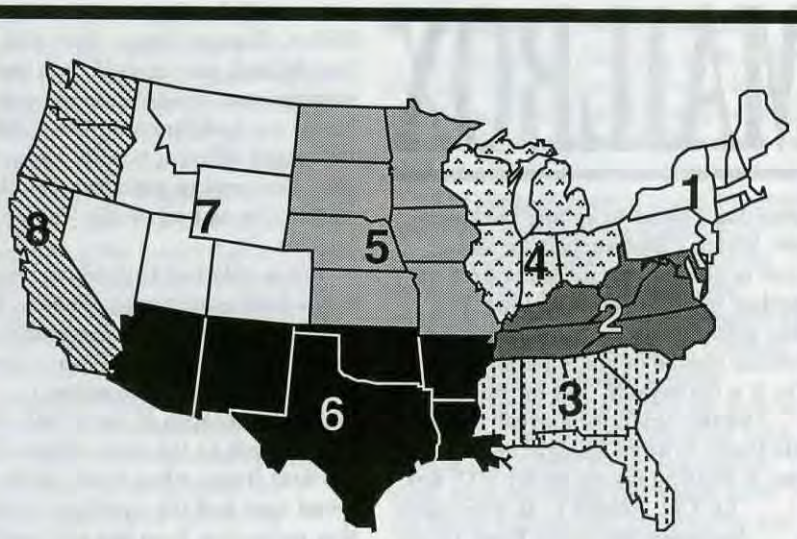
William R. Diaz-Fontana
8808 Colesville Road
Silver Spring, MD 20910

MAY Honey Report

May 1, 1994

REPORT FEATURES

Prices shown are averages from many reporters living in a region, and reflect that region's general price structure. The Range Column lists highest and lowest prices received across all regions, from all reporters.



	Reporting Regions								Summary		History	
	1	2	3	4	5	6	7	8			Last	Last
Extracted honey sold bulk to Packers or Processors									Range	Avg.	Month	Yr.
Wholesale Bulk												
60 #Light	40.03	42.29	33.18	47.00	30.38	35.00	44.75	47.50	33.18-.56.00	42.78	45.73	41.44
60 # Amber	41.39	43.20	44.40	40.00	48.00	33.71	40.00	45.67	25.20-55.00	43.59	42.78	39.51
55 gal. Light	.57	.55	.64	.51	.54	.49	.52	.58	.44-.90	.59	.568	.595
55 gal. Amber	.55	.52	.49	.46	.54	.46	.50	.65	.42-.78	.58	.528	.553
Wholesale – Case Lots												
1/2 # 24's	17.97	23.80	16.75	18.00	18.15	20.05	22.50	13.29	15.67-26.00	19.79	22.30	20.26
1 # 24's	28.67	29.57	27.70	30.00	29.64	29.40	31.68	25.73	20.00-38.40	29.73	30.71	29.37
2 # 12's	27.75	29.36	25.40	27.60	25.93	26.23	28.75	29.00	25.25-36.00	28.85	25.54	28.28
12 oz. Bears 24's	27.47	28.57	36.00	25.20	25.00	24.93	29.35	26.73	22.90-37.90	28.45	27.26	25.69
5 # 6's	28.45	28.32	32.55	30.60	30.00	27.05	27.75	27.10	23.00-38.00	29.97	30.01	29.35
Retail Honey Prices												
1/2 #	1.70	1.52	1.12	.99	1.04	1.29	1.10	1.01	.82-2.80	2.71	1.37	1.12
12 oz. Plastic	1.55	1.74	2.00	1.39	1.47	1.44	1.50	1.44	1.19-2.00	1.61	1.63	1.54
1 #	1.75	2.02	1.54	1.59	1.72	1.59	1.67	1.79	1.20-3.25	1.78	1.67	1.77
2 #	3.08	3.27	3.08	2.89	2.81	2.99	2.95	3.30	1.59-4.55	3.21	3.16	3.13
3 #	4.05	4.59	4.50	4.43	3.78	3.77	4.47	3.88	3.50-5.55	4.25	4.32	4.28
4 #	5.47	5.75	5.63	6.04	5.17	4.95	4.95	6.18	4.95-7.40	5.76	5.46	5.39
5 #	5.96	6.82	6.63	6.29	3.62	5.99	5.95	6.32	1.24-8.95	6.41	6.58	6.45
1 # Cream	2.03	2.30	1.10	1.89	1.89	2.55	2.10	1.91	1.10-3.50	2.13	2.40	2.22
1 # Comb	2.98	2.73	2.63	3.25	2.98	3.68	3.80	2.59	2.45-4.10	3.19	3.25	3.11
Round Plastic	2.57	2.65	3.00	2.70	1.35	3.43	1.93	2.92	1.35-4.00	2.74	2.79	2.44
Wax (Light)	1.77	1.28	1.63	1.35	4.00	1.48	1.20	1.43	1.20-4.00	1.78	1.68	2.05
Wax (Dark)	1.76	1.16	1.25	1.15	1.79	1.08	1.10	1.27	1.00-4.00	1.36	1.40	1.49
Poll. Fee/Col.	29.09	23.75	31.67	33.47	25.00	15.00	33.47	32.00	15.00-55.00	30.42	32.04	30.93

MARKET SHARE

What will happen to the tariff on Chinese honey? Will the loan program be reinstated? Will formic acid be approved? Are African honey bees in California yet? Are bees becoming resistant to tracheal mites? What's happened to all the beekeepers? Will you be able to sell your honey this season? Inquiring minds need to know.

Region 1

Prices appear steady with little movement either way. Demand seems to be increasing, especially for new crop honey. This seems to favor some increase in operation size especially since winter losses appear average or even less.

Region 2

Prices holding to sliding a bit, but demand appears average. Colonies in good shape generally, but late winter losses higher than thought poor spring. Expansion plans more positive than in recent years due to fewer losses and increased demand.

Region 3

Prices and demand flat so far, but producers see some bright spots later in season. Mite losses declining, finally, but not gone. Colonies doing well on seasonal flowers, but citrus somewhat a disappointment.

Region 4

Prices declining, mostly due to influx of large competitors and less expensive product. Mite losses heavier than hoped for, but seem to be slowing. Starvation more of a problem this year. Colony conditions about average, but wet spring hasn't helped a whole lot.

Region 5

Pretty much status quo on both price and demand, which is an improvement, really. Colony conditions seem better than in recent springs, but mites in unprotected colonies still taking their toll. Producers' plans seemed aimed at rebuilding or holding steady rather than expand much.

Region 6

Prices and demand very spotty - up and down and up and down - difficult to pin point. Colony conditions average to excellent with spring build-up at or ahead of normal. Sales, unfortunately not doing well and expansion plans for most on hold. Exceptional year for bee producers.

Region 7

Winter was kind this year and colony conditions appear strong and ready to move. Prices and sales steady, but most producers in a wait-and-see mode for expansion.

Region 8

Mixed reviews on colony strength. Commercial operations seem harder hit than smaller - upwards to 30% losses. Bad for pollination. Prices and demand steady to increasing a bit especially in the north. Southern areas mixed. Mass movement begins, or has already begun, to summer pastures.

ANNUAL HONEY REPORT

kim flottum & honey reporters

If you're either new to the industry, or you've spent the last 12 months with your head in the sand you won't have noticed the upheaval in normal honey marketing that's occurred during 1993. The Federal government changed the way we do business by absorbing the subsidy program to cover the budget deficit. But even though they charge interest and other fees, the loan program is still in place. Though this helps cash flow, whether it will be used by the majority of former users remains to be seen. However, that cash flow in many of these operations has been, and may remain dependant on their continued relationship with the ASCS. Real income will drop, undoubtedly, (the several cents/lb. subsidy is gone) and at the moment there seems little chance that other events affecting the price of honey, and the income of beekeepers, will enhance the situation.

Although many other forces have contributed to this upheaval – mites, Africanized honey bees, regulations – the most visible, and certainly most controversial event has been the significant increase in the amount and price of honey imported from The People's Republic of China.

In fact, imports from China have increased from 24.9 million lbs. in 1989 to 72.4 million lbs. in 1993, mostly, but not entirely in the medium color range. The price has hovered right around $.40/lb. all during that time, while the buyback price has stayed in the $.47 range. It's easy to see why so many feel this has been disruptive to U.S. sales, especially for the medium color group producers that sell to the industrial and bakery market. We'll return to this later.

This past year has seen a plethora of excellent reports on the honey industry produced by several divergent, but related sources. Each of which in its own way has contributed to a better understanding of the industry, honey sales and 'the market'

The first, entitled 'The U.S. Beekeeping Industry, was prepared by the USDA ERS under a cooperative research agreement with Cornell University. Data was gathered by surveying 2,319 honey producers, packers, importers and brokers who pay assessments to the National Honey Board. Of these, 817 were used for the analysis – 688 producers, 112 packers and 17 importer/brokers.

The second report was put together by the American Beekeeping Federation (ABF) in response (and in defense) to the threat of loss of the honey subsidy. It used information available from several USDA agencies, the National Honey Board, this magazine, their own membership and other resources at their disposal. This well-done report was distributed to about 700 legislators, news media and industry spokespeople.

A third was compiled by The International Trade Commission (ITC) for their study on the effect of imported honey from China on the U.S. industry. Their data was obtained from (probably) the greatest number of resources of the three. They used USDA, NASS, Dept. of Commerce, *Bee Culture* and other industry sources, plus an intricate and sophisticated series of surveys sent to producers, packers, importers and handlers asking about volume, price and marketing of honey; labor, equipment and other business related ques-

Continued on Next Page

PRICE SUMMARY BY REGION 1989 - 1993

Wholesale Bulk	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Avg.**	**1992**	**1991**	**1990**	**1989**
60 #Light	46.96	43.84	43.84	40.96	40.82	41.54	43.05	41.16	42.77	42.34	41.50	38.19	37.78
60 # Amber	43.69	41.16	39.39	37.84	38.73	35.37	40.30	38.21	39.34	39.50	38.33	35.19	34.68
55 gal. Light	.66	.56	.57	.56	.55	.56	.55	.60	.58	.55	.52	.49	.51
55 gal. Amber	.60	.51	.52	.51	.53	.51	.52	.54	.53	.52	.48	.45	.46
Wholesale - Case Lots													
1/2 # 24's	21.21	22.87	20.33	20.20	18.71	20.48	21.41	20.93	20.77	21.14	-	-	-
1 # 24's	30.54	30.46	30.22	29.16	28.76	32.05	30.05	28.27	29.94	28.81	27.58	26.50	26.19
2 # 12's	27.98	28.70	28.65	28.14	25.92	27.45	28.40	30.14	28.17	27.17	26.60	25.60	25.40
12 oz. Bears 24's	28.10	27.56	28.52	25.70	24.57	25.70	26.97	22.40	26.19	26.07	-	-	-
5 # 6's	31.38	28.26	30.84	30.87	28.74	28.80	28.50	27.91	29.41	28.91	26.96	26.25	25.99
Retail Honey Prices													
1/2 #	1.20	1.33	1.15	1.15	.96	1.15	1.14	1.14	1.15	1.13	1.07	.95	.94
12 oz. Plastic	1.59	1.68	1.77	1.52	1.44	1.48	1.53	1.44	1.55	1.48	1.40	1.34	1.34
1 #	1.71	1.89	1.80	1.83	1.74	1.79	1.81	1.73	1.79	1.73	1.65	1.55	1.55
2 #	3.26	3.26	3.20	2.98	2.71	2.98	3.17	3.27	3.10	2.94	2.96	2.76	2.78
3 #	4.54	4.44	4.67	4.53	4.06	3.93	4.31	4.35	4.35	4.12	3.98	3.76	3.77
4 #	5.93	5.33	5.55	5.57	5.45	5.10	5.29	5.50	5.46	5.06	4.82	4.14	4.75
5 #	7.44	6.51	6.16	6.76	6.13	5.91	6.20	5.97	6.38	6.25	6.07	5.92	5.77
1 # Cream	2.31	2.69	2.56	1.97	2.03	2.72	2.26	1.96	2.31	2.04	1.74	1.59	1.63
1 # Comb	3.15	2.86	3.05	3.23	3.13	3.37	3.26	3.19	3.15	2.65	2.44	2.44	2.32
Round Plastic	2.48	2.64	2.89	2.68	2.44	2.91	2.73	2.73	2.69	2.41	2.11	1.93	1.88
Wax (Light)	2.44	1.31	1.56	1.36	1.49	1.88	1.55	1.30	1.61	1.31	1.21	1.07	1.03
Wax (Dark)	1.73	1.16	1.25	1.20	1.28	1.44	1.20	1.15	1.30	1.12	1.07	.94	.90
Poll. Fee/Col.	34.54	24.08	29.12	32.04	29.71	25.73	30.91	30.79	29.62	25.44	24.10	19.97	23.16

SOURCE: *Bee Culture* Market Reporters

REGIONAL SUMMARY 1989-1993

	Production (x 1000)					Colonies (x 1000)					Avg. Yield/Colony, lbs.					Avg. Price/lb.				
Region	1989	1990	1991	1992	1993	'89	'90	'91	'92	'93	'89	'90	'91	'92	'93	'89	'90	'91	'92	'93
1	8832	7091	7911	6734	6734	195	182	147	129	123	45	39	54	52	45	.62	.71	.67	.69	.91
2	3945	3567	3078	2993	2987	127	101	88	68	66	31	35	35	44	46	.74	.87	.76	.79	.95
3	20029	29532	25190	30964	29962	446	396	389	366	327	45	75	65	85	73	.50	.51	.56	.56	.59
4	18274	20496	20105	16122	18952	320	299	305	274	252	57	69	66	59	68	.59	.60	.59	.61	.67
5	59846	64335	76256	74119	70143	641	879	919	946	835	64	73	83	78	75	.46	.51	.54	.54	.50
6	18134	22015	23353	23837	22091	319	325	331	312	281	57	68	71	76	75	.51	.55	.55	.53	.60
7	21965	22063	22774	26780	26662	393	397	319	315	363	56	56	71	85	67	.49	.55	.58	.58	.63
8	24717	27122	38906	37558	51251	693	621	661	602	613	36	44	59	62	67	.49	.53	.54	.55	.56
Total	175742	196221	217573	219107	228782	3434	3200	3159	3012	2860	48.9	57.4	63.0	67.6	64.5	.55	.60	.60	.61	.68
Increase/ Decrease		+12%	+11%	+1%	+4%		-7%	-1%	-5%	-5%		+15%	+9%	+7%	-5%		+9%	0%	+2%	+10%

Source: USDA, ITC

HONEY REPORT ... Cont. From Pg. 267

U.S. HONEY IMPORTS 1993

SOURCE	POUNDS
Canada	11,233,080.9
Mexico	4,547,103.0
Dominican Rep.	362,034.4
Argentina	35,875,903.7
UK	33,926.9
Austria	3,669.3
Hungary	52,744.9
Mainland China	76,105,314.8
Australia	2,440,638.2
New Zealand	52,263.3
Chile	3,739.9
Columbia	2,969.8
Germany	194,805.6
Slovakia	23,781.8
Switzerland	121,488.4
Hong Kong	218,195.9
Ghana	3,394.8
Total lbs.	131,242,940.4
Value	$49,229,163.00
Avg.Price	$.3751/lb

Source: USDA NASS, US. Dept Commerce

tions plus other areas of interest. The ITC certainly has the most detailed report for the areas covered in this article. Interestingly, when compiling their data the ITC found it convenient to use the same region system used in *Bee Culture's* monthly honey report. This certainly has made some interpretations and comparisons easier for us.

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The 'Price Summary By Region' chart is the heart of this article. It shows the average price for each commodity for each of our reporting regions for the entire year of 1993. The boxed row labeled 'Avg' is the average cost of that commodity across all regions for 1993. The four shaded columns to the right of that are the same figures from the previous four years. Comparing them can be revealing in how some prices have changed, and how others haven't as figured from our monthly report.

Because of the wide variety of our sources (small retailers to huge packers) bulk honey prices tend to be different than USDA's reported prices, but they do parallel each other for the most part. Light honey typically commands a somewhat higher price than the darker varieties, reflecting the 'average' of both USDA and us as different (the averages are not weighted by volume). Also, the USDA does not report other wholesale or retail prices.

RETAIL PRICE ONE POUND JAR HONEY 1989-1993

1989	1990	1991	1992	1993
1.55	1.55	1.65	1.73	1.79

Source: *Bee Culture* Monthly Honey Report

Probably most indicative of what's been happening on the retail level is the price of a one-pound jar. Again, from the 'Price Summary By Region' chart, that price has gone from $1.55 in 1989 to $1.79 in 1993. The price has dropped a bit so far this year, with an average price of $1.74 (April 1994). This, too, is probably a result of the influx of Chinese honey at reduced prices, creating a surplus of U.S. honey.

Although both the number of beekeepers, (1990 - 139,000; 1992-125,000; *Bee Culture* survey) and colonies (see Regional Summary chart) has slowly dropped in the last five years, the amount of honey

U.S. HONEY IMPORTS, PRICES – CHINA & ALL OTHERS

	China Million lbs.	Avg. price/lb.	All Others million lbs.	Avg. price/lb.	Total million lbs.	U.S. Avg. price/lb.	ASCS Buy Back
1989	24.9	35.8	52.4	42.2	77.3	.49	N/A
1990	25.5	40.6	51.6	46.0	77.1	.47	41.0
1991	14.8	43.0	47.4	52.9	92.3	.50	47.2
1992	60.1	43.4	54.6	52.8	114.6	.54	147.8
1993	72.4	40.2	58.1	51.3	130.6	.56	47.0

Source: USDA ERS, ASCA; Dept. of Commerce; ITC

produced in the U.S. has increased each year.

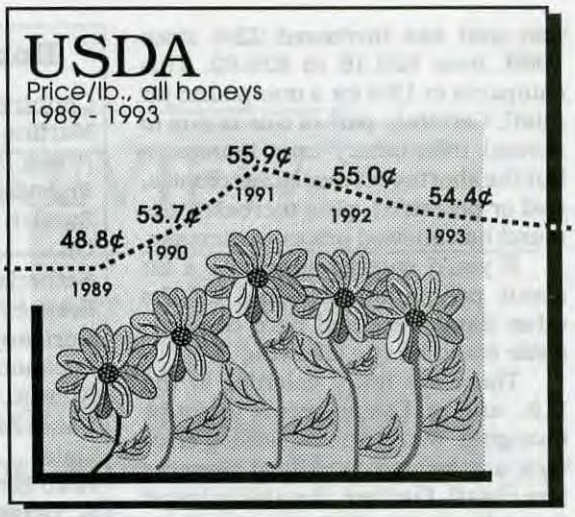
Because the annual average yield per colony has been up and down, but certainly more up than down, the amount of honey produced continues to climb. This could be difficult to explain even with the yield/colony up each year. But in fact yield dropped 3.1 lbs./colony in 1993, (and there were 152,000 fewer colonies) yet production increased nearly 11 million lbs. One explanation *could* be that because of a general price decrease (imports notwithstanding) more honey entered the mainstream of commerce (both general and government) than in previous years to make up for the shortfall in income. However, close inspection of region eights' figures shows why (probably) the difference occurs. Lots of colonies, lots of honey – lots more than in the past several years in fact. Region eight definitely skewed the curve in 1993.

Earlier, imports from China were mentioned in connection with both price and sales of U.S. honey. But all imports have some affect. The U.S. imported 131,242,940 lbs. in 1993, valued at $49,229,163.00 That's an average value of $.3751/lb. Mainland China was responsible for 76.1 MM lbs., or 58% of all imported honey (ITC figures).

But the history of imports deserves a second look. The 'U.S. Supply & Disposition 1989-1993' chart is informative in the obvious trends that are crystalizing. Imports are increasing, production is increasing, consumption and exports are increasing, but the amount of honey domestic beekeepers are unable to sell each year is increasing, too. If you examine this in detail, the statistics indicate that the more honey that's imported, the less domestic honey is moved, (r = .95). That's a nearly perfect correlation. This, in case you didn't already guess, is an important piece of information. Imported honey is replacing domestic honey in the marketplace *almost pound for pound.*

When those imports are examined individually the increase is evident, but China's role in that increase becomes much more clear. Their price remains low, very low for the 1989-93 period. Conversely, prices from all other countries increased more or less in synch with U.S. prices during the same time. Interestingly, imports from countries other than China did not drop during this time, even though their prices crept up. U.S. prices, though, remained above even these higher import prices. This can be explained, at least to some degree, by the subsidy paid to U.S. beekeepers, which keeps U.S. prices higher than the world market price – and certainly higher than China's price.

The current picture, then, is painted more completely in the 'U.S. Supply and Disposition, 1989-1993' chart. In essence the U.S. has a 161.4 MM lb. surplus of honey as of 12/93. That's 71% of what was produced in the U.S. in all of 1993. Moreover, after the 1993 crop is accounted for the government will no longer take honey off producer hands. The 1994 crop, though used as collateral for the continuing loan program, cannot be forfeited, and there is no buyback program to subsidize producer's income.



Source: NASS, USDA

All of the 1994 crop will enter the mainstream market or sit on producer's docks.

The potential for problems is obvious. Every summary presented here shows stagnant wholesale prices and increasing imports at lower-than-U.S. market prices. Further, the amount of honey remaining to be sold from previous years is considerable. To move that honey, to stay in business, that honey must be sold – at some price, somewhere.

The bright spot is that consumption is increasing and retail prices aren't falling. And although some of the low priced imported honey is showing up on store shelves, most is still going to the industrial market. Too, increased scrutiny of imported honey, especially Chinese honey, has reduced the lower quality product coming ashore so what is showing up on shelves is better, if not yet perfect.

Two categories from the 'Price Summary By Region' graph not yet mentioned deserve some attention. The average rental price for a pollina-

Continued on Next Page

U.S. SUPPLY & DISPOSITION 1989-1993

	Supply – (Million Pounds)				Disposition (Million Pounds)		
	U.S. Production	Already on Hand[1]	Gov't. Inventories[2]	Imports[3]	Consumption[4]	Exports	Remaining[5]
1989	177.0	32.9	122.8	77.3	284.8	9.9	115.3
1990	197.8	31.1	84.1	77.0	299.8	12.4	77.8
1991	219.2	36.2	41.6	92.2	292.0	9.6	87.6
1992	220.6	38.9	48.7	114.6	298.5	10.4	113.9
1993	228.8	49.1	64.8	130.6	303.5	8.4	161.4

1 – In producers warehouses at year's end; 2 – In Govt. warehouses as part of loan program; 3 – From all countries; 4 – Consumed in U.S.; 5 – Honey unsold at year's end

Source: USDA ERS, ASCS, Dept of Commerce

tion unit has increased 22% since 1989, from $23.16 to $29.62. This compares to 13% for a one-pound jar retail. Certainly part of this is due to normal inflationary cost increases, but the shortage of available colonies, real or perceived, plus increased demand has allowed prices to increase.

If you'd care to speculate a bit about pollination fees and all the other data presented here one outcome could be the following .

There are fewer colonies in the U.S., and that trend seems to not be changing. Where the remaining colonies are located is critical however (see chart). Further, the ability to sell domestic honey seems to be more difficult – prices are not increasing with production costs (mites, marketing, AHB, labor, etc.). To stay in business beekeepers will by necessity need to expand their horizons and pollination is one way to do that.

Short term pollination fees will, or should rise. Demand is increasing (more colonies needed), while supply (fewer colonies available) is dwindling. And the cost of running a pollinating colony is increasing (available bees located further from crops). Growers who need bees will have to pay what beekeepers need, rather than rely on cutthroat competition – there won't be any. That's a bright spot, certainly.

Beeswax, too, has shown a healthy price increase – dark 30% and light 36% – in the last five years. This however cannot be explained by a demand for wax from the beekeeping industry – wax foundation sales just aren't what they used to be. The source of the demand for beeswax remains elusive, however. Exports have increased, somewhat but there are no official records kept for this commodity. Cosmetics use is increasing, consuming over three quarters of domestic and imported wax. Whatever the uses, demand and price have increased.

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The inherent weakness in the data presented here is that it is too general in nature to be useful in everyday decisions for an individual honey producer or seller. It is difficult to relate to millions of tons of honey. It's also data of the past. It's what has already happened. History. Done deals.

The value, however, to those who choose to see it, is in the information needed to predict the future. Some commodities are doing well while others languish – and they are different for each region. Buying practices in the northeast are different than the southwest; pollination possibilities are greater on the east coast and west coast than the Midwest; direct retail sales are more difficult in the Dakotas than in the Pacific northwest

The data also shows that the future of mass marketing honey is changing. Competition for valuable shelf space is keen, 'cutthroat' is the term often used, and to succeed, only the strong and large survive. It takes very deep pockets to offer the discounts retailers demand and to continue on the miniscule margins required to play that game. Some can however. Volume, cheap imports and an extensive distribution system keep them in the market.

Certainly big producers have fewer options now. Government programs are essentially extinct, national organizations are essentially powerless in international politics and big packers are essentially conglomerates dedicated to supply, no matter the supplier. It is, after all, business.

The future for big producers? Setting up their own packing operations? Forming new co-ops? Increasing pollination and migratory operations? All hold promise. All *can* help compete with cheap imports. All producers *can* encompass production, packing and distribution, and without doubt all these will (and must) be tried to stay in business.

The proverbial wrench in any new venture will be providing a continuous, steady supply of product (ask any packer!). If you pack you need to sell – continuously. You may be able to produce all you need, most years (see the production chart) and sell it for a profit. But not every year. That's where a group is better than one, to buffer that shortfall. Moving bees, though certainly a possibility, will most likely become more difficult, or at least more expensive (see the AHB article, this issue). Big producers will definitely need to finetune their operations, and as the saying goes, sharpen their pencils to keep going.

But the rest, the majority of producers need to pursue smaller, more focused markets. 'Niche marketing' is the catch phrase, but it holds true. What sells, for how much and where is the key to success. And every market, like politics, is local.

The data presented here shows trends and directions. But what is popular in Medina, OH, or Turtle Lake, WI, or Litchfield, CT or Austin, TX, or Los Angles, CA is specific to that market. Knowing where to start helps. Knowing what's popular helps. Knowing what has worked in the past helps. And knowing what will probably occur in the next year helps.

Finally, if you've followed the trail this far you're one up on almost all of your competition.

And that's an advantage you can't afford to ignore.

Honey Exports 1993

Country	Amt.	Tarriff
Martinque	17,140.2	
Brazil	19,492.0	20%
Argentina	15,881.8	
Sweden	630,599.2	
UK	66,541.2	
Netherlands	390,508.8	
France	143,050.6	
Germany	692,388.4	
Lebanon	12,298.0	
Kuwait	465,682.8	
Saudi Arab	1,242,399.4	12%
Qatar	37,721.2	
Arab Emirates	358,650.6	
S. Yemen	1,15,292.2	
Oman	82,244.8	
Singapore	85,056.4	
Indonesia	91,715.8	
Brunei	5,134.8	
Philipines	59,734.4	
Hong Kong	387,316.6	
China	87,777.8	
Japan	501,963.0	30%
Canada	864,776.0	3%
Mexico	292,208.4	20%
Guatemala	30,467.8	
Costa Rica	36,042.6	
Panama	8,511.8	
Barbados	19,322.6	
Northern Antilles	4,400.0	
Guadalupe	39,384.4	
Poland	5,500.0	
Israel	26,628.8	
Jordan	11,985.6	
Thailand	2,395.8	
Malaysia	13,413.4	18%
China Main	104,222.8	60%
Korean Republic	6,545.0	20%
Total Exports	8,522,888.0 lbs.	
Export Value	$6,118,841.0	
Avg. Price/lb.	$.718/lb.	
Difference	122,720,052.4 lbs.	
Imports vs. Exports	$43,110,295.00	

Source: USDA, Dept. of Commerce

RESEARCH REVIEW

roger morse cornell university ithaca ny

"The number of colonies being rented for pollination is increasing each year. However, our knowledge of the pollination requirements for various plants is far from perfect."

In most of our common fruit there is a direct relationship between the number of seeds and the size and shape of the end product. In many fruits the fleshy part that we eat will not develop without seeds. However, the number of seeds needed can vary greatly and pollination requirements are not the same. For example, a peach has only one seed and that is all that is needed to form a perfect peach. One seed requires only one pollen grain for fertilization. Apples, on the other hand, may have as many as ten seeds and at least seven or eight are needed to form a fully rounded fruit. Apples with only one to five seeds are usually small and/or lopsided. As far as I am aware, no peach grower rents bees but over 250,000 colonies are rented by apple growers each year.

Other pollination variables include the number of flowers per acre, the percentage of flowers that may result in mature fruit and whether or not the plants need pollen from another variety, or another plant, to set seed.

Another factor is the number of bees in a colony and whether or not brood is present. Colonies with brood need more pollen and will have a greater percentage of their foragers collecting pollen, thus acting as good pollinators. Listed below are some of the special considerations for selected crops that require pollination.

Apples Old-fashioned apple plantings, with 27 trees per acre, had about one million flowers per acre. However, it is now popular to plant apple trees in hedgerows and to have several hundred trees per acre. Yields per acre are higher with the hedgerow system but no one has counted the number of flowers in a hedgerow acre. I suspect it may be between one and a half to two million flowers per acre. This means we should probably use more bees in hedgerow orchards. If only seven percent of apple blossoms set fruit there will be a big crop, at least that was the case with the old style plantings. Out west, growers often use one and a half to three colonies/acre to compensate for the additional bloom. Two/acre is more or less standard I've been told.

Cranberries Cranberries, blueberries, tomatoes, peppers, kiwis and many other plants shed pollen through holes in the end of the anthers where the pollen is produced. In other plants the pollen-producing anthers split lengthwise and make it easy for honey bees to collect pollen. Plants such as cranberries are usually pollinated by ground- and twig-nesting bees (now called 'pollen bees'), that vibrate (sonicate or 'buzz') the flowers to cause the pollen to flow from the anther. However, Cane and his colleagues (1993) found that honey bees drum the tips of the cranberry anthers with their forelegs, thus forcing the pollen from the anthers. This demonstrated that honey bees are good pollinators of cranberries despite their inability to sonicate.

Blueberries Over 75,000 colonies of honey bees are rented for blueberry pollination each year and the acreage of blueberries and the number of colonies needed continues to grow each year. Blueberries may have 30 to 40 seeds per berry; one researcher told me he had found as many as 70. Again, each seed must be fertilized by an individual pollen grain. In the case of blueberries, and several other fruits an increased number of seeds produces a sweeter fruit.

Melons A wide variety of melons are grown in nearly all states in home gardens though commercial melon production is restricted to a relatively small number of states. Melons must have a large number of seeds to be sweet, and normal in size and shape. McGregor (1976) states that muskmelons with fewer than 400 seeds are culls. More data are needed on other melons. Time of day is also important. In the case of watermelons most of the fruit is set between 9:00 and 10:00 a.m.; the flowers wilt soon after that.

Citrus Many citrus do not need cross pollination to set fruit. However, some researchers have stated that even the seedless varieties may be stimulated by bee visits to produce more fruit. The mandarin-type citrus do require cross pollination and there are an increasing number of these eaten-out-of-hand type fruits being grown. Furthermore, certain varieties are better sources of pollen than others. For example, pollen from temple or-

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RESEARCH ... Cont. From Pg. 271

anges sets almost three times as much fruit on Orlando tangeloes as pollen from valencia oranges does.

Alfalfa Alfalfa is peculiar in that the sexual parts of a flower being visited by a honey bee actually explode, showering the bees with pollen. The keel petal of the flower "hits" the bee on the head when she explores for nectar. Bees do not care to be hit and soon learn to avoid the explosive part of the flower and still collect the nectar. If a flower does not explode, there is no pollination. Thus, what is needed is a constant supply of young, naive honey bees to trip the flowers. Of course, some old bees occasionally make a mistake and do some tripping. Alfalfa flowers are an excellent source of nectar. However, for alfalfa to have an adequate number of bees for pollination there are so many bees that colonies rarely make any surplus honey.

Summary These are random notes but typical of the kinds of things beekeepers and growers need to know when honey bees are used for pollination. The number of colonies of honey bees being rented for pollination is increasing each year. Our knowledge of the pollination requirements for various plants is good but far from perfect. Two excellent and detailed books (Free, 1990 and McGregor, 1976) on the subject are listed below. However, a major problem is that varieties and cultural practices are changing rapidly, often making our knowledge out-of-date.

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Cane, J. H., K. Mackenzie and D. Schiffhauer. *Honey bees harvest pollen from the porose anthers of cranberries.* American Bee Journal 133: 293-295. 1993.

Free, J. B. *Insect Pollination of Crops.* Second edition. Academic Press, London. 684 pages. 1993.

Mcgregor, S. E. *Insect Pollination of Cultivated Crop Plants.* Agricultural Research Service. United States Department of Agriculture. Agricultural Handbook No. 496. 411 pages. 1976.

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?DO YOU KNOW?

Spring Management & Bee Biology

clarence collison

Spring is the time of new beginnings and beekeepers begin making preparations for a productive season. Winter losses will be replaced with packages, nucleus colonies, splits and captured swarms. Colony inspections are made to determine the condition of the surviving colonies and hive manipulations will be carried out to enhance colony development and prevent swarming. Spring is also time for new individuals to get interested in keeping bees and getting their first hive.

How familiar are you with honey bee biology and spring management? Please take a few minutes and answer the following questions to determine how well you understand these important topics.

The first nine 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).

1. ___ Honey bees are cold-blooded insects and they will only fly when it is warm enough for them to leave the hive.
2. ___ Bees within a package normally are from the same hive and contain a laying queen that is closely related to the workers.
3. ___ Queen excluders are normally left on the hive year around.
4. ___ A colony with 60,000 bees will make more than twice as much honey as will two colonies each of which has 30,000 bees.
5. ___ Honey bee workers forage for food according to their own needs.
6. ___ Nectar and honey normally satisfies the dietary requirement for proteins, minerals, lipids (fats) and vitamins in the honey bee diet.
7. ___ Adult worker bees consume similar amounts of pollen throughout their life.
8. ___ Water is a vital element in the honey bee diet.
9. ___ The queen honey bee organizes the activities and supervises the work that goes on inside the hive.

Multiple Choice Questions (1 point each).

10. ___ A colony that has a good brood pattern with brood in all stages, particularly eggs, has a queen which has been there within the last ____ days.
    A. Five
    B. Four
    C. Two
    D. Three
    E. One
11. ___ Most beginners start with a ____ pound package of bees.
    A. Three
    B. One
    C. Four
    D. Five
    E. Two
12. ___ A two pound package will contain approximately ____ bees.
    A. 3,000
    B. 7,000
    C. 9,000
    D. 12,000
    E. 5,000
13. What is the primary purpose of the late winter/early spring colony inspection ? (1 point).
14. When installing a package of bees, why would you use an entrance reducer? (1 point).
15. Name two materials that honey bee foragers carry back to the hive on their hind legs. (2 points).
16. During the spring inspection, some beekeepers often medicate their bees against potential disease and pest problems. What is the purpose for using the following materials to treat colonies? (3 points).
    A) Menthol Crystals
    B) Apistan Strips (fluvalinate)
    C) Terramycin
17. Why is it recommended that package bees be installed during late afternoon or in the evening near dusk? (1 point).
18. Name two advantages and two disadvantages of starting colonies from nucleus hives (nucs) rather than packages. (4 points).
19. Please explain why adding honey supers on top of a colony does not prevent swarming. (1 point).

ANSWERS ON PAGE 310

ANOTHER MANAGEMENT TOOL

Pollen Supplements

mark winston

Let me head off the wave of "You're wrong, you idiot; what do you professors know about beekeeping?" letters that this column could inspire by stating right at the start, categorically, unequivocally and without a doubt: I believe in pollen supplement feeding. We feed our bees with a pollen supplement every spring, and sometimes at other times during the season. I consider supplement feeding to be one of the most important aspects of our bee management, and yours as well. So, don't take this column to mean that you shouldn't feed pollen supplements; the commercially available supplements do a reasonable job of stimulating your bees and increasing colony populations.

That said, I think we can do better. Bee nutrition seems to be a dying or even dead art; the last wave of good research on bee nutrition ended almost 10 years ago. There are virtually no research scientists out there today working to better define the necessary components of bee diets, and to improve the available supplements. In this article, I would like to review the history and major findings of the bee nutritionists of olden days, discuss pollen supplement feeding and argue that, although supplements do work, I think that there is still considerable room for improvements in what we feed our bees.

There have been two "great" bee nutritionists in our time, Mykola Haydak and Elton Herbert. The early and most classic work was elegantly performed by Haydak, and published in a deluge of papers that extended over a period of five decades, from the 1930s into the 1970s. This work literally defined the field; Haydak rigorously examined the nutritional requirements of bees, particularly of brood, and extended that work into the development of pollen supplements for beekeeping applications. His intellectual successor, Herbert, picked up the torch in the 1970s, further defined bee nutritional requirements and investigated supplemental feeding. There have been many others working in this area over the years, but these two distinguished scientists have been the most significant contributors. Unfortunately, the untimely passing of Herbert in the mid-1980s seems to have brought the field of bee nutrition to a grinding halt.

There are two major components required by bees in their diets: sugar and protein. Sugars are needed primarily for energy and come mostly from nectar. Proteins are the building blocks that bees use to construct body tissue, muscles, glands, blood, etc. Without the right types of proteins, larval bees cannot grow and adult bees can not perform many of their tasks. The larvae require a considerable amount of protein to grow and develop into adults, while adults require protein to complete their development following emergence, allow for gland development and produce brood food and wax. The only source of protein naturally available to bees is pollen, which normally contains anywhere from six to 28% protein.

Pollen also contains most of the other components necessary for a good bee diet, including lipids, vitamins and minerals. Although lipids are not generally considered to be major nutrients for insects, some of the lipids in honey bee brood food are essential. For example, bees need cholesterol in their diet since they can not make it themselves, and must obtain it from pollen. Although cholesterol and related sterols make up only 0.25% of brood food, bees will not develop properly as larvae or function properly as adults without it. For vitamins, some of the B, C, and other vitamin complexes are required for proper bee growth and development and, again, bees deprived of these materials will not develop properly. For minerals, almost nothing is known, although the addition of minerals such as potassium, sodium, calcium, and others in the form of pollen ash seems to improve the ability of adult bees to rear brood.

Once the basics of bee nutrition were understood, this information was used to design various protein-based supplemental feeds for bee colonies. Numerous human foods and food by-products are eatable by bees when

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Perhaps we have been lulled into a false sense of success by the obvious increase in bee populations induced by supplemental feedings. While we may be increasing bee numbers, these population increases could be at the expense of poorer quality bees and may not always be justified.

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properly formulated, and a number of successful commercial formulations have been marketed, based on substances such as brewer's yeast, Torula yeast (a type of brewer's yeast), expeller-processed soybean flour, fish meals, skim milk powders, and Wheast (a by-product of cottage cheese production). These materials generally are over 50% protein, but need to be specially processed in order to be suitable for bees. Some of the above feeds need to have fats and/or salt removed during processing; dairy products can be poisonous for bees unless the milk sugars lactose and galactose are removed. Thus, it is important to only use these products when the labels indicate that they have been properly formulated for bees.

Pollen supplements usually are fed to bees in moist patties that are composed of the supplemental feed mixed with thick sugar syrup to a doughy consistency, often with a small amount of pollen added as an attractant and feeding stimulant. These patties are placed on the top bars of the brood chamber and may be covered to prevent drying. Supplemental feeding is most commonly used to stimulate colony growth early in the season, prior to the availability of fresh-collected pollen, and is particularly useful when premature spring colony growth is required for package bee production, spring pollination or early spring honey flows. Pollen supplements are effective because they stimulate nurse bees to begin producing brood food, and provide surplus protein that these stimulated nurse bees can use to rear additional brood. The end effect of supplemental feeding is to increase colony populations earlier than would naturally occur with freshly collected pollen.

There are surprisingly few scientific studies on the economic value of pollen supplement feeding, but those studies do suggest that supplemental protein feeding can be an effective management tool. For example, a study by Herbert and colleagues in 1976 demonstrated a 25-pound increase in honey production in packages established on March first and fed a Wheast-based supplement, compared to packages not fed pollen supplement. Economically, the Wheast-fed packages earned about $23 more per colony in 1994 dollars when feed costs were deducted, although they did not consider the cost of labor. Interestingly, similar supplement-fed packages established on April 15 actually produced significantly *less* honey than control packages, indicating the importance of proper timing for supplement feeding.

In another study, conducted by Keith Doull in Australia in 1980, supplement feeding increased honey production by close to 40%, although only five colonies per treatment were used in that study. A third study done in my laboratory demonstrated that feeding approximately one dollar's worth of pollen supplement in February resulted in a $10 profit increase for package bee producers due to increased bee populations relative to unfed colonies.

These apparent successes of supplemental feeding are an excellent example of how basic research can be exploited for beekeeping applications, yet there are a number of troublesome aspects to supplemental feeds that suggest additional work in this area would be warranted. The first thing to consider is that we have not been able to develop a pollen *substitute*, only *supplements*. Pollen is still the only complete bee food, and no supplement can replace fresh pollen for more than a few weeks before colonies begin to show nutritional deficiencies. I suspect that we're doing a reasonable job of replacing the abundant proteins of pollen, but are missing vitamins and minerals that may be present in small quantities but nevertheless are essential in a proper bee diet. However, very little research has been done to examine the role of vitamins and minerals in bee nutrition. There have been numerous recent advances in food technology and in our understanding of the roles that vitamins and minerals play in the nutrition of other organisms, and new studies in these areas for honey bees would provide a fertile and useful opportunity for a student looking for a place in honey bee research.

I also question whether we have adequately examined the effects of supplemental feeding on individual bees, as well as the economics of feeding supplements in different situations. Perhaps we have been lulled into a false sense of success by the obvious increase in bee populations induced by supplemental feedings. While we may be increasing bee *numbers*, these population increases could be at the expense of poorer *quality* bees and may not always be justified.

There is some evidence that supplemental feeds produce bees of lower quality than bees fed only fresh pollen. For example, we conducted a study in which our objective was to compare brood survival and adult longevity in colonies fed various supplements. We found that brood survival was equal or better in supplement-fed colonies compared to control colonies that only received fresh bee-collected pollen. However, the life span of adult workers was about four days shorter than workers that only received fresh pollen. Unfortunately, we did not carry these studies further to examine colony performance, individual worker behaviors, or the relative economic impact of the supplemental feedings. Nevertheless, these results suggest that pollen supplements may increase worker populations, but with workers of lower quality. This aspect of supplemental feed-

"Since . . . purchasing pollen provides some risk of disease transmission . . . synthetic attractants . . . would be very useful in supplement formulations."

ing needs to be further examined.

There are other reasons to suspect that even the best pollen supplements may be producing individual workers of diminished quality. Subtle deficiencies in the type and amounts of proteins and lipids are known to induce lower-weight bees, inhibit proper larval development and create problems with the completion of adult development, particularly adult glandular development. We assume that such deficiencies are compensated for by higher bee populations, but this trade-off needs further study.

A final useful area for additional research would be to identify the natural substances found in pollen that can attract bees to supplements in the hive and stimulate feeding. Anyone who has made up supplements without adding some pollen to them may well have found dried-out, unused patties in the hive a few weeks later, because the bees were not attracted to the feed. However, we don't always have pollen available to add to patties, and purchasing pollen provides some risk of disease transmission. Thus, synthetic attractants derived from the natural attractants in pollen would be very useful in supplement formulations.

In this article I've tried to be both positive about the benefits of supplement feeding, but cautious about assuming we know everything there is to know about the subject. I believe we can do better in formulating more attractive and nutritional supplements that not only induce larger colony populations, but provide workers of the same high quality that result from fresh pollen. It's time to revive the art and science of bee nutrition, and couple it with economic management studies to provide beekeepers with improved formulations of what can be a very potent management tool – pollen supplements.

Mark Winston is a professor and researcher at Simon Fraser University, Burnaby, B.C. Canada.

NOW THAT THEY'RE HERE . . .

jeff ott

Each state that encounters the African Honey Bee (AHB) reacts differently, in spite of federal efforts to the contrary.

Africanized honey bees have been in the United States since October, 1990. Before they crossed the border and in the years since there has been much speculation about their impact on the U.S. beekeeping industry. This article looks at how some of the southernmost states have responded to the Africanized honey bee invasion. And, what the result may be because of these responses.

Texas was the first to prepare for AHB. Their management plan has been very successful in readying both citizens and the state's beekeeping industry. In fact, the Texas Plan was so well prepared it has been used as the template for several other states' action plans.

Shortly after the Texas Plan was adopted, the National Association of State Departments of Agriculture (NASDA) sponsored a meeting in St. Louis attended by 22 representatives of government (research and regulatory), universities, bee breeders, fruit and vegetable growers, honey producers, crop pollinators and beekeeper organizations. They met to form a steering committee to develop a National Honey Bee Strategy, sometimes referred to as the National Certification Plan. The National Honey Bee Strategy, published in February, 1991, incorporated parts of the Texas Plan and attempted to set national standards for dealing with all honey bee diseases and pests – American and European foulbrood, chalkbrood, nosema, tracheal mites, *Varroa* mites and the Africanized honey bee.

Essential to the National Honey Bee Strategy are the following objectives:

1. National Honey Bee Certification Standards will be drawn up that will replace the current system of conflicting state regulations with uniform standards and inspection procedures to facilitate the interstate movement of honey bees.
2. Enhance research that would emphasize the development of honey bee resistance to pests, improve techniques to identify AHB, and develop colony management methods to abate honey bee pest problems.
3. Maintain extension programs to inform beekeepers on the use of new beekeeping technologies.
4. Support public education to mitigate the public threat posed by AHB.

According to the National Honey Bee Strategy, adopting this plan provides the following benefits to the beekeeping industry:

- ✓ The continued viability and profitability of the honey bee industry.
- ✓ An adequate supply of pollination services for agricultural producers.
- ✓ A continued stock of honey and honey bee products for consumers.
- ✓ Reliable public safety information regarding AHB.
- ✓ The latest technologies and practices for controlling the spread of exotic and traditional honey bee pests and diseases.

The National Certification Plan calls for the federal government to coordinate the *development* of uniform standards and procedures while the states would be responsible for *enforcing* the standards.

How has the National Certification Plan been received by the states most likely to be affected by the AHB? Following review of a national survey published by the NASDA in Dec. 1993, talking to many of the people involved in the industry and the implementation of the plan, and studying individual state management plans, I looked at the nine southern states (Alabama, Arizona, California, Florida, Georgia, Louisiana, Missouri, New Mexico and Texas) that will have to cope with the "natural migration" of the Africanized honey bee. I found their acceptance of the National Certification Plan is, at best, lukewarm.

> "The National Certification plan calls for the Federal Government to *develop* standards, while state governments are responsible for *enforcing* those standards."

The beekeeping industry in Texas has worked hard to develop and maintain a system to monitor and regulate AHB. Texas beekeepers are surviving and seem to have more problems managing mites than coping with Africanized honey bees. They are, for the most part, cooperating and working together as an industry to survive the management changes the AHB has brought. This is not so true elsewhere.

New Mexico, Alabama and Missouri beekeepers have not adopted the National Certification Plan. Beekeepers in those states have expressed

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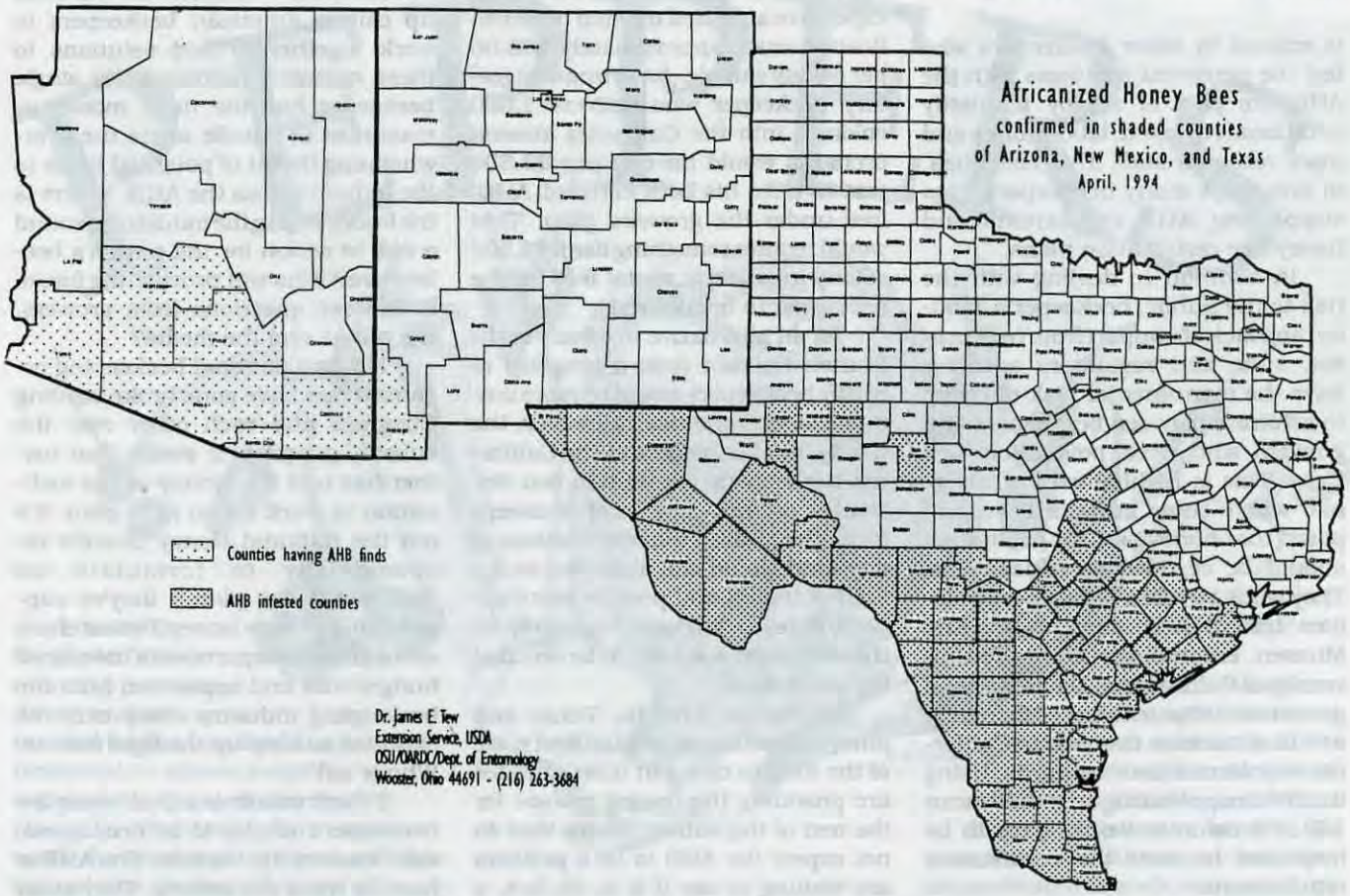
Who's Doing What

Response from state Depts. of Agriculture	Regulations or statutes regulating AHB movement into state	Has the State accepted National Certification Plan?	What is beekeeper's reaction to state certification plan?	If using management plan, what is working – what isn't?	If the State does not have mgmt. plan or regulations, what action has been planned for AHB arrival?	How will state handle migratory beekeepers coming from AHB state?
Alabama	No.	No.	See AHB threat, but no money to do anything. More impacted & worried about mite problem.	N/A	None at this time.	No regulation.
Arizona	Yes. Beekeepers required to requeen or destroy confirmed AHB colony.	In the process of developing an AHB free certification plan.	Very mixed. Vocal group pushing for deregulation, less vocal group favors regulation.	Education & training of public. AHB Committee very successful at getting info out to public. Media doing good job at presenting facts accurately.	N/A	No regulation.
California	No.	No statewide plan. Some counties are preparing their own plans.	Migratory beekeepers want no regulations hindering movement of honey bee colonies. Bee breeders support certification plan.	Honey bee industry completely deregulated.	CA Dept. of Food and Agriculture established a multi-agency steering committee to improve communications, public awareness and prepare each agency to handle its responsibility.	With no plans for quaran., CA expects honey bees from known infested areas in AZ will be tested.
Florida	No specific rules for AHB have been developed.	Has adopted the National model plan. Basic tenets are: (a) Establish Certification Zones 60 days following first discovery in county, (b) Certify managed colonies using guidelines in the National Model Plan, (c) Only Certified colonies will be allowed to move from a Certified Zone.	Industry support of plan has been very positive.	Not using a plan at this time.	1. Provide media training for Apiary Inspectors. 2. Proactive placement of bait hives. 3. Creation of AHB Task Force. 4. Develop grade school lesson plans emphasizing value of bees. 5. Develop public service announcement videos.	All certification of honey bees, either coming into the state or going out will be based upon the National Model Plan.
Georgia	Current regulations prohibit movement of honey bees from areas known to contain AHB populations.	Is planning to adopt the National Honey Bee Certification Plan with some minor modifications. Current regulations require a quarantine of a 2-mile radius & depopulation of colonies if AHB are found in GA.	GA Beekeepers Assn. have expressed support for a plan. Queen breeders eager to develop a certified breeder program.	N/A	Currently developing information & Education plan for various segments of the public. Already using information developed in other states.	Current regulations prohibit the movement of honey bees into GA from areas known to have AHB populations.
Louisiana	Yes.	Yes, in principal. Is currently reviewing plan with industry.	N/A	Has adopted model ordinance patterned after the Texas model ordinance.	AHB Advisory Committee est. 1989. No funding has been secured. Will address (a) Regulatory, (b) Education, (c) Research.	Will accept certification from states based upon the NHBCP. Will prohibit movement of bees into state from areas not providing certification based upon or similar to the NHBCP.
Missouri	Yes.	No. No formal law for AHB.	Beekeepers want no additional regulations.	N/A	May have public education campaign and training to handle AHB in cities.	Will require certification of bees until state is completely africanized.
New Mexico	No	No.	Beekeepers want no regulations what-so-ever!	None.	All media calls are to be directed to the Cooperative Extension Service at the State or County level.	None.
Texas	Yes. Infested areas under state quarantine. Honey bees may be moved within AHB quarantined areas without EHB certification. Colonies from AHB infested areas must be EHB certified.	Yes. Have a European Honey Bee Certification Program.	Active participation of state beekeepers from the beginning.	(a) No longer capturing feral swarms, (b) Periodic requeening with EHB queens, (c) Certification of EHB upon request or for movement out of AHB quarantine zone.	N/A	Must have acceptable EHB certification if coming from any AHB infested state or area.

Adapted from the 1993 State Africanized Honey Bee Management Plan Survey prepared by The National Assoc. of State Departments of Agriculture.



no interest in it at all. Arizona has adopted an AHB-free certification plan that requires the destruction or requeening of AHB colonies. Ultimately though, according to Larry Stanford of the Arizona Department of Agriculture, the industry will have to police itself.

California produces the most honey of any state. The USDA's Agricultural Statistics Service reports that in 1993 there were 500,000 colonies in California producing 45 million pounds of honey. This represents the honey-producing colonies *in* the state; it does *not* include the thousands of pollinating colonies that move in and out of California each year. Yet California has not adopted a statewide plan. They have left it up to individual *counties* to regulate the movement of honey bees in and out of their repsective jurisdictions. California has been without a state inspection service since 1991 when beekeepers there voted against subsidizing a proactive honey bee inspection program.

Why has acceptance of certification or regulation been difficult, if not impossible, to achieve in these states? One answer has been the lack of money. Regulation requires someone to *enforce* the laws passed. States are reluctant to enact any legislation that requires enforcement. Only Texas has provided state money to combat the AHB. Tighter state budgets and the current political inclination to eliminate "wasteful" state and federal expenditures have reduced beekeeping (and many other ag related) programs.

Another, and perhaps the most critical, reason that states have failed to adopt the National Honey Bee Strategy has to do with the beekeepers themselves. Simply, beekeepers resist regulation. A good example is found in Arizona. While some beekeepers there have adopted an abridged version of the National Certification Plan, others have lobbied for legislation to deregulate the state's beekeeping industry altogether. Even though some Arizona beekeepers have worked hard and diligently to help the state educate the public with informative videos, media contacts and emergency response personnel, others are working hard to prevent the state from any involvement with the industry whatsoever.

According to one government official who wished to remain anonymous but did help coordinate the National Honey Bee Strategy, beekeepers' resistance is why states are not acting on the AHB threat. This official said that beekeepers are their own worst enemy and that is why states are not providing the kind of budgeting certification programs need. If beekeepers wanted their states to provide money for certification of honey bees they could lobby for and probably get it. They are not united, and they end up working against each other.

Beekeepers may be reluctant to endorse restrictive regulations because many believe the Africanized honey bee is not a real threat. Rather, some believe the danger is just a product of media and researchers' exaggerations. Roger Starks, of Howalt-McDowell Insurance and a beekeeper himself believes researchers are particularly guilty.

"If the research community can show that the AHB is a devastating problem for all of agriculture," Starks said, "then the government will offer grants to fund research to find solutions to the problem." Starks' opinion

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is echoed by other beekeepers who feel the perceived problems with the AHB are part of a ploy to justify additional research, laboratories and more research staff. This belief has, in fact, kept many beekeepers from supporting AHB regulations and honey bee certification plans.

In addition to dealing with the risk to the public, beekeeper's liability, and lack of support from beekeepers, state and regulatory agencies have the monumental task of trying to arbitrate between beekeepers and growers who need pollination services. This is highlighted in California, where some growers have proposed that honey bees for pollination should be certified as African-free. They want 10% of a beekeeper's colonies tested. According to Dr. Eric Mussen, entomologist from the University of California at Davis, almond growers anticipate the need for nearly a million colonies this year in California to pollinate their orchards. Using the 10% inspection figure would mean 100,000 colonies would have to be inspected to meet the certification requirement.

The growers' solution presents some sizable problems. Mussen says there are not enough testing facilities in the whole U.S. to process 100,000 samples fast enough for the pollinating beekeepers. The cost of such testing is no small amount, either. According to Arizona Dept. of Agriculture's Larry Stanford the least expensive accepted method of identification costs approximately $35.00 per colony sample. An Arizona migratory beekeeper who delivers 1,000 colonies into the California almond orchards would have to pay $3,500 just to have his bees certified AHB-free under the growers' plan. That would require something like a $3.50/colony increase in rental fees for the beekeeper to break even

As an alternative to colony certification Mussen feels a program to certify beekeepers would be more economical and practical. However, the nearly 250 beekeepers at the California Beekeepers' convention last November did not approve of Mussen's idea. They feared that certification of any kind would call attention to the AHB situation and provide more opportunities for lawsuits, especially for those who did not need to be certified for pollination.

California, Florida, Texas and other states that expect the first wave of the AHB to thrive in their climates are providing the testing ground for the rest of the nation. States that do not expect the AHB to be a problem are waiting to see if it is, in fact, a serious problem for those states before money is invested in a management program at home.

This problem and its solutions are constantly changing – however, one thing is perfectly clear. No matter what the solution is, the industry needs to face the heart of the problem – beekeepers. This should be *the* wake up call to American beekeepers to work together to find solutions to these common problems. No single beekeeper has the time, money or resources to handle alone the overwhelming threat of potential harm to the industry from the AHB. Where is the leadership in the industry to sound a call to action for the nation's beekeepers? Who will provide the forum to answer questions from growers, the public and the media?

The two national beekeeping organizations have gone broke battling Congress and each other over the subsidy program. It seems that neither has had the money or the inclination to work on an AHB plan. It's not the National Honey Board's responsibility to formulate an Africanized bee plan – they're supposed to promote honey. Researchers and extension departments have faced budget cuts and opposition from the beekeeping industry. They can't be expected to keep up the fight forever. Who is left?

If there was ever a time when the beekeepers of the U.S. need good, solid leadership, it's now. The AHB is just the tip of the iceberg. They must start working together to create solutions to this and other problems – and not be part of the problem themselves. ◊

Jeff Ott is a freelance writer and computer security specialist in Colorado. He is also a routine contributor to Bee Culture.

PEPPERS

I went to the garden this morning just after dawn, and was reminded for the hundredth time what an almost magical place this is at the birth of a new day. The early sun's rays made the dewdrops shimmer and highlighted the delicate beauty of newly opened flowers, all with the accompaniment of an orchestra of bird song. I really must do this more often.

There's another sound in the garden just after dawn, the quiet, almost sleepy hum of the first bees to arrive in search of pollen and nectar. A few were already working the zucchini flowers, which I know will soon be absolutely polluted with bees, five and six to a blossom. Our honey flow ends here before July first and the bees don't have a lot to do after that, so they take full advantage of any opportunities offered by our garden and those of our neighbors.

I also noticed a lone bee working the small, white pepper flowers this morning. Arriving right on cue just as they were opening, this bee was almost certainly a nectar collector. Although pepper flowers open soon after dawn, the anthers only split open to release pollen a few hours later, as daytime temperatures rise. So our resident bees won't be collecting pollen until 9:00 a.m. or so. Bees quickly learn when a particular flower secretes nectar or sheds pollen and remembers from day to day, arriving at the appointed time with uncanny accuracy.

If a honey flow is in progress near your garden you probably won't see bees working your pepper flowers because pepper blossoms are relatively unattractive to bees. They will work them, but are likely to do so only when more attractive flowers aren't in abundance. Here, with the honey flow over and only a few gardens and an occasional wildflower available, and with a large population of bees in the area from our 20 home hives, they are motivated to work every available flower, peppers included.

But you needn't be concerned about the absence of bees on pepper blossoms. Although pollination by insects can occur, peppers are largely self-pollinated. When the tips of the anthers rupture later in the morning the pollen falls onto the stigma. There it germinates in the thin film of moisture that covers the receptive stigma and produces a pollen tube to fertilize the ovule, which becomes a seed.

For each seed in a mature pepper one pollen grain is required. A pepper has many seeds and the more that are pollinated, up to a point, the larger the fruit. This is because developing seeds produce the hormone auxin which stimulates flesh growth.

The pepper you'll notice next have flower lives but a single day. By evening the flowers closing slightly, and the morning they will be badly wilted or dropped completely.

Some gardeners think, as they watch flower after flower wither and drop without setting fruit that lack of insect pollination must be the cause, but there are many factors that cause blossom drop. For example, if temperatures are very high about two weeks before the flower opens, the pollen aborts and no fruit is formed.

And if temperatures are above 90° at the time

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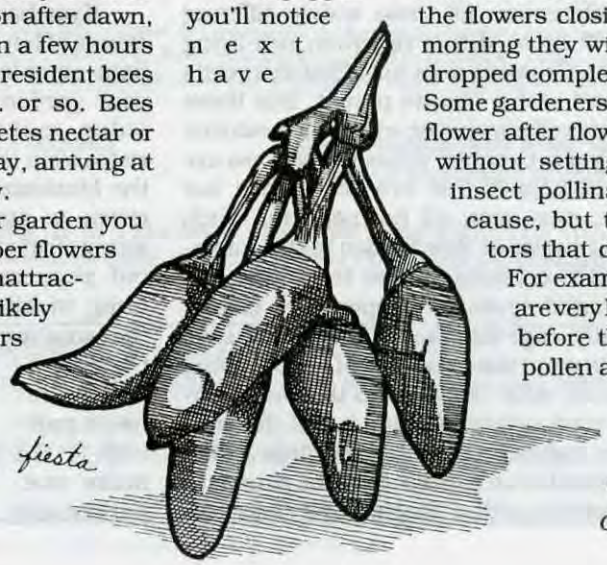
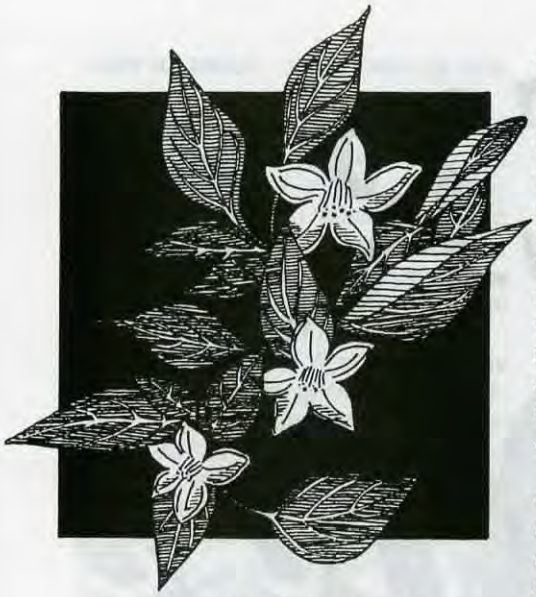


By Mary & Bill Weaver – Ten year veterans of English & Biology teaching, and 16 years experience as vegetable producers are the backgrounds the Weavers bring to these pages. They now have 200 colonies, and are growing.



of blossoming both flowers and small fruit can drop. Nighttime temperatures of 60-68° and days in the 70s are best for fruit set. With temperatures much below 60° peppers may set some fruit, but they contain few seeds, thus are smaller and misshapen.

If you live where nights are cool for long periods, hand-pollinating your peppers to get as much pollen onto the stigma as possible may help give you a fruit set. Also, the variety *Gypsy* sets fruit in cool weather better than most others.

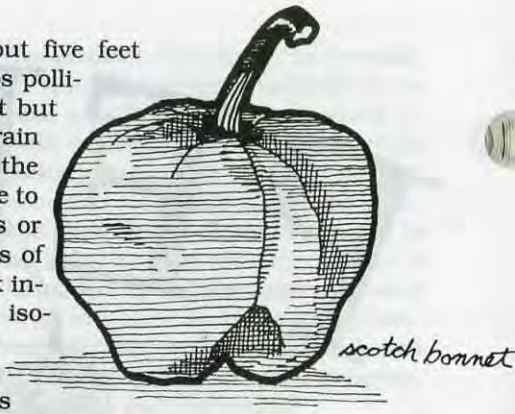
Another factor contributing to blossom drop is the presence of developing fruit. The first five or so flowers to set fruit, called the crown set, can inhibit the plant from producing more until they are harvested. So promptly harvesting peppers that are ready for use will lead to setting more fruit. But choosing the right varieties may be the best defense against blossom drop. New Ace, Lady Belle, and Gypsy are three varieties with fewer of these problems.

Although you don't need to *worry* about the presence of bees for pepper pollination, if you plan to save seed for next year from your peppers, bees become an important factor if you or your neighbors are raising more than one variety.

And there are many kinds of peppers. All those commonly grown and sold in the United States are of one species, *Capsicum annum*, but what a tremendous variety there is within that species! Sweet peppers may come in blocky bells and long slim types, in green, red, yellow, orange, chocolate and lime. Hot peppers come in yellow, red, orange, and green, in sizes from the foot-long Big Jim to the tiny grape-size bird peppers, in many nuances of flavor from "brain-frying hot" like Hinges Of Hell to those more mild mannered with a bit less heat.

Despite their differences, all these widely-differing varieties can and will cross if they're within bee-flying distance of each other. Crossing does not affect *this* year's fruit, which looks and tastes like its parent. But these crosses can and surely will play havoc with fruit produced from that seed *next* year. Because genes for hotness are dominant, any sweet pepper that crosses with a hot pepper will produce, next year, all hot peppers. Much crossing does occur. Studies at New Mexico State University found from 15-80% crossing in their test plots.

Since all the varied types of peppers are closely related and cross easily, cage the plants if you want to save pure seed and there is more than one type of pepper being grown within a quarter mile. (Be sure to use only non-hybrid varieties for seed saving.) Caging is not difficult. Take a four-foot wire and bend it into a half-circle. Stick two of them in the ground in an X shape over the plant and cover the wire framework with a floating row cover like Agryl, cut to about five feet square. This keeps pollinating insects out but allows light and rain to pass through so the plant can continue to grow. Place bricks or soil over the edges of the fabric to block insect entry. Thus isolated from insect activity, the plant will self-pollinate its fruit and your seed will breed true.

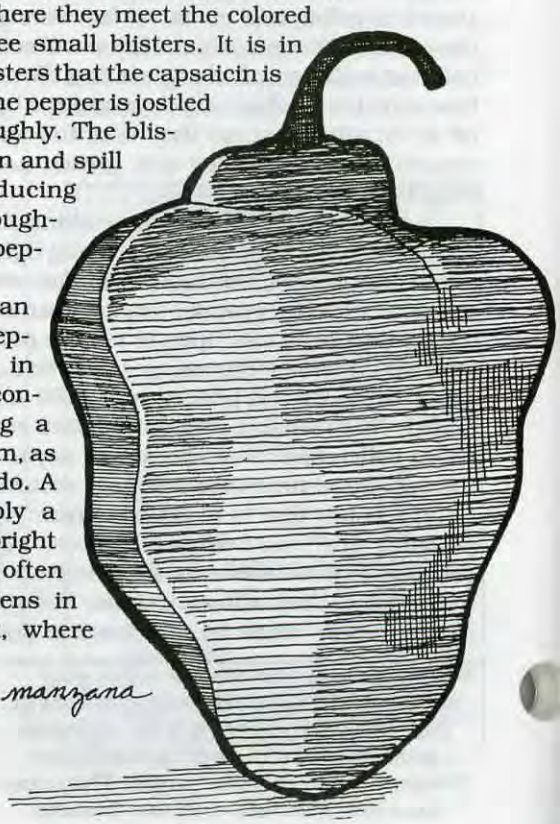


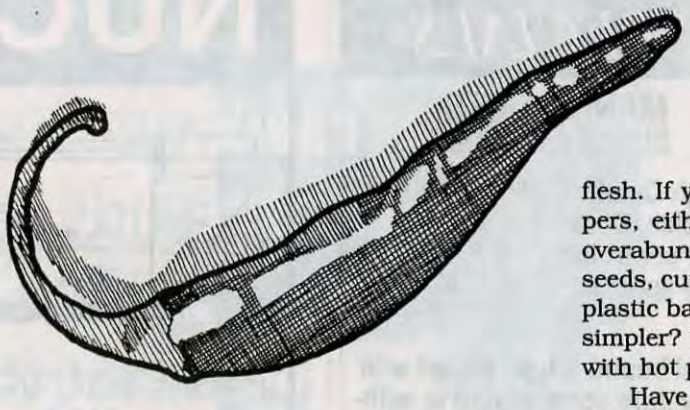
That's all there is to it. Let the peppers mature on the plant to just past their prime, when they become a bit soft and wrinkled. Then harvest the disease-free fruit, cut off the end, and scoop out the seeds. Spread these to dry for about two weeks on a glass plate. (The seeds stick fast to paper plates.) You'll know they are dry enough to store when they crack instead of bend when you try to fold them.

No special precautions are necessary for working with sweet peppers, but for hot peppers, wear rubber gloves and be careful not to touch your eyes or face. The capsaicin that makes hot peppers hot is very irritating and doesn't wash off easily with soap and water.

Capsaicin is so powerful that people can detect its presence in solutions of one part per million. But it does not actually *taste* hot; rather it is technically tasteless and odorless. Hot pepper lovers perceive the "heat" of hot peppers through pain receptors in the mouth, nose, and stomach rather than through the taste buds. Nor is it spread all through the fruit as the pepper grows, though it seems so when you eat a hot pepper. To find where capsaicin is produced look along the whitish membranes where they meet the colored flesh. You'll see small blisters. It is in these small blisters that the capsaicin is found – until the pepper is jostled or handled roughly. The blisters break open and spill their fire-producing chemical throughout the whole pepper.

If you have an excess of hot peppers ripening in your garden consider making a ristra from them, as the Mexicans do. A ristra is simply a string of dried bright red peppers, often hung in kitchens in the southwest, where they're handy for use in cooking. To make one, harvest fully





chilcostle

ripe hot peppers *with some stem attached.* With a large needle and heavy thread pierce the stem of each pepper and string the peppers on the thread, and hang to dry. When they're thoroughly dry you can twist several strings together to make a colorful ristra to hang in your kitchen. Ristras keep best in dry climates, so in more humid areas you may want to dry your peppers in a dehydrator and store in a tightly closed glass jar to prevent mold growth.

The best peppers for drying are small with rather thin flesh. If you're growing large, meaty, thick-walled peppers, either hot or sweet, and you're blessed with an overabundance they can be frozen. Simply remove the seeds, cut the peppers in strips, pack the strips in small plastic bags and pop them in the freezer. What could be simpler? Remember the rubber gloves if you're working with hot peppers.

Have you tried letting peppers on some plants ripen to their ultimate yellow or red? Doing this lowers the yield from that plant somewhat, but fully ripened peppers most always are sweeter, with a richer flavor, than the green ones most Americans are accustomed to eating. They are also considerably higher in vitamins A and C.

This summer try some exotic peppers in your garden. Then take an early morning stroll to look for necta-collecting bees. The result will be a pantry full of peppers. And, if the rest of your bees' bounty fails, you will be providing a rich reward of nectar and pollen – when they need it the most. ○

YORK BEE COMPANY

A Georgia Beekeeping Tradition

keith s. delaplane

Everyone who keeps bees has a "how I got started" story. Many started the ordinary way with a mail-order package. Equipped with only a vague interest in bees, we turned to the Sears catalog, ordered a beginners kit, received a package of bees in the mail, and installed it in a semi-panic. If that's the way you started keeping bees, chances are you started with a package from York Bee Company of Jesup, GA. For years, York's has provided not only the Sears catalog, but all the world with queens and package bees, and today is one of the most well-known names in beekeeping.

This past March I was visiting several beekeepers in south Georgia with Wulf-Ingo Lau, a visiting professional apiculturist from Germany. For beekeepers from any part of the world south Georgia in March is an exciting time. In early years like this one, honey flows are well underway. Brood production is nearing maximum. Queen producers are stocking mating nucs and producing their first queens. Azaleas are in full bloom, and promise is in the air.

Wulf and I dropped in on Randy Franks, Wayne County Extension Director, who had arranged a visit with Harvey York, Jr., President of York Bee Company. The three of us drove the half mile to York Bee Company's impressive central office and production facility. Walking inside, we found a comfortable office suite with busy secretaries and ringing telephones. Mr. York ushered us into his office, seated us, and spun a tale about York Bee Company. A life-long bee breeder, businessman, and author of a chapter in the 1975 *Hive and the Honey Bee*, Mr. York speaks with authority and perspective about the industry he helped shape.

Harvey York, Sr. started the company just before World War I. The elder Mr. York had worked for Stover Apiaries and used his experience to enter a relatively new market – mail order package bees. In the early days, packages were shipped by rail, and Harvey, Jr. reflects sadly on the decline of America's railroad industry.

"Rail transit was fast and versatile," he says, "Society will suffer for its loss."

York Bee Company grew with the industry in a society that valued honey bees and hive products. In the years before and immediately after World War II, America's bee industry peaked as sugar rationing and war manufacturing increased demand for honey and beeswax. York's was there, providing queens and packages to the growing industry.

About 1950, York Bee Company started expanding its international sales. York bees have traveled to England, Guatemala, Switzerland, former Yugoslavia, and all over South and Central America. In the boom years of the 1970s, up to 25% of York's business went to Canada whose beekeepers routinely 'killed' off colonies in fall and started from packages in spring. Like other package producers, York suffered from Canada's border closure in the mid-1980s, but domestic business and other international markets have since filled that gap.

"International markets vary according to their crises," says Mr. York. "Lose colonies to drought, war, or mites? Then you'll buy package bees."

Mr. York has always been in a good position to promote genetics as a tool for advancing beekeeping. He reflects humorously on today's rising interest in "dark" bees.

"In the 1930s, yellow bees were popular because they were considered more resistant to foulbrood. This preference has, until recently, persisted to this day. People nowadays are interested in dark Carniolan-type bees because they perceive that they are mite resistant. Historically though, these dark bees have shown a greater susceptibility to foulbrood."

Mr. York was involved in the development of the popular Midnite and Starline hybrid lines, and today he is one of about 20 vendors of these hybrids in the U.S. Every year, Mr. York gets breeder queens for each line from Hybri-Bees, Inc. – a company in Florida that maintains and monitors these and other bee stocks. The breeders Harvey acquires are instrumentally inseminated, and the daughters he raises and sells from them are open-mated. Drone colonies near the mating

A skilled employee grafts larvae by transferring them from natural work cells into wax cups.

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During winter, York crews build packages for next season.

A bar of cups ready for grafting.

A queenless starter colony is kept full of young nurse bees. These colonies readily accept many grafted queen cups at once and begin feeding them royal jelly.

YORK BEE COMPANY ... Cont. From Pg. 289

yards are headed by daughters of last year's breeders to improve chances of desirable matings. The Midnites are a Caucasian hybrid known for their gentleness. Starlines are an Italian hybrid with typical Italian characteristics. York Bee Company maintains Midnite mating yards in Toombes County, Georgia, and Starlines in Appling County.

"Some people say their Midnites or Starlines hold up well under tracheal or *Varroa* mites," said Mr. York, "It's probably not a true resistance, but I think their hybrid vigor helps them overcome mite pressure."

Although the agricultural community laments the loss of feral bee colonies, Harvey has a slightly difference perspective.

"If you're a good breeder, and there's no feral bees around you," he says, "You get better mating control!"

As Wulf, Randy and I sat in Mr. York's office and talked about bee breeding, the conversation inevitably turned toward Africanized bees – the latest historic milepost in the U.S. bee industry, according to Mr. York.

"AHBs are a media event," he says, "They're a solvable problem."

According to Harvey, constant requeening is the key to managing Africanized honey bees. He cites enterprises in Mexico that produce European queens as evidence that European stock can be maintained in Africanized areas.

"With regular requeening, drone saturation in mating yards, and education, we can learn to live with these bees," says Mr. York.

It was time to stretch our legs and take a tour of York Bee Company's expansive two-story office/warehouse/production facility. Wulf was impressed.

"Everything is *big* in America," he said, picking up a giant south Georgia pine cone.

Harvey led us upstairs and we walked down a canyon of stacked packages ready to be filled with bees. Two employees were busy inserting foundation in frames.

At York Bee Company, the years have brought about an efficient and predictable routine. Harvey aims to graft the first queens by the last week in February. This involves transferring tiny larvae less than 12 hours old into specially-made wax cups. Rows of these cups are then placed into queenless "starter" colonies which begin feeding the larvae royal jelly. After 24 hours, cells are transferred to queenright "finisher" colonies that finish feeding and capping the cells. Ten to 12 days after the first graft, Harvey's crews start making up the mating nucs into which ripe queen cells are placed. The sole purpose of these miniature "nucleus" colonies is to house young queens as they emerge, mate, and begin laying eggs. When a young queen in a mating nuc is laying a good brood pattern she is ready for sale. Only after mated queens are available (usually the last week of March), can the crews begin shaking bees into packages for mail shipment.

We visited York's when they were busy grafting and stocking mating nucs. It takes about the whole month of March to finish stocking the thousands of nucs owned by York Bee Company.

Harvey led us down a sandy path between pine trees and palmettos to his grafting yard – the place where it all begins. An employee was finishing the last graft of the day and putting grafted cups into the starter colonies. The queenless starter colonies are regularly stocked with frames of emerging brood to keep a high population of young nurse bees. Under these conditions bees readily accept large numbers of grafted larvae and begin feeding them royal jelly. However, maintaining these queenless starter colonies is labor-intensive, so breeders like Mr. York rely on queenright finisher colonies to finish the job; that's why breeders have many finisher colonies but relatively few starters. After 24 hours cells are removed from the starters and distributed among numerous finishers. Cells are placed in the upper of two supers, and the resident queen is confined to the lower super with an excluder. After cells are capped, bars of cells are placed in specially-designed "incubating supers" above a full-size colony until the cells can be placed in mating nucs.

By now it was lunch time and Harvey treated the three of us to a spread of south Georgia country cooking at Sibyl's Restaurant in Jesup. Wulf was introduced to fried okra and seemed to take to it O.K. We talked about

The special super used to hold finished cells.

By sitting on top of the colony, the cells are kept warm.

Setting up a mating yard. Each nuc is a duplex that houses two queens and their cohort of workers. Frames are set out and ready to go in the boxes after bees are added. The large screened package contains bees for the nucs.

Harvey's non-beekeeping pursuits. Among other things, he's an avid photographer, amateur genealogist, and treasurer of First Baptist Church of Jesup.

After lunch, we drove to a yard where Harvey's crews were setting up mating nucs. Earlier in the day crews had visited an apiary and collected several very large packages of bees. These were the bees destined to go in the nucs. Each nuc is actually a duplex that contains two separate queens and their cohort of workers. The empty nucs had already been set out, each with a miniature division board feeder full of syrup. When we arrived, Harvey's employees were walking down the aisles setting out the nuc combs – two for each half of a duplex, one of foundation, one of drawn comb.

Next, each large package of bees is sprinkled heavily with water to coat the bees and keep them from flying. Then, with the fluid motions of the well-practiced, the men walk down the aisle, filling the nucs with bees and combs. One man opens each side of a nuc and covers the open feeder with his hive tool to keep bees from drowning; his partner uses a big ladle and dumps a generous dollop of wet bees into each half of the nuc. Other employees follow this pair and insert frames and ripe queen cells.

If everything goes well (as it usually does), bees set up housekeeping in these little hives, queens emerge and mate, and brood production begins. When crews are ready to harvest queens they inspect each nuc to make sure queens are laying eggs. Each acceptable queen is then caged and ready to sell.

Our visit was too early for "shaking season" – when Harvey's crews visit his numerous and scattered apiaries to shake bees into mail-order packages. But the pattern is straightforward. One team opens each colony and finds and sets aside the colony's queen. With the queen found and set aside, the next team shakes bees off the combs, down a funnel, and into a mailing cage. Queens and cans of syrup are added next, and back in the warehouse mailing labels, health certificates, and other paperwork are stapled on with pneumatic equipment.

"The peak package season is over by May 10," says Mr. York, "But we will continue shipping as needed into the summer. Late orders or small orders are no problem. Hobbyists are an important part of our business."

So, what happens at York Bee Company in summer? I asked. From what Harvey says there's still plenty to do, but there's not as much urgency as in spring. All summer York's crews take off honey (a by-product in this business), inspect colonies, requeen, and treat for mites. If you have 10,000 colonies, it can take all summer to do this. In the sandy pine woods fire is a threat, so his crews protect yards by cutting and raking up brush down to bare sand.

Mite treatments involve fluvalinate and grease patties in summer, fall, and spring. Harvey has a big-picture philosophy toward mite research that many in the academic community would admire.

"I think our mite research has approached the problem the wrong way. We haven't yet addressed the root of the problem: that is, the *Varroa-Apis mellifera* relationship. We need to ask ourselves why honey bees in China tolerate *Varroa* so well. There must be some biological basis. We are trying to solve the mite problem, but we don't even understand this relationship yet."

And so our visit ended. Wulf had a head full of new experiences and enough pictures to do years' worth of "Beekeeping in the U.S.A." talks back in Germany. Randy had a new appreciation for this world-renown company in his own back yard. And I was reminded how nice it is to be a beekeeper in Georgia. If beekeeping is the backbone of agriculture, I wonder if queen and package production is the backbone of beekeeping. These professionals, like Mr. York are guardians of our bee stocks. Where would we be without them? ○

Keith Delaplane is the Extension Apicultural Specialist in Georgia and an occasional contributor to Bee Culture.

WHAT ABOUT WATER?

dick bonney

Water plays many roles in a hive – from dissolving crystalized honey to cooling – but it is always , always needed.

As beekeepers, we know that water is essential to the well being of the colony, and we usually take steps to insure that the bees have water available. The details of the bees' needs for water are sometimes less clear. What specifically do the bees do with the water they collect? How and when and where do they use it?

We can identify at least three uses for water in the hive — for cooling or air conditioning, for diluting brood food, and as an aid in liquefying crystallized honey or sugar. Further, adult bees must have moisture in their diet. Normally this comes from nectar or honey, but occasionally it comes directly from drinking water.

The first use mentioned, cooling, is one that tends to catch our fancy. It's the sort of thing we delight in telling non-beekeepers, to help explain and justify our madness. "See," we say, "bees are more than just insects. They're smart. They can air condition their hive. They're engineers, and architects, and sculptors, and " OK, OK, don't get carried away here. But bees do have a large measure of control over temperatures in the hive, and this control is essential to their well being.

When water is required in a hive, house bees accept water from a forager. The eagerness with which they accept it indicates to the forager whether more is needed.

Temperature in the heart of the brood nest is usually between 92° to 96°F, even in the coldest weather. Yet the bees must sometimes cool the brood nest — down to that same range of 92° to 96°. Very warm weather in the hive is confining, and the daily activities of the bees give off heat. That heat (along with carbon dioxide) must be vented. Initially, as the bees sense this buildup of heat and CO^2, they proceed to fan, some facing in at the entrance, others facing out. Within the hive other bees fan to move columns of air in and out of the hive.

Up to a point this fanning does the job; temperatures are controlled. However, on very warm days something more is needed, and foragers begin bringing water. This is deposited within the hive at strategic locations, especially in the brood area. The moving columns of air evaporate this water and help reduce the temperature. With careful inspection you can see these water deposits. Perhaps you have seen them in the past and thought they were nectar drops. Look for them on the frame tops. Look closely at the capped cells, in those little indentations in the cappings. Check the open cells for hanging droplets. Of course, when the hive is very busy, with lots of nectar coming in and storage space limited, some of these droplets may be nectar. If you are curious, taste it to find out which it is.

As a second use, bees add water to brood food. We know that for the first 2-3 days of larval life, worker brood is fed royal jelly. This was drummed into us in the early days of our beekeeping education as we learned what differentiates a queen from a worker. The exact nature of the worker larval diet for the remaining 2-3 days is a little less clear in the popular literature. We do know that older larvae are fed a diet of "ordinary" brood food, which includes glandular secretions, honey diluted with water (or nectar), and pollen.

Water (or perhaps better stated, moisture) also plays a part in an adult bee's life. It is necessary in order that normal metabolism may proceed, it is a component of glandular secretions and it is required in their excretory process. (Bees don't have liquid excrement because they drink water, rather, they drink water because they have evolved to have liquid excrement.) This moisture comes from nectar when available, or directly from water.

Adult bees also use moisture to dilute thickened, or crystallized honey, or dry sugar. Without this added moisture, these foods would be at least difficult, if not impossible, to eat.

Where do bees get water? Sometimes from embarrassing places. The neighbors' swimming pool, for instance. You know, the neighbors who didn't want you to have bees in the first place. Their swimming pool or bird bath are the places the bees will go first — guaranteed. In fact, the bees are going to go to the closest *consistent* source, and if that swimming pool is it, they will find it. Then your neighbors will find you.

Actually, given a choice, the bees' first preference seems to be for brackish water, rather than fresh. This can

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be another source of embarrassment of a sort, if you live near a farm. I have watched bees happily collecting water from the murky puddles in a barnyard — you know, the puddles created by the livestock — while just across the road was a river full of fresh clean water. The two sources were about equidistant from the hives. I've observed this preference for brackish water many times.

At the same time, the bees have what may seem to be a conflicting preference for moving water. If you give them a container of still water from which they can collect readily, and nearby there is a source of gently moving or dripping water, they seem to prefer the latter. Dripping is very attractive to bees.

The bees' use of and need for water has a seasonal aspect. Air conditioning and cooling are warm weather activities. In cold weather, excess water in the hive can be a problem if the hive isn't properly ventilated.

The need for collected water at other times is directly related to nectar availability, and this is related to such things as season, weather, and local forage sources. At certain times of the active season the bees do not need to collect much water. They get all the moisture they need from nectar.

Consider brood food. Older larvae are fed ordinary brood food which includes honey diluted with nectar. In the late spring and early summer brood rearing and nectar collection are in high gear. There is plenty of nectar available to add to brood food. Usually during this same period, the weather is not immoderately hot. To cool the hive, fanning may be necessary, but not water evaporation. So rates of water collection are comparatively low.

As the season moves along, the need for collected water usually begins to rise. In mid to late summer, temperatures are peaking for the season, but nectar may be less available. The Northeast, for instance, experiences a dearth of nectar from mid-July until mid-August. This is coincident with some high temperatures. Other parts of the country have their own particular patterns of hot weather and nectar availability. During these times, beekeeper attention to water supplies becomes very important.

Consider the conditions in and about your hives if you do experience a hot weather nectar dearth. The colony is probably at peak population, and the hive is crowded. Little or no nectar is coming in, so they must have water. It is prudent, then, to provide a source if no natural water is nearby.

We don't think a lot about water needs in the winter, but life goes on in the hive, even in the north, and in some of the coldest weather, brood is reared. A certain amount of moisture is required. Older honey may have thickened somewhat in storage, or may be granulated. Either way, the bees must add moisture to dilute or liquefy those stores. Those needs can be satisfied from water that condenses and accumulates in the hive. Moisture is given off by the bees' life processes. In fact, we go to some lengths to ventilate the hives in the winter just for this reason.

In the dry season, we need to be a little more attentive. If no adequate water supply is nearby, it is prudent to provide one with some provision to prevent bees from drowning. If bees fall into the water, and they do this regularly, they have great difficulty getting out. Even though they have both claws and sticky pads on their feet they are unable to grasp whatever "shoreline" is available and pull themselves out. Bees do not need deep water to drink from. If you use an open container provide something flat they can land on, a floating board for instance. Better yet, arrange for a trickle of water to run over a board or rock. Another method is to drape a piece of burlap or similar material over the surface of the water in a shallow container. The burlap will wick up the water and they can get what they need from it.

As a final thought, be careful of pesticides. If you are in an agricultural area where spraying is done, your bees may choose to collect contaminated water from puddles left in the fields after spraying, or from residual materials left in containers in which the spray material was mixed or stored. Know your bees' foraging range, and if you suspect this type of problem, be especially careful to provide a water source close to the bee yard.

Dick Bonney is the Extension Apiculturist for the state of Massachusetts and the author of two books on beekeeping.

QUEEN WATER

This is the season when many of us are receiving queens in the mail, or even directly from a producer. It's not possible to know exactly how long the queen and her attendants have been confined in that little cage, especially when it has come through the mail. Further, there is no source of water in the cage. The bees are dependent on what little moisture is in the candy, and there isn't much. As soon as you receive that queen cage, apply a little water. This is easily done by spreading a drop or two on the wire screen. Depending on how long they have been confined, you may see them begin to suck it up immediately. As an alternative, you can give them a little sugar syrup.

If you are unable to install the queen right away, give them a little water once a day, and perhaps more often depending on the temperature and conditions under which you hold them.

$3.50 /Lb!

robert smith

Yes, and that's wholesale. My sole source retailer is selling my 500 to 600 one-pound jars every year at $5.50 each, and many of his sales are for a half-dozen or so containers to a customer.

I did not invent this some six years ago, but I did a few things that led to it.

After a few early years of making cut comb honey from my two hives, I increased my apiary to eight colonies and bought a three-frame manual extractor. All of a sudden I had more honey than my family could eat or we had friends to give it to.

The first thing I did was visit a few supermarkets and look at their honey shelves. A pound was selling for about $1.50. Glass jars with professional multi-colored labels were standing along side a much larger selection of jellies and peanut butter.

Next I checked out the shelves of some gourmet food stores. Here I found much nicer jars, especially the hexagonal ones, with much more sophisticated, multi-colored and sometimes gilded labels. The retail price was one to two dollars higher than the supermarket selection.

Nowhere in the inventory of these first two sources did I find any honey produced locally, or even in my state. So I stopped by a local farm produce stand and found some ordinary glass jars of local honey, at about $1.50 a pound, with simple, white, homemade, block-lettered labels that looked like smudgy imprints of a rubber stamp.

What did I learn from this "market research?"

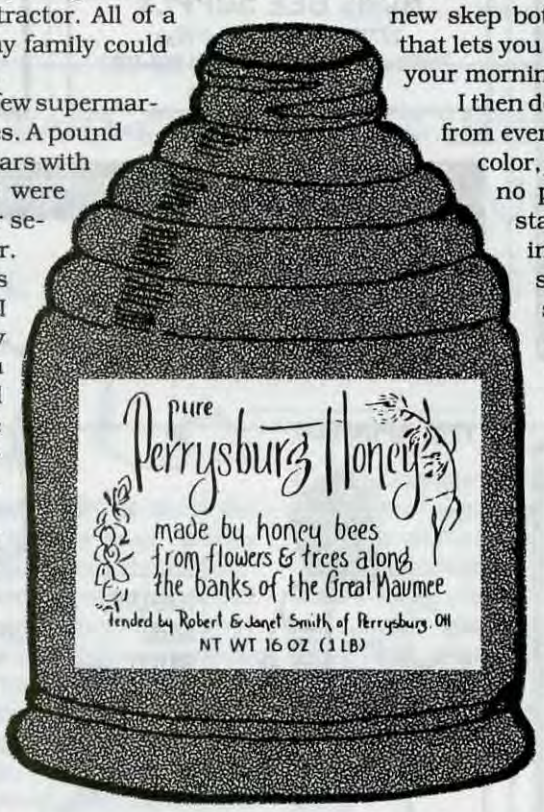
1. Except for the farm produce stand, all the honey bore very professional, printed, multi-color labels and were shelved with competing spreads that also had very professional, multi-colored labels.

2. All the honey was in glass jars, requiring some kind of table wear to apply it to toast or muffins. Glass can be elegant. But scooping honey out of a jar, or even a honey pot with a swivel stick, is a sticky business. Honey is nicer, but jelly is easier.

3. Also, except for the farm produce stand, all the honey came from elsewhere, as did all the other food products on the shelves.

With these profound findings in mind, I wondered what I could do to discover that mythical marketing "niche" where my honey would stand alone. At this time, I was not even thinking about a price.

So I took the following steps: I discovered the then-new skep bottle with the white plastic flip-top that lets you squeeze out just what you want on your morning toast.



I then designed my own label to be different from every honey label I had seen. First – no color, just black letters on white. Second, no printer's typeset alphabet, rubber stamp or computer-generated lettering. It had to look less than professional but better than amateur – something very local with a touch of the poetic. I was lucky. The name of my town Perrysburg has a local, small and homey sound. (I doubt if Toledo, Cleveland or Akron Honey would have the same appeal.) And the "banks of the Maumee" has a romantic sound to it. (Note, I did not use the word "river" which to many has negative connotations.) Flowers and trees, of course, are lovely to behold and honey bees are O.K. if mentioned but not illustrated (according to the research on that topic).

So I spent about two hours designing and drawing a camera-ready label about seven times larger than the final label size, paying close attention to the relationship of jar size and label shape. I took the camera-ready art work to a local offset printer and had a thousand printed in black on white crack-back stock at less than four cents each.

That year I gave away more honey than usual and many a donee asked for more, which I sold for $2 a bottle. But filling individual orders, delivering and collecting change became a burden.

One of my favorite haunts in Perrysburg is the local book store, whose proprietress was accustomed to my

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frequent browsing. So I showed her my new jar and label, offering it to her as a fee for advising me on how to price and where to sell the honey. I told her you could buy the same quantity around the corner at the supermarket for $1.50, to which she replied "Listen, dearie, if the honey is worth $1.50, the label is worth at least $3.00. Take it across the street to the gift store. Nobody buys a gift for under $5. Sell it to them for $3.50 and they will put a retail price on it." I told her I was glad she did not print her own dust covers and paid a visit to the gift store.

End of story: she was right. The gift store took it on and we made a deal that they could have Perrysburg Honey exclusively if they would buy all I wanted to sell, that I would sell none myself in the local area, but only give it away to friends as I pleased.

Each year my retailer, who has a dozen or so other high-end food products primarily for the gift trade, sells all the honey I care to produce. Some of his customers sign up for it early in the summer, declaring it the "best honey they have ever tasted." Often I hear the comment, "I just love your label and bottle. It's so easy to use."

Moral: If you are a small-time beekeeper with a limited supply to sell, figure out how you can capitalize on rarity, source uniqueness, customer loyalty, local attractiveness, a touch of poetry, convenience, and not least of all, excellence of taste and aroma. Then find a small, high-end retail gift shop where your honey can be a distinctive gift item of local origination.

When you think about your label, content and design, think about what gift buyers would delight to give, not what pleases your ego. Your name, or the name of your apiary, may not be the best marketing device. If you cannot render your own camera-ready art, find a local artist (with more than conventional calligraphy talents) who will give you a few "thumb-nail" sketches to choose from before rendering the final art work.

A good local label can sell the first jar, often for reasons that have little to do with taste, but the flavor of really good honey with a fetching label can sell it again and again to loyal and discerning folks.

Robert Smith is a beekeeper, artist & salesman from Perrysburg, OH.

2 FOR THE HONEY

vincent doyle

A few of us are drinking coffee and watching others, far below, move colonies into the outyard. The sun is just touching the peak of Waterloo Mountain, the yard is still in shadow but the sides of the valley blush pink. It's a clear June morning, mighty cold in western British Columbia and we hold our mugs in both hands.

This is prime fireweed country but the season is short. Moisture-laden winds off the Pacific ocean condense in the chilly air. Fog is a problem. Canadian mountains cast shadows that shorten the day and reduce flying time. There is nectar in abundance but only strong colonies get it. One of our group points to a corner of the yard where two men are taking the top off one colony and the bottom off another, "Look at that. Uniting colonies. Well, that'll make room in the yard for someone else. Never ran two-queen colonies myself." I look.

That's when I find out what strong colonies are like. The instant the men remove the top we see bees bubble up. They rise in mounds over the sides, a brown froth like instant coffee on over-time in the microwave. Someone spreads a newspaper over them. The paper moves. It's awesome. Why anyone would want to reinforce such a colony is beyond me.

> A two-colony (or united colony) system has definite advantages. This has more than most.

Using a two-man hive-lifter they begin to move the two-story colony towards one that is three deep. As they move we see bees hanging in curtains from the bottom. More come down every moment to find out what happened to their bottom board. The men grunt as they lift the tippy hive. They hold it suspended above the other colony with the lifter bars almost at eyelevel. They ease it down to give the bees a chance to move. The strain is too much. One bar slips. The colonies unite with a bang. Bee juice flies . and later, when the entrance screens are removed, to the few of us witnessing the event it becomes painfully obvious that we are too close to the problem to give it the attention it deserves. It needs a more detached point of view. At a distance that lends both objectivity and isolation to our deliberations we survey the developing scene. This is my first experience with the operation of two-queen or two-colony colonies, and I think with any luck it will be my last. Too complicated. Too much work. Too many angry bees. Too, too much!

We've just watched one problem – how to unite strong colonies. Another task: how to find the queen in such colonies.

Looking for the queen even in a strong colony is not that bad but it is one thing people talk about. A lot! The problem is that we get the colony roiled up. So many bees buzz around that we forget what we came for and just close 'er up in a hurry. We can't let the bees fake us out like that. There are two main points to bear in mind. *Keep them isolated. Keep them disorganized.*

Examine this strong three-story colony with me while I find the queen. The smoker's going, and in the tool box is a spray bottle filled with light sugar syrup – five water to one sugar. In another section we've also got some square pieces of cotton ripped from old bed sheets.They have been slightly dampened, and are large enough to cover a super and overhang by two or three inches on all sides.

Nearby are two sawhorses about six feet apart with two planks wide enough to hold a super and covered with a plastic tarp. We've also got some sticks about the size of your little finger and a couple inches longer than a super is wide. They are spacers, used so the bees are not crushed between the bottom of the super and the planks. A hive body we bought with drawn comb is already sitting on two spacers ready for use. We smoke the colony and wait a minute.

Take off the top super complete with its cover and put it on the sawhorses. Cover the supers still on the stand with a damp cloth. Take off the next super and place it next to the other on the sawhorses. Cover the bottom super with a damp cloth then take it off and place it alongside the others. Take that spare hive body with the dry drawn comb and place it on the bottom board. Take the top and inner cover off the first super and place it on the spare hive body. Cover that top super with a damp cloth.

Field bees are returning to the spare box on the bottom board. They go inside, out of our way, and that's what we're interested in. On the sawhorses there are three supers, isolated, and disorganized. Let's keep it that way.

Going to the group of bees we took off last which become more relaxed after a short rest, gently peel the top cloth back enough to expose the closest frame. Spray the top bar with sugar-water, take the frame out, and examine it. This frame can go in the hive body which is now on the bottom board or simply lean it next to the super. This gives us room to work. Pry the next frame out and repeat the

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2 FOR THE HONEY ... Cont. From Pg. 299

process. After examination replace this frame at the side of the super and cover it with that damp cloth you got from the pile. In this way work your way across the super exposing only one frame at a time, keeping the remainder under wraps as we move from one side to the other. There's mostly pollen and honey and some empty frames but no queen. This is pretty much what we expected. Now there's a choice. If the bees are getting restless in this super put it back on the bottom board remembering to replace the frame we took from it. If they are quiet, as they usually are, I prefer to leave them where they are for the moment.

Return to the middle super. The first frame is mostly honey, but the next is capped brood and the following one has some older, uncapped brood. We're getting close now. The very next frame, the fourth one in from the side has very young brood and for the first time – eggs. Take your time and look specifically for the queen. The bees on these frames are very tame, mostly nurse bees, going about their business as if nothing is happening. Turn the frame this way and that having a good look. She's not here. Put this one back, and just as you are about to get the next frame free you spot her going under the frame to the other side. You lift the frame out, turn it around and there she is. You do what you have to do. Now replace any frames you took out, remove the spare hive body, and replace the supers on the stand. Shake the bees from the extra hive body out on the ground in front of the entrance and we're done.

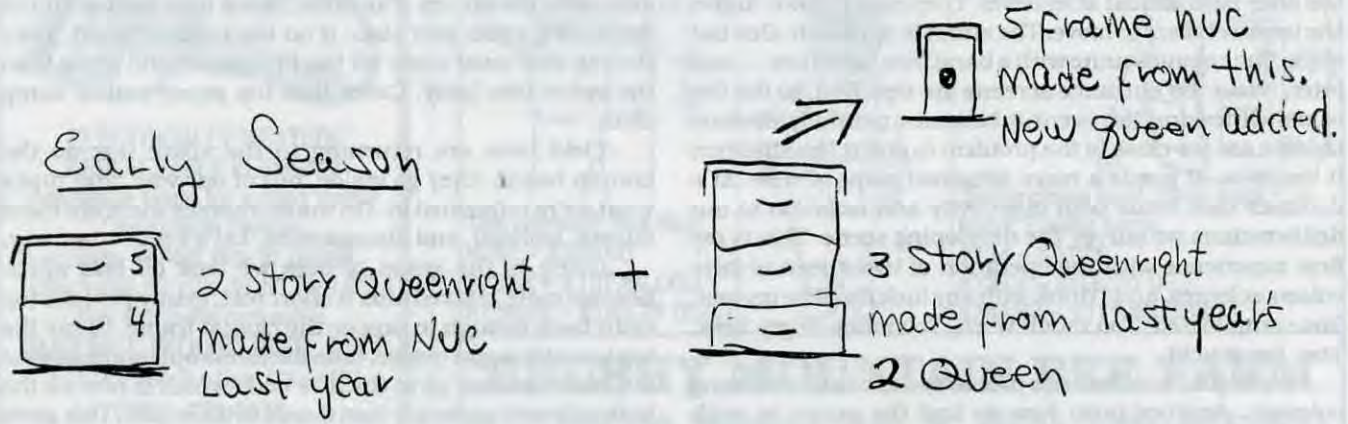
This colony could have occupied five, six or more supers. It would be examined in exactly the same way. But if you have a large colony you *must* reduce it to three supers. After you find the queen, *and kill her* you can shake the bees off of any honey or pollen frames and give these to other needy colonies, but make sure you leave her broodnest intact.

I don't usually go to such lengths for the average colony, but it really pays to take these few simple precautions when working with very powerful colonies The hive may be strong to overflowing but you are looking at only one box at a time. If you are careful and gentle you will find that the bees pay little attention to you. You will find the queen near the young brood and the eggs. Most of the time. If you don't find her, don't sweat it. The best queen will win when you unite colonies. Most of the time. Commercial operators tell me even their best crews find her only about 80% of the time. But they don't do it our way. I think you can expect better success. So much for problem number one. No, I haven't forgotten. We are still talking uniting colonies but we are taking the difficult part first.

Well, we found the queen. The next toughy is how to unite. Don't count on doing that the usual way either. We dequeened the three-high colony and marked it with red tape. Two days later we move into the valley with our dequeened colonies, plus regular hives and extra equipment. For each two-high queenright colony that we brought we have two extra fully equipped supers. One of these has a one-inch hole cut out just below the hand-hold and is covered with a double sheet of newspaper. This newspaper has been glued to the super with a thin paste made of flour and water and trimmed to size. Cut two slits lengthwise in the paper in the middle, parallel to and outside the two center bars. We can't use our smoker here because of the fire hazard which, in spite of the mist, is extremely high. We'll have to make do with our spray bottle filled with sugar-water.

Next place the two-story queenright colonies next to their queenless three-story mates. Next to the two-high are the empty supers. The *united* colony will stand just where the two-story colony stands now. Make sure it is sitting where the entrance

You'll need 2 established colonies to start. Both queenright initially. One you'll de-queen. From the other you'll split out a nuc for *next* year's program.



can catch the morning sun and that it is perfectly level. Then we will give the bees in the two-high a drink of sugar-water right through the travelling screens. That will slow them down a bit and give them something to do as well as cooling them off before we cut the bands.

Once this colony is well wetted down take off the travelling screen and immediately put on both wxtra supers as a unit. This makes a four-high colony out of what was previously only a two-high. You will see that by putting both of these supers on as a unit few bees will fly in spite of the fact that it is a big colony. The newspaper covers them up nicely. They immediately expand to fill these two supers and reduce the congestion of the brood nest. This is one method of swarm control. Do you see why we glue the paper to the super with flour paste? The flour won't hurt the bees if they get chewing on it.

Once this is done set up the sawhorses the same as before. Remember how we took the three-story colony apart to find the queen? Do the same thing here. The difference is that now there is no queen and we take away the bottom board and the travelling screen.

So you see, we only lift one super at a time. The last one will be a six-high lift but that is still better than trying for three at once in a four-high lift. Don't remove the cloth covering each super until that super has been lifted into place. When removing the cloth roll it from one side to the other and spray the bees as they are uncovered. The bees usually do not surge out of the bottom of these supers and you'll crush few bees if you remember to set the super down in catty-cornered fashion and twist it into position, thereby forcing the bees out of the way.

When the last super is in place you have a queen-right colony that is seven supers high, but we are not finished yet. With the last super in place go back to the truck and unload the rest of the supers that have drawn comb or perhaps foundation. I usually add one to three of these to each colony. Remove the cloth cover as before, rolling it back gently and spraying the bees as you go. Then can add the supers one at a time. So you see now each colony will be from eight to ten high; a queenright two-high colony on the bottom; two empty supers, one intact, one with the front entrance hole and covered with newspaper between; then the queenless three-high colony and, finally, one to three honey supers above it all.

A week from now we will return with the truck loaded with nucs. Didn't I tell you about the nucs? We'll stack them two-high with alternating entrances, each on an individual bottom board which is just a 3/4" frame with a one-inch notch cut out for an entrance. Nothing special. Telescoping covers are 1/2" plywood cut to size. And that's it.

This takes care of the two major problems: finding and killing the queen and uniting colonies in the outyards.

So for we've delivered a three-high colony in which, two days earlier, we found and killed the queen. We delivered a queen-right two-high colony, and we combined the queenless and queenright colonies. This eliminates one colony. When we go back up there a week from now we will take the nucs with us. When we return from the fireweed we will come back with three to five supers of honey, one very strong colony and one very strong nuc.

In the home yard we will overwinter the nuc on stores it puts away during the summer, during which it will have grown from a small four or five frame nuc until, by season's end, it occupies a full ten frames and is in fine condition. It will have sufficient stores to pass the winter in good shape. You can see a pattern developing here, can't you?

When de-queening a large colony keep several things in mind. Keep returning field bees away (empty super on bottom board); keep the supers covered with a damp cloth when examining; and keep basic colony structure in mind – the queen will be near eggs and brood.

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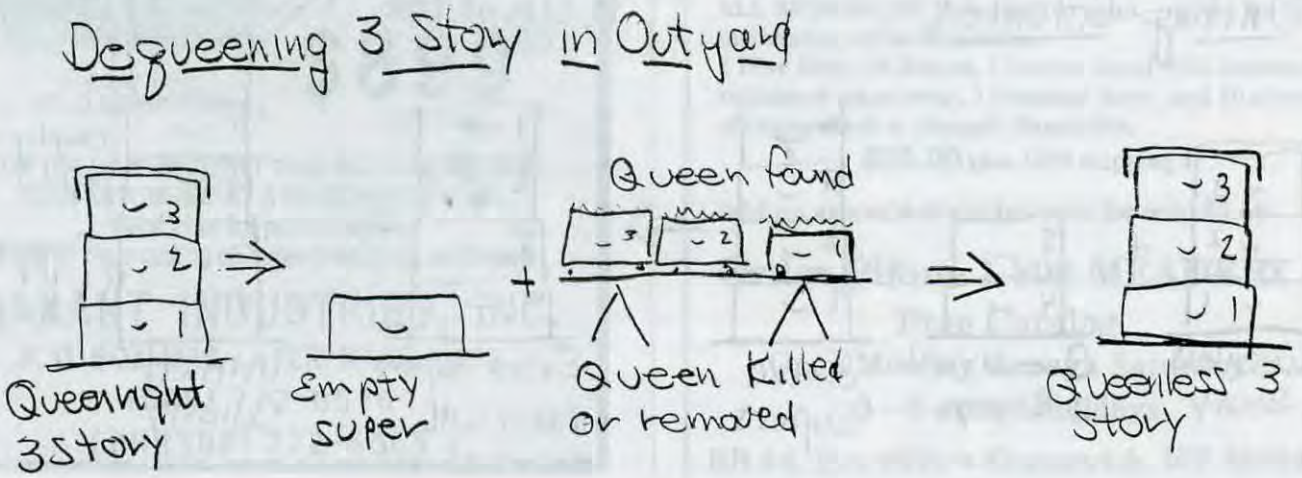


This nucleus becomes the two-high colony of the following year. The three-high colony results from the colonies combined in the outyard and by the time you are ready to go to the fireweed in late June or early July, may be four or five supers high. Then it is dequeened and reduced to a three-high colony. And so on. All that remains is to see how and when the nucs are produced.

You should start by the end of May or the beginning of June to build your nucs. A good nucleus has brood in all stages of development from eggs to emerging workers, abundant food and a strong population of nurse bees. It should occupy four or five frames. Brood, bees and stores are taken from the overwintered *three-high colony*. This nucleus can make its own queen, but personally I don't like the idea of giving them some eggs and 'letting the bees do it' because there are too few bees available and their queens do not develop properly.

Give the nucleus a ripe queen cell or a mated queen, if you have one, after they have been queenless for a few hours.

Here are seven advantages of this system:

1. Maximum colony strength at honey flow time.
2. Colonies headed by young queens at their most productive age.
3. Colonies requeened automatically every year.
4. Queens accepted without fail.
5. Better swarm control.
6. Successful wintering.
7 Abundant pollen and honey reserves.

Here are the details, step by step: Timing is given to catch the fireweed harvest in the Pacific Northwest. Adjust the timing to suit your location.

1. Make up the nucs as soon as the weather permits in spring.

2. In July unite for the harvest. Select a date for the move to the outyards and two days prior find and dispose of the old queens. Mark these colonies as queenless, not to be confused with colonies that are queenright. Reduce them to three hive bodies. Take as much honey from them as they can spare to get them down to size. DO NOT UNITE AT THIS TIME.

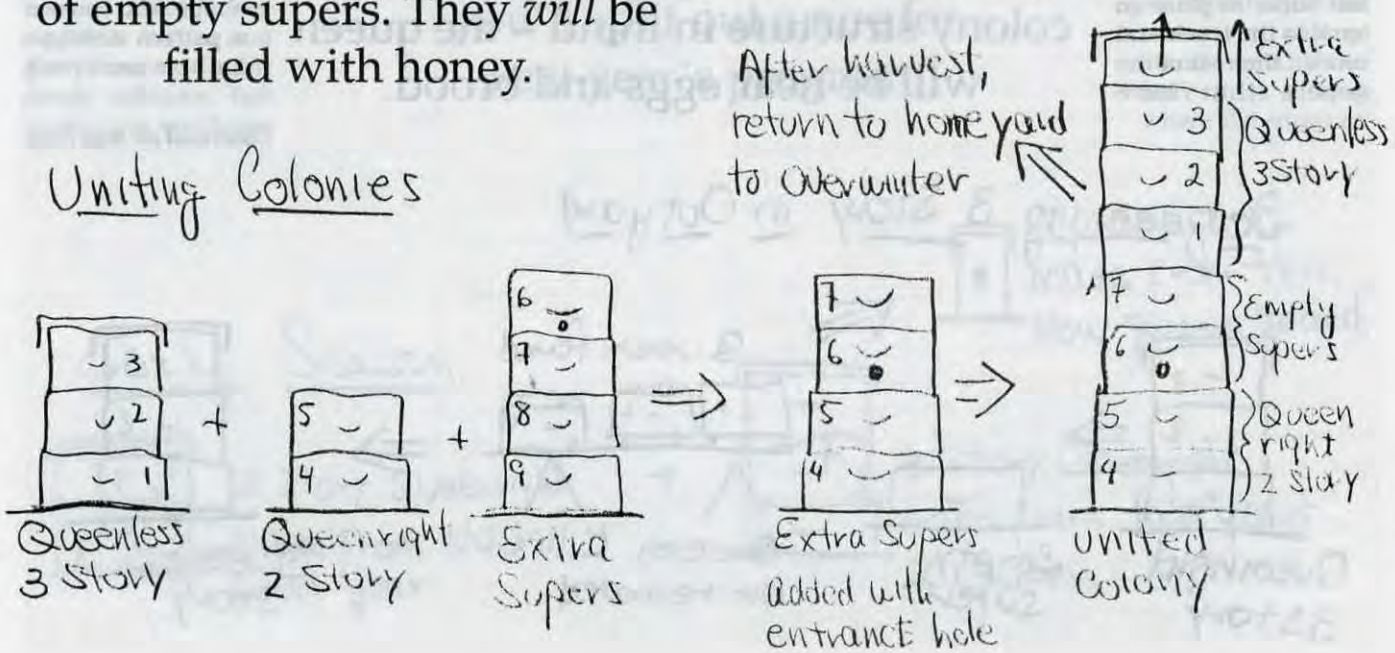
On moving day, take the overwintered colonies plus additional supers with drawn comb to the outyard. One of these extra supers has a 1" hole drilled in one end below the hand hold for an entrance.

Set the queenright colony (two bodies) on the bottom board. Put the empty super with the 1" entrance hole on top. Spread a sheet of newspaper over this. Place the other colony (three hive bodies) on the newspaper. Place the two empty supers on top of the combined colonies. Replace the inner cover and the top cover.

Note: The top entrance (1" hole) in the super between the colonies is important for several reasons. When bees from the stronger top colony chew through the paper they find a way out without going through the strange queen's broodnest. No queen excluders are needed. There is no queen to wander about in the upper hive bodies; she has been disposed of. The remaining queen is held down initially by the newspaper separator. Later on, foragers returning via the middle entrance move nectar up and down, storing it above and below the entrance hole, while those coming in at the main entrance below plug the broodnest itself with honey and pollen. This 'squeezes' the broodnest from above and below, limiting the number of 'free-loaders' (bees that are too young to participate in the harvest), while still maintaining colony strength for the winter. The brood bodies packed with pollen are ideal for spring build-up.

3. One week later. If you have your nucs in four- or five-frame nuc boxes, now is the time to transfer them into 10 frame bodies. These bodies should have a 1" hole for an entrance. Bring the nucs to the outyard. Stack them two or more high with alternating side entrances. This allows

When uniting these 2 colonies remember to allow a middle entrance (the 1" hole) and lots of empty supers. They *will* be filled with honey.



them to provide their own stores for the winter. The brood nest of the new queen in the nuc is plugged by the storage of pollen and honey, so her egg-laying is limited and her vitality preserved. The queen is *'honey-bound'* and she is restricted this way until the following season. She will be less than one year old then and vigorous. Because of this her colony will build up rapidly to occupy two hive bodies in the spring. The overwintered production unit will build up even more rapidly and occupy three hive bodies.

4. September/October. Bring in the harvest. If queens are available you can shake bees for sale to reinforce weak colonies or you can make up nucs. These can be sold for additional profit or overwintered to increase the size of your operation at no cost in honey production. Shake the bees from additional brood frames into the nucs to make up for the loss of fielders going back to the support colony. To prevent fighting, spray with one-to-one syrup scented with something like anise extract.

Equalize the colonies and nucs to reduce the size of the stronger ones and bring the weaker ones up to par. You do this by removing brood and stores from the strong colonies and giving whatever is needed to the weak ones. The idea is to have all two-high colonies at maximum and equal strength, and all three-high colonies at maximum and equal strength.

Like many other things this system is not all sweetness and light. There are a few hitches with the "Two For" system:

1. For each producing colony extra equipment is required: a division board, inner cover (if you use one), top cover, bottom board, mating nuc, and 10 to 12 supers equipped with frames. For each producing colony one super has to have a 1" entrance hole cut in one end just below the hand grip.

2. Colonies have to be rebuilt in the field, a problem which you now know how to handle.

3. Large colonies may be difficult to handle during honey removal. This can be handled with the appropriate use of covering cloths.

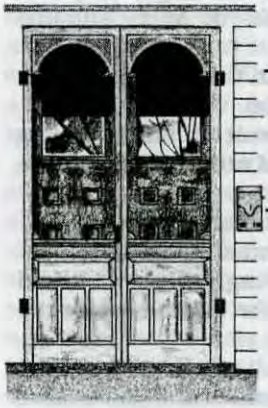
4. You must have extensive understanding of beekeeping practices and be able to find and kill the queen.

5. You need at least two strong, well-established colonies to start with. This is not for beginners nor the faint of heart.

If you can live with these difficulties and you believe the advantages far outweigh the disadvantages, as I do, then this system is for you. You won't find an equivalent system of colony management that is as uncomplicated to operate, once you get it going.

And that's it. I think you'll find it a useful system that makes you operate your colonies in the most efficient manner for extracted honey production. You'll never miss a major flow because you were unprepared. The only daunting thing, even for the experienced, is the size of the colonies in the outyard. Remember: No pain, no gain. And the gain here can be *at least* 25% greater than running separate colonies. That makes it worth the effort.

Vince Doyle is a beekeeper, freelance writer, and skyscraper climber from Cowichan Bay, British Columbia.



HOME HARMONY

ann harman

Strawberries

May is a good month. The bees are busy pollinating and collecting nectar. In some areas of the country beekeepers are piling on supers. Gardens are being dug and seeds are being planted. I hope that you will plant nasturtiums this year. The leaves and the flowers are so useful in salads. You can also use the flowers for dipping, just as you would carrot sticks or broccoli florets. Do any of you have strawberries in your garden?

Strawberries lend themselves to assorted situations. You can grow a huge bed of strawberries or you can make a strawberry tower that holds an amazing number of plants. For very limited space — or just the convenience of having strawberries by your back door — you can grow the plants in a strawberry crock or a half-barrel. Your favorite strawberry cultivar can be early, middle, late or everbearing. Try a few of each this year.

Strawberries do well in a rich loamy soil but too much fertilizer will encourage leaf growth, not berry production. Strawberries really do need to be mulched because the berries are so close to the ground that mud and damp can ruin the crop. Check with your local Cooperative Extension Agent for the best ways to do this.

Alpine strawberries are a delightful little plant. You can grow these in a flower bed as an edging. Although the berries are small the taste is not — they are delicious. Another advantage of alpine strawberries is that once planted they will grow in one spot with none of the runners regular strawberries have. Alpine strawberries winter well and can be grown in many areas of the country. Make room for a few plants in your flower bed this year.

Honey bees and strawberries have a good partnership. So do strawberries and honey. Studies have been done on the pollination of strawberries by honey bees. In order to have large, symmetrical berries and multiple berries, it is essential to have insect pollination. Wind pollination may help, but insect pollination is the most effective. Although strawberry blossoms are not the most favorite flowers of honey bees, they do visit willingly and carry out their pollination duties.

Birds love strawberries so much that you may have to put netting over the plants during fruiting. Little critters like the berries, too. Unfortunately strawberry plants are low growing and quite within reach of chipmunks. After bird-netting my strawberry bed one year I still had quite a bit of chomped-up fruit. The mystery was solved when I discovered that a chipmunk family had moved into the bed and was enjoying my strawberries for breakfast, lunch and dinner. Perhaps you will have to plant enough berries for you and the wildlife, too.

If you are going to make jam, strawberries are best picked when just barely ripe. Too-ripe berries will not give you a firm jam or jelly. Don't be discouraged if your jam turns out to be sauce. Strawberry sauce is great over ice cream, cake and fruits. Do not wash the berries until you are ready to use them. Strawberries are best kept in the refrigerator until used. Since they are a soft berry they do not keep well so plan to pick or buy and use immediately. Strawberries freeze well but tend to get rather mushy when completely thawed. Plan your use of these berries with their characteristics in mind.

Some strawberries are huge and look wonderful but actually are rather bland in flavor. Try this — slice the berries in half, place in individual bowls and drizzle orange blossom honey, a teaspoon to a tablespoon, over them. Toss gently and let sit at room temperature for about 15 minutes. You will find the flavor much improved.

Strawberry shortcake must be one of the nation's most popular foods. But strawberries can be used in so many other ways. Take advantage of a good strawberry harvest to try some new recipes; you may find one that surpasses strawberry shortcake.

Strawberries Chantilly

Here is a recipe that, admittedly, is rich. But it is simple, quick to prepare and makes a dessert fit for a gala occasion.

1 quart fresh strawberries
1 cup heavy cream
1 teaspoon honey
1 tablespoon rum or brandy or a liqueur such as Kirsch, Framboise, Chartreuse or Cointreau

Wash berries, hull and drain on paper towels. Whip cream, add honey, then fold in liqueur. To serve, fold berries into cream and spoon into individual dessert dishes. Yield 6 servings.

Naturally Delicious Desserts & Snacks
Faye Martin

Strawberry Dressing

Throughout the coming months you can enjoy fruit salads. Here is a recipe that gives you a fruit dressing for that salad. It's a nice change from the usual dressings.

3/4 cup sliced strawberries
1 tablespoon honey
1/2 cup mayonnaise

Place strawberries in a small bowl. Stir in honey, mashing berries slightly with fork. Add mayonnaise, stirring until well blended. Chill about 1 hour to develop flavor and color. Serve with fruit salad. Yield 1 1-1/4 cups.

Feasting On Raw Foods
ed. by Charles Gerras

Berry-Melon Salad

Sometimes it's difficult to coordinate the ripening of various fruit, i.e., strawberries during melon season or melons during strawberry season. This is a delicious salad the dressing is quite different.

1/2 cup unsweetened orange juice
1/3 cup unsweetened grapefruit juice
3 tablespoons lemon juice
1 tablespoon cornstarch
2 teaspoons vegetable oil
2 teaspoons honey
1 teaspoon poppy seeds
2 medium cantaloupes
2 cups sliced fresh strawberries
2 cups honeydew melon balls fresh mint sprigs for garnish

Combine juices, cornstarch, vegetable oil and honey in a saucepan, stirring well. Cook over medium heat, stirring constantly, until thickened and bubbly. Stir in poppy seeds. Cover and chill thoroughly.

Peel cantaloupe and cut each melon crosswise into four 3/4-inch slices. Place slices on individual salad plates. Combine strawberries and honeydew balls. Spoon 1/2 cup strawberry mixture over each cantaloupe slice. Spoon poppy seed mixture evenly over fruit. Garnish with fresh mint sprigs if desired. Yield 8 servings.

Cooking Light Cookbook
Oxmoor House

Fruity Pasta Salad

Strawberries combine very well with other fruits. The distinctive taste of strawberries never seems to be overwhelmed by other fruits. Instead, the flavor of the combination is enhanced with the addition of strawberries. Although pasta is frequently associated with vegetable salads, it's a good addition to a fruit salad. This next recipe will make an ideal lunch when combined with a soup. Since it must be made ahead, then chilled, this salad is suitable for potluck picnics or for those busy summer days when everything needs to be picked at once.

2 slightly beaten egg yolks
1/3 cup orange juice
3 tablespoons honey
2 tablespoons lemon juice
1/8 teaspoon ground cardamon
1 cup bow tie or 2/3 cup wagon wheel macaroni (about 2 ounces)
1 cup sliced, peeled peaches OR orange sections OR cubed cantaloupe OR honeydew melon
1/2 cup sliced celery
1/2 cup sliced strawberries
1 kiwi fruit, peeled and sliced

For the dressings: In a small saucepan mix egg yolks, orange juice, honey, lemon juice, and cardamon. Cook and stir over medium heat until thickened and bubbly. Cool slightly. Cover and chill.

Cook pasta according to package directions. Drain pasta, rinse with cold water. Drain again. Combine pasta, peaches, orange sections or melon, and celery. Add dressing; toss to coat. Cover. Chill for 4 to 24 hours. Before serving, stir in strawberries and kiwi fruit. Makes 6 servings.

Better Homes & Gardens New Cookbook

Fruit Salad With Poppy Seed Dressing

Poppy seeds and strawberries seem to be a popular combination. This salad dressing, however, is quite different from the one given earlier in this article. It can be used on other fruits.

2 cups torn leaf lettuce
1 8-ounce can pineapple slices (juice pack), drained
1 cup strawberries
1 cup cubed honeydew melon
1 orange, peeled and sectioned
1 kiwi fruit, peeled and sliced
lemon juice (optional)

Dressing:

3 tablespoons honey
1/4 teaspoon finely shredded lemon or lime peel
2 tablespoons lemon or lime juice
3/4 teaspoon poppy seed
dash ground mace

Prepare dressing: In a screw-top jar combine the dressing ingredients. Cover and shake well. Chill till serving time. Shake well before using. Makes about 1/3 cup dressing.

Divide the torn leaf lettuce among four salad plates. Cut the pineapple slices in half. Arrange the pineapple slices, strawberries, honeydew melon cubes, orange sections, and kiwi fruit slices atop the lettuce. If desired, brush the kiwi fruit slices with lemon juice to keep them from turning brown. Cover and chill salad for up to 1 hour. To serve, drizzle salad with Poppy Seed Dressing. Makes 4 servings.

Better Homes & Gardens Family Favorites Made Lighter

Strawberry-Apple Juice

And finally a wonderful juice that can be made with slightly too-ripe berries, berries not beautiful enough for pies and salads and berries that need a bit of trimming-away of soft spots.

3 pounds apples
1-1/4 pounds strawberries
3 cups water
1/3 cup honey, or to taste

Wash and core apples. Hull and prepare strawberries. If a juicer is available, juice the fruit. Otherwise, grind apples and strawberries through a food chopper or chop finely. Bring fruit and water to a boil in a 4-6 quart kettle. Reduce heat and cook slowly for about 10 minutes. Strain through a cloth bag. Let juice stand 1 to 2 hours to let sediment settle, if desired. Add honey to juice and mix well. This can be used right away or it can be heated and poured into hot sterilized jars to within 1/2 inch of tops. Complete seals. Process in hot-water bath for 15 minutes. The juice can be frozen also.

Putting It Up With Honey
Susan Geiskopf

Enjoy the strawberry harvest!

INNER ... Cont. From Pg. 260

the Italians (and their variants the Starlines) raise lots of brood late into the fall, and start raising lots of brood early, early, early.

For those who need or want lots of bees this is an outstanding attribute. But if you have early, hard and late winters it can be a killer. And this year it was. Both colonies were gone. Starved. Lots of bees still in the hive, all grouped together right at the top. Not a speck of honey left. Sad.

The others, who generally tend to shut down early and start late did better. At least they were alive. The Caucasian had lots of dead on the floor and between some combs and they were on the edge, food wise. It was close.

Both Carniolans did pretty well. Normal amounts of winter loss and still lots of food. They seemed in pretty good shape.

The Buckfast were the strongest, population wise, and had the most food left. But my records indicate they had the most going in. They also had more brood than any of the others but even then it wasn't much. But it was early, and they were being careful (how's that for an anthropomorphic analogy?).

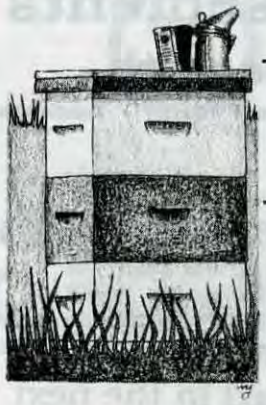
The Cordovans fared well. The yellows superceded in late summer so can't be counted, really, but the resulting progeny has distinctly Italian traits – and irritable behavior. Time will tell. The purples were weak, with lots of perished on the floor, but seemed to be doing alright.

Right off the bat someone is saying, "You could have saved those bees if you had done things differently. " Which, I admit, is exactly right. But I don't usually need 100 lbs. of food; I never wrap; I'm not in this for the honey; and time is always short. I need a bee that is adapted to my style and amount of care, and, it's pretty obvious some of ours were, and some weren't.

The article published in January stated you *can* pick the equipment and the type of bee that fits you, your budget and your lifestyle.

I know the area I live in, the local honey flow patterns, and *my* management style. Some bees do well with that. Others don't. And, I know, I can customize my operation to meet my needs. So can you.

Kim Flottum



BEE TALK

richard taylor

"There's more than one right way to take care of bees, and control mites."

May is when you've got to think about swarming, although it will not peak until June, at least in this northern latitude. So I could talk about swarm control this time, except I've done that before, several times. I'm going to make just one important point here about swarming, something that is not widely understood. That point is, swarming is not, as beekeepers tend to think, caused primarily by overcrowding in the hive. That is, it is not caused by the hive just getting too full of bees. The more direct cause is *congestion of the brood nest* – not a congestion of bees, but of brood. In other words, the brood nest gets so full of eggs, larvae and capped brood that the queen cannot find empty comb to lay in. That's when queen cells begin to appear. And this is why reversing two-story hives tends to delay (but seldom prevents) swarming. It breaks up the brood nest. All effective swarm control methods, accordingly, involve dividing the colony in one way or another; for example, removing some combs of brood and replacing them with empty combs. Having that in mind, it is not too hard to work out swarm control methods that work pretty well.

Now I want to talk about something else, namely, general management.

You can learn a lot about managing bees for honey production by reading books. But another very good way to learn a lot in a hurry is to talk with some expert. This is what happened to me recently. I was at a big bee meeting, and I just chanced to fall into conversation with a beekeeper whom I've long admired, although I don't know him all that well, because he lives far away. Anyway, I got to talking with him, and in less than 10 minutes I picked up more valuable information than I would be likely to get from a dozen books.

This gentleman comes from several generations of well known and highly successful beekeepers, who have made good livelihoods producing honey. He has developed a system of management for his 1,800 colonies which, in many ways, flies right in the face of established principles.

For instance, colonies are overwintered in single-story hives. A queen excluder goes over this single story when supers are added in the spring, and stays there until all the honey is harvested. I think he said he does not wrap the hives, but he does put a sheet of insulation board on top of each one, instead of an inner cover. He said that moisture does not form on the bottom of the insulation board, and of course that is critical. If frost forms in the top of a hive, then melts and drips down, the bees are in trouble. His bees cluster right up in the top, against that insulation board, which is very good.

It was, however, the way he controls *Varroa* mites that interested me most. He thinks *Varroa* is not much of a problem, at least for him. Here is how he controls it.

When brood rearing stops – I think he said October – he goes around and puts *one strip*, only, of Apistan, in about every fourth hive, and leaves it there just *five days*. He's done controlled tests, and found that this kills off the *Varroa* mites just as effectively as using more strips. After the fifth day he removes the strip and puts it in the next hive down the row, then does the same again after another five days or so. Thus it only takes one strip to deal with four hives, and you can deal with a whole apiary of, say, 40 colonies with only 10 strips.

That all struck me as pretty astonishing. So I asked him about tracheal mites. He said that when these first appeared they were causing maybe 25% winter loss, but he has cut that to 13% just by using extender patties. That is, he mixes Crisco® and powdered sugar, and puts a dollop of this – maybe a tablespoon or so – on the middle top bars of each hive. The mites, which attack adult bees (unlike *Varroa*) don't like bees that have come in contact with the grease patty, and aren't attracted to them. He said that this works as effectively as menthol treatment, and is certainly lots easier and cheaper, besides which there are lots of objections to trying to control mites with menthol.

Now it really astonished me that he adds no Terra to the grease patties, so as to control American foulbrood while he's at it. And it astonished me even more when he said that he uses Terra only when he finds a colony already infected with American foul brood. That is, he uses the Terra as a medicine, rather than a preventative. And there I have to disagree with him. I think you should never try to *cure* AFB, except with fire. And it is very easy, and cheap, to prevent, with Terra. I ran into Dr. Bill Wilson there, afterwards, and asked him what he

Continued on Next Page

BEE TALK ... Cont. From Pg. 307

thought, and he pointed out the obvious: Why not add the Terra when your mixing up the Crisco and powdered sugar? It's no more trouble, and costs little.

I don't think anyone can be of much of a beekeeper unless he reads some books and makes an effort to keep up with things, but sometimes you can learn an awful lot just by asking the right questions and keeping your ears open. Q

QUESTIONS? ANSWERS!

Richard Taylor

How Many Strips?

Q. My hives are two-story ones. When using Apistan strips, should I put them in both hive bodies, or just one?

Tim Grove
Searsburg, NY

A. The strips must go between the combs of whichever story has brood. There is no point in putting a strip into the part of the hive that is mostly honey. And the strips will not be effective if simply laid across the top bars. The bees that are tending the brood must come in frequent contact with them.

Editor's Note: Apistan has, or will soon release a modified label that states that one strip must be used for every five frames of bees. Therefore, count frames of bees/super and apply accordingly *in each super.*

Swarm Traps

Q. I am contemplating trapping swarms this year. I could buy the expensive traps, but will regular deep supers work as well? Do pheromones help attract the swarms? And when do I set the traps out?

Ben Beiler
Stark City, MO

A. Regular deep supers, that is, single-story hives, work well for trapping swarms. Have a few scraps of old dark comb in them, to attract the attention of the scout bees. Have them about 10 feet off the ground, in trees, for instance, and facing open areas. Such bait hives are found first by scout bees, which then lure the swarms to them. You do not need special pheromones to attract the scouts, so long as you have some old dark combs in them.

Starting When?

Q. When do the bees actually start brood rearing in spring?

George Piper
Torrington, CT

A. I'm not sure, but I would guess that by late February, in your area brood rearing is starting to increase.

'Terra' Breakdown

Q. How long will Terramycin last after it is mixed with powdered sugar? Does it work just as well mixed in sugar syrup?

Robert Scott
Rock, WV

A. Packets of Terra have a date on them, beyond which the effectiveness is not guaranteed. Terra is quite stable if kept dry, and mixing it with dry powdered sugar does not reduce its shelf life. Once applied to a colony, however, internal moisture begins and it loses its effectiveness very quickly – in a matter of hours, I believe. If mixed with syrup it breaks down even sooner and so should not, I think, be used that way.

Splits

Q. If I put a double screen between the two stories of a hive and in four days move the half that has eggs to a new location, and introduce a new queen to that half, should I look for and destroy any queen cells I find there?

Arthur Young
Norwalk, WI

A. The procedure you outline is wrong in several respects. First, you should leave the half with eggs, and hence queen, at the original location, and move the queenless half to a new location nearby, then introduce the new queen to the moved half. Thus the field bees will return to the queenright half, and it will be easy to introduce a new queen to the moved half because it is mostly populated with nurse bees. Second, be sure that the half that is moved is not heavy with honey; otherwise the bees will rob it out (if it is close by, a mile or less) and take the honey back to the original location where they think it belongs. So, third, if you discover that the eggs, and hence the old queen, is in the half that does not have much honey, and the moved half is therefore heavy with honey, it will be necessary to switch them around, find the old queen, and put her in the part heavy with honey on the original stand. There is no need to destroy any queen cells, unless advanced ones are already in the moved half.

Package Timing

Q. How long can a swarm be kept in a cage or swarm box before being hived?

Henry Yoder
Flemingsburg, KY

A. I would think about three weeks, maximum, but it is best to get them hived within a couple of days. If kept confined longer than that they must be fed sugar syrup, and even so, dead bees will begin to appear on the bottom in increasing numbers. Also, the swarm begins to build comb after a couple of days, especially if kept in the dark or shade, which is where they should be kept, in order to reduce their activity.

Slow Release Best

Q. What is the best way to introduce a new queen – just let her walk into the hive, or release her on the combs, or let the bees eat through the candy and release her?

Bob Lyons
Pincher Creek, Alberta, Canada

A. Let the bees eat through the candy. She is almost certain to get murdered if you release her directly. The best way to get acceptance is to split out a nuc, introduce the queen to that, then recombine the nuc with the colony. That way, the field bees stay with the parent colony and the queen gets introduced to the gentle, friendly house bees.

Questions are invited. Address Dr. Richard Taylor, Box 352, Interlaken, NY 14847, enclosing stamped envelope for response.

?Do You Know? Answers

1. **True** Both temperature and colony strength affect the initiation of workers' foraging activity. Honey bees cannot start into flight at a temperature of less than 50°F Low temperatures severely reduce or prevent foraging with almost none occurring below 55° F. and there is a linear rise in the number of foragers up to approximately 90° F. Weak colonies do little flying below 60° F
2. **False** Bees shaken into a package are usually all from the same colony but the queen that is added to the package comes from a different colony. She is usually a young mated queen, raised in a queen rearing yard specifically for inclusion with the package of bees.
3. **False** Queen excluders should be removed in the fall so that they are not between the bee cluster and the stored food. Since the bees tend to move upwards in the hive as winter progresses, it is important that the queen not be trapped below the cluster as it moves upward.
4. **True** Strong colonies are more effective honey producers than weak colonies because the stronger colony has a larger percentage of adult bees available for honey collection. As a colony increases in size, the number of bees required to take care of the household duties in the hive does not increase accordingly. Stronger colonies not only produce more honey than the weaker colonies, they also produce more honey per bee.
5. **False** Honey-bee workers forage for food not according to their own needs, but in response to the needs of the colony.
6. **False** Nectar and honey satisfy the carbohydrate requirements of the honey bee and pollen normally satisfies the dietary requirements for proteins, minerals, lipids (fats) and vitamins.
7. **False** Worker honey bees begin consuming pollen within 1-2 hours after emergence. Mass consumption begins when the bees are 42 to 52 hours old and they consume large quantities of pollen in the first two weeks of adult life. Nursing duties are normally finished and field duties are undertaken when bees are 10 to 14 days old. At that time the requirement for pollen decreases and the chief dietary constituent becomes carbohydrates which are obtained from nectar and honey.
8. **True** Water is a vital element in the honey bee diet, without water bees will die within a few days. Internally water carries dissolved food materials to all parts of the body, assists in the removal of waste products and digesting and metabolizing food. Water is also a major component of larval food secreted by nurse bees. Water is also used to break down crystallized honey and used to cool the hive.
9. **False** Although the activities of worker bees are affected in many ways by the queen, it is the pheromones produced by the queen rather than her physical presence, that affects worker behavior and physiology. The queen is not actively and consciously guiding or organizing worker bee activities. In fact, all activities within the hive can proceed, at least for a period of days, in the absence of a queen.
10. D) Three
11. A) Three
12. B) 7,000 bees
13. The primary purpose of the late winter/early spring colony inspection is to check to see if the colony is alive and to check on the location and quantity of food stores so they will not starve until a nectar flow begins. Equipment containing dead colonies should be removed from the apiary.
14. An entrance reducer is used during the installation of a package of bees to reduce flight activity until they become acclimated to their new location and to prevent stronger colonies in the area from robbing the newly established package colony of its food stores.
15. Propolis, Pollen
16. A) Honey Bee Tracheal Mites
    B) Varroa Mites
    C) American Foulbrood, European Foulbrood
17. The best time to install the package of bees is in the late afternoon or early evening. This will reduce the possibility that some of the bees will fly off before they become acclimated to their new surroundings. Hopefully, the next morning will see a slow warming so that the bees will gradually begin to fly out and become oriented to their new surroundings, and losses will be minimized as they begin to forage.
18. Advantages of starting colonies with nucs rather than packages:
    • The nucleus colony contains brood and food so no delay in colony development or replacing older bees.
    • Nucleus colony contains combs and laying queen.
    • No delay in building comb or queen introduction as with packages.
    • Disadvantages of starting colonies from nucs rather than packages
    • Nucleus colonies cost more and are more difficult to ship.
    • Greater chance of transmitting brood diseases and varroa mites.
19. Adding honey supers on top of a colony does not prevent swarming since it does not relieve congestion in the broodnest, the primary cause of swarming.

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.

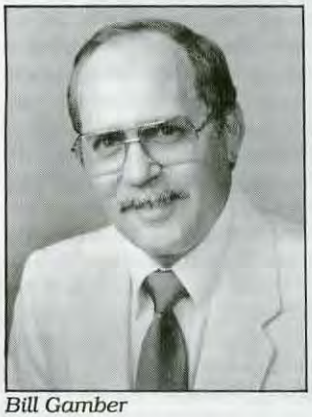
Number Of Points Correct
25-18 Excellent
17-15 Good
14-12 Fair

Gleanings

MAY, 1994 • ALL THE NEWS THAT FITS

EAS MEETS IN LANCASTER, PA

The Eastern Apicultural Society will hold their annual meeting in Lancaster, PA the week of July 11, 1994. Earlier than usual, this year's conference starts Monday with the two and a half day short course. A two-tiered course this time, one will cover the business of beekeeping while the other is more practical, hands-on learning.



Bill Gamber

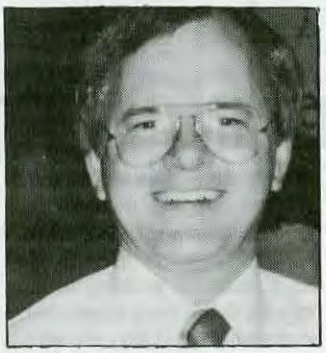
The main conference starts on Wednesday afternoon, and continues Thursday and Friday mornings. In the afternoons there are a wide range of workshops, including: Developing School programs with Cliff Sunflower; nectar to honey by Rick Fell; publishing newsletters with Kim Flottum; marketing with Tom McCormack; dipped candles with John Peters; Queen rearing with Dennis Keeney; record keeping with Jerry Ely; Paschal candles with Gus Skamarycz; and brood diseases with Bob Wellemeyer.

Main speakers include Dr. William Towne on Bee Senses; Dr. T. Cherbulez on Apitherapy; AHB with Dr. Jim Tew; Queens with Dr. Rick Fell; Honey Quality by Dwight Stoller; Carniolans by Sue Cobey; plus Dr. Clarence Collison, Andrew Matheson from IBRA and Dr. David Fletcher.

Cliff Sunflower

Plus, there will be tours of Dutch Gold Honey, a BBQ and banquet and all the beautiful surroundings of the Willow Valley Resort Complex.

Dwight Stoller



Jim Tew

Registration absolutely ***MUST*** be sent in by June 1, 1994, so if you're not receiving the EAS Journal please contact Joe Duffy, 309 Clouden St., Glenside, PA 19038 (215) 885-1681 for registration information.

EAS – Lancaster, PA
July 11 – 15, 1994

WARM FLOWERS HELP

If crops could sport warmer flowers, bees and other insects might spend more time pollinating them – resulting in higher yields of fruits or seed grains. That's the implication of findings by ARS scientists who measured temperature differences of up to 12°F among some cocoa flowers. Pollinating bees were more active around warm flowers. A possible explanation is that those flowers may give off more of the natural aromatic chemicals attractive to bees. If the floral heat differs among crop varieties, it may be possible for plant breeders to select for the warmest trait when developing new commercial crop varieties.

WETLANDS STORY ALL WET

An Appleton, WI architect's whopper about how his son's pickup truck was designated as a wetland took top honors in the Burlington, WI 64th annual Liar's Club competition.

"It was so wet last spring that cattails grew in my son's pickup. The Dept. of Natural Resources spotted him parked in a highway rest stop one afternoon.

"After careful consideration, they declared his truck a wetland and impounded it. A court injunction allowed him to drive the truck, under the stipulation that it be clearly identified with 12" letters on each side and both ends stating it was a movable wetland.

"Another condition was that he could not fill his truck box unless he received a variance from all districts in which he would drive the pickup truck."

Milwaukee Journal

Bumblebees Rumble

POLLINATION BUSINESS CRITICIZED

Non-native bumble bees, imported to the western U.S. for pollination, could threaten native bumble bees and the plants they pollinate, according to bumble bee experts from Oregon State University (OSU) and University of California, Davis (UCD).

These domesticated bumble bee colonies are being offered for sale in the western United States as pollinators of greenhouse crops such as tomatoes, melons, cucumbers and field crops such as cranberries and blueberries, explained W.P. Stephens, OSU professor of entomology.

Regulations to prevent their importation have not been fully applied, said R.W. Thorp, a UCD entomologist. Both Stephens and Thorp are members of the western states working group of native bee biologists.

The imported bees could wreak havoc on local bumble bee and plant pollination ecology and spread parasites and diseases to native bee colonies, they explained.

"They are aggressive and could displace native bumble bees here that normally do wild pollination of both native and agricultural plants," said Stephens. "There is also a potential risk of release of exotic nematodes, mites, diseases and parasites from the non-American species."

Many native wild plants and crops are dependent on native bumble bees for pollination. If replaced by more aggressive exotic species, some native plants may lose their natural pollinators and could be threatened with extinction, they said.

European bumble bee companies have bought into the bumble bee market in the U.S. and Canada and their operations are significant commercial ventures, explained Stephens and Thorp. Companies are requesting permission to import or have already imported eastern species into the western United States.

"Bumble bees are a major industry now," said Stephens. "When dealers get a surplus of bumble bees, their prices may fall, making them attractive to potential buyers. People can just mail order them surreptitiously.

"We know of cases where bumble bee queens have been caught in FL, shipped to Belgium for establishment, then colonies derived from these queens were subsequently returned to Pennsylvania for transshipment to Colorado and California," he said.

"We find it difficult to conceive of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) granting approval for such an odyssey."

Western bee biologists strongly recommend that the western states departments of agriculture prohibit the importation of bumble bees and colonies into areas where the species are not native.

"This would restrict western species to areas west of the 100th meridian and eastern species to the east of that line," Stephens explained. "We are also urging APHIS to consider and take heed of the dangers inherent in the importation of bumble bee species and colonies from overseas."

There are enough commercially propagated colonies of native western bumble bees available for glasshouse and field producers in the western United States, assured Thorp.

"Prohibiting the importation of eastern and foreign bumble bee species will have no adverse effects on growers who rely on these species for crop production," he said.

FDA Urged To Rule

ROYAL JELLY IMPLICATED

The Food & Drug Administration (FDA) was urged recently to warn consumers immediately of possible hazards from royal jelly, a common dietary supplement derived from honey bees.

In a letter to FDA Commissioner Dr. David Kessler, the Center for Science in the Public Interest (CSPI) pointed to recent reports linking royal jelly to the death of an 11-year old asthmatic girl and serious asthmatic attacks in nine other individuals. These reports, which appeared in the Nov. 1993 and Jan. 1994 issues of the Medical Journal of Australia, are apparently the first published accounts of this health risk.

Royal jelly is a substance excreted by worker bees that stimulates the development of bee larvae into queen bees. It is sold in more than 6,000 health food stores nationwide and is used in alternative medicine to treat ailments from insomnia to liver disease.

CSPI urged the FDA to issue an immediate warning to consumers that dietary supplements containing royal jelly should not be used by anyone with a history of asthma or allergies related to asthma. CSPI also urged the FDA to require a warning notice on the labels of all dietary supplements containing royal jelly.

"While reactions have not been reported here," CSPI said. "It's clear we should learn from the tragedy that occurred overseas."

"This tragedy dramatizes why Congress should not weaken the FDA's authority to restrict the sale of dangerous supplements," stated Bruce Silverglade, director of legal affairs for CSPI.

"It is ironic that the so-called Dietary Supplement Health and Education Act (S. 784 and H.R. 1709) has significant Congressional support. The bill is a ticking time bomb. If it or similar legislation weakens the FDA's authority to halt the sale of hazardous products, it will only be a matter of time before a tragedy occurs in the U.S.," he said.

"Consumers should not be forced to play Russian Roulette when they take a supplement," stated John Gleason, CSPI's senior staff attorney. "The FDA's authority must be preserved."

CSPI is a national non-profit consumer advocacy group specializing in food and nutrition issues. It was formed in 1971 and is supported by 700,000 subscribers to its Nutrition Action Healthletter and sale of educational publications.

FOOD SPENDING

Per-capita spending on food rose 25% in the last half of the 1980s, according to the U.S. Department of Agriculture. That kept pace with the 25% increase in household income after taxes. On average, it cost each American $1,652 to eat in 1990. The bulk of that is still being spent on food to be prepared at home, although spending on dining out continues to rise. Spending increases were generally across all food categories, though some – such as cereals and bakery products – grew faster than other categories. USDA notes other differences in spending by income and ethnic background.

CRP LAND GOING, GOING . . .

Conservation Reserve Program (CRP) contracts begin expiring in 1995. A recent USDA survey found that over 40% of the reserve acreage will be returned to production when the contracts expire. About 25% of the land will be used for hay production or livestock grazing, and 13% will be rented to other farmers. Under the CRP, 36 million acres of environmentally sensitive land was retired from production for 10 to 15 years. Much of that land has been used as nectar sources for honey bees. It is not known whether Congress will renew expiring contracts.

HONEY BEAR LOGO

Are you selling honey to a food manufacturer or baker whose product(s) may qualify for the honey bear logo? Besides targeting potential service mark users from shelf surveys and literature reviews, the Honey Board welcomes referrals from the industry. Please call Crystal Chalmers at the Honey Hotline, 1-800-356-5941, and she will contact the company to provide information on the service mark program.

NEW HONEY BEE RESEARCH LAB

The researchers are Anita M. Collins, William T. Wilson, William L. Rubink, and Frank A. Eischen (Texas A&M Univ.), and Ben Underwood, TAMU. Missing are current technicians Roy Medrano and Jesus Maldonado.

The Agricultural Research Service dedicated the new Honey Bee Research Unit laboratory building on April 7 in Weslaco, TX.

The Honey Bee Research Unit is part of ARS's Subtropical Agricultural Research Laboratory (SARL). ARS is the principal scientific agency of the U.S. Department of Agriculture.

The ARS Honey Bee Research Unit is a primary site for USDA research on Africanized honey bees (AHB) as well as tracheal mites, a parasite currently threatening the existence of the commercial beekeeping industry in the United States.

Scientists in the Honey Bee Research Unit maintain bait hive lines to monitor and sample wild honey bee populations and study changes taking place as AHBs become more prevalent in southern Texas.

The first AHB swarm identified in the U.S. was found in one of the lab's bee monitoring traps, seven miles west of SARL on Oct. 15, 1990.

In addition, researchers in the lab have helped make major advances in developing chemical controls to combat tracheal mites.

"The work of the SARL Honey Bee Research Unit is an essential part of ARS's program to help maintain a healthy bee population and a vigorous beekeeping industry in the U.S. This new laboratory will help ensure that our scientists' work remains state of the art," said R. Dean Plowman, USDA Acting Assistant Secretary for Science and Education. "Honey bee pollination is a critical link in the way our system of agriculture is conducted."

Representative Kika de la Garza, who represents the Weslaco area and serves as chairman of the House Agriculture Committee, said, "This new facility is an important addition to the Weslaco agricultural complex. It provides our scientists with a larger, more modern laboratory for their internationally-renowned research on one of the most important and beneficial insects for agriculture. Research on the spread of Africanized honey bees – important to our understanding of its effect on public safety and the beekeeping industry – will also be enhanced by the new facility."

The new facility houses five scientists: three full-time ARS scientists, one support scientist, and one cooperating scientist from the adjacent Texas A&M Agricultural Experiment Station, a part of the Texas A&M Univ. System.

The Honey Bee Research Unit, which was originally established in Laramie, WY, in 1926, moved to Weslaco in 1986. It moved to temporary quarters in 1989, and ground was broken for this new building in 1992.

•

In addition to moving into their new facilities, the entire staff of the Weslaco Lab was honored at a March conference of USDA AIA and Extension Specialists held in Beltsville, MD. Each year the Apiary Inspectors of America honor a research scientist who has contributed to a greater understanding of bee management through research.

"This is the first time we've ever awarded this distinction to the entire staff of a research lab," said I. Barton Smith, Secretary of the AIA, who made the presentation, "but we feel this entire lab has been outstanding in their dedication and production."

Dr. Anita Collins accepted the award on behalf of the Lab, and commented later that "this was a wonderful first addition to the walls of our new lab."

Honey, Wool Good Examples

FARM SUBSIDY CUTS ARE POLITICAL

Attacks on Federal farm programs aren't necessarily aimed at cost control, says an agricultural economist at OH State Univ. Carl Zulauf says public coffers are paying out to farmers at about the same rate as the past five years. What's happening, however, is the public and elected officials are beginning to question legitimacy of individual farm programs. That's why the honey and wool/mohair support plans bit the dust last fall – taxpayers couldn't see their usefulness anymore. Removal of these programs and the threat on tobacco production quotas should be a wake-up call for the rest of U.S. agriculture, Zulauf says. Although done under the guise of "budget cutting," cost of these programs is so small they do little to attack the budget deficit. But the public is saying those moneys may be better spent on other domestic programs instead of farm support. This means other farm support programs will likely be forced to justify their existence. Arguments of low income and farming's importance to society no longer hold much appeal. Farmers need to spend time thinking about what farm policy should do for society and less time thinking about what it should do for them, Zulauf says.

STRAWBERRY PRODUCTION UP

The 1994 strawberry crop is likely to set a record, continuing a nearly unbroken chain of records for the past 20 years. Growers in California and Florida have expanded acreage to meet the increasing demand from consumers. While larger acreage has boosted production an even larger role has been played by increasing yields. National average yields have tripled in the last 20 years to 14 tons per acre. Yields in California have been even higher, reaching 24 tons per acre. California's increase is due to adoption of an annual planting system, development of new varieties, and soil fumigation. U.S. grown strawberries are now second in value only to apples. Strawberries remain a bargain for consumers. Inflation-adjusted prices have remained flat since 1980.

EDGE CITIES GROWING

If you're going where the lights are bright these days, you may not be heading downtown. "Edge cities" – typically, new areas where 24,000 or more jobs are concentrated outside traditional downtowns – are expanding rapidly, according to data compiled by Strategic Mapping Inc. in Santa Clara, CA. Comparing 189 edge cities with 38 major urban downtowns, the data show:

- Downtowns have an edge in jobs: 22 of the top 40 job centers are downtowns. But each of the top 18 edge cities has more jobs than downtown Pittsburgh.
- The 13 richest urban areas are all edge cities, led by the Bishop Ranch area east of San Francisco Bay, Great Neck on Long Island, and the I-270 corridor north of Washington.
- Small companies thrive in edge cities: The 10 areas with the highest concentration of companies with fewer than 50 employees are all edge cities.
- Edge cities are fun. When areas are ranked by the number of restaurants, drinking establishments, and nightclubs per employee, edge cities hold eight of the top 10 spots on each list.

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A Tale Of 3 Hives

dan hendricks

BOTTOM·BOARD

This is a story of three identical hives that overwintered with drastically different results. I am relying on you to explain to me what happened, so listen up.

To start I'll have to describe my overwintering scheme. Each hive consisted of three boxes, a deep brood chamber below two medium supers. Most of the deep frames had honey arches, some had extra pollen and those with the most honey were located toward the outside. The middle and upper supers contained frames mostly full of capped honey. The top one had ten frames while the middle one had five with the remaining space filled with empty drawn combs. The intention was for the cluster to eat its way through the middle super and end the winter near the top. Here in this suburb of Seattle there is no fall nectar flow so when the June blackberry honey is capped I extract it all and feed the bees through the fall. This is done so that the overwintering honey will be laced with fumagillin. To provide maximum ventilation, the bottom entrance is unrestricted and a screened 2-1/2" hole in the inner cover is left open. (Mice are excluded with hardware cloth.) An empty super is placed on top with folded newspapers stacked vertically to absorb the water which condenses around the edges under the cover. A screw in one corner keeps the cover lifted so it won't seal against the top of the super. A piece of black plastic stretched across the front entrance prevents wind from blowing in while affording access from one end. Finally, three sides are wrapped with a sheet of black plastic and folded down into the newspaper super under the telescoping cover.

First, here's what I found when I checked in mid-March. Number one had a large number of busy foragers, many loaded with pollen, when I approached on a balmy afternoon with temperature in the high 50s. Inside, the hive was dry with no more than a couple of dozen dead bees distributed on the bottom board and slatted rack. The large population was about the same as I remembered when I put the hive to bed in the middle of last November. Except that there was no sign of any brood, no queen, no laying workers.

Number two just the opposite. Many dead, wet bees littered the landing board and not a single bee was flying. Inside there was about half a cup of live bees with a live queen huddled together in the middle of the upper super. A big moldy pile of dead bees was on the slatted rack and another on the bottom board. Dead bees, individually and in small groups were scattered throughout the hive. The highest concentrations, strange to tell, were between the sides of the supers and the outside combs. Some bees had their heads stuck into cells but most were just in the space between combs.

Well, when I approached hive number three, the most baffling of all, no bees were flying around the intended entrance but there was a knot of bees around a hole in the top front of the third super. but there had been no hole there! The bees had chewed an entrance there. (Their task was made easier by dry rot!) But the real shocker came when I removed the plastic hive wrap. They had also chewed a large slot in the back rabbet, emerged between the outside hive body and the plastic wrap and died, making a deep, long pile of dead bees on top of the lifting lug. Even more surprising was another identical pile of dead bees on the lifting lug of the middle super below! They really had to work to get around the ends of the upper lugs to get down there. I expected the entrance to be plugged with dead bees but there were only a few down below. Could it be that the bees found it so repulsive to go down through the dead wet bees in the lower brood chamber that they chewed an upper egress? And why were they so determined to leave the hive in such numbers? In spite of all this mess, about half the bees and the queen were alive and dry in the upper super and there were enough eggs for about 3/4 of a medium frame of brood distributed through three frames.

I lifted the two medium supers off with a tripod hoist (Fairfax Engineering) and replaced all below with a fresh, dry bottom board. Immediately the bees began flying from the new lower entrance in significant numbers and the next day were foraging and orienting as if nothing had happened.

The "usual suspects" these days are mites, of course. I had inserted three Miticur® strips in the brood chamber of each hive as soon as the extracting supers were removed in late June and didn't remove them until mid-November. A vegetable-oil, TM pattie was kept in each hive from March through November and each had at least half of its overwintering honey and pollen left. The newspaper "sponges" were well damp around the edges but not dripping wet and those over the inner cover hole were dry. The insides of the boxes in hives two and three were wet, especially the bottom ones.

Alright, so, does anybody have any idea what happened? And why? Write The Editor and explain what happened to those three hives.