Bee Culture

JUNE 1994

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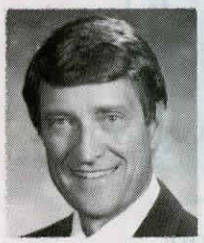

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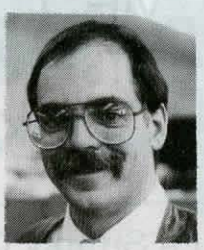

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e '94

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Finding Dirty Honey
Chemical analysis of honey is a sophisticated and precise science. Intentional contamination is, quite simply, stupid.
(by Mark Winston)
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Water is critical to colony health, but getting it there can be tricky.
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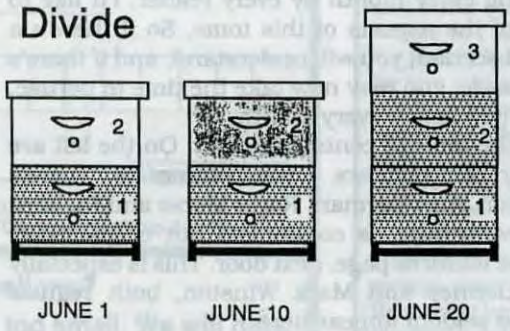

Cover
Keeping bees in the midwest can be profitable. This management system shows how. Check it out.

Spivak photo

Raspberry Honey
Northern Maine produces much of our raspberry honey – from late June through July. It is worth the effort to make the trip – here's why.
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Spring & Summer
Last summer was one of the coldest, wettest summers in recent history in Minnesota. The University bees, on the other hand, produced a bumper crop, but only in the two apiaries where we used Furgala's Horizontal 2-Queen System. Here's how.
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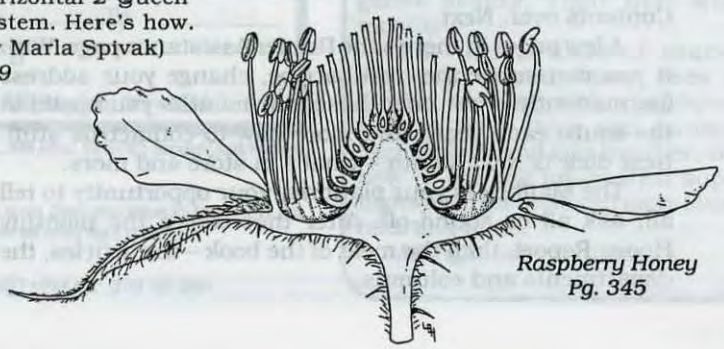

Raspberry Honey
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INNER · COVER

On a recent Sunday evening a friend called to ask what I thought was an elementary question on how to find some information in this magazine. What he wanted to know was how to find a particular display ad. He didn't know there was an index, or how to use it when I suggested he do so.

Rather than assume my friend had fewer than normal faculties, I queried several people, subscribers and others, and found that several facets of this monthly missive were neither understood, nor bothered with because of this.

And, since I just can't bear to believe that even a single page of this work isn't at least useful, let alone absolutely required reading every month by every reader, I'd like to explain some of the aspects of this tome. So if there's a misunderstood section, you will understand; and if there's an unread passage, you may now take the time to peruse, partake and enjoy here – every month.

Logically, the table of contents is first. On the left are the listings for our regulars – the columnists. There's Clarence Collison, Ann Harman, Roger Morse and Richard Taylor. Most contribute as columnists but occasionally cross over to the features page, next door. This is especially true of Dick Bonney and Mark Winston, both regular columnists who seldom appear here.

Columnists tend to cover topical issues – Ann Harman on cooking; Dick Bonney on current management; Richard Taylor on general management; Clarence Collison has his timely quiz and our newest contributor, Mark Winston on issues of a somewhat larger scope – Mark likes to make us think.

The Department section covers this piece, the Mailbox, the Honey Report, Taylor's Q&A, Gleanings (our eclectic collection of news and stuff), classifieds and the Bottom Board. The Departments, though different every month, tend to be very predictable. They're in the same place, they look the same from month to month and they give you the same (but updated) information every time. Sort of like those old boots you use – familiar, comfortable, yet practical. On the far left of this page, this year, is the 125th year logo for the Root Company Business (it's only 121 for the magazine, but just wait).

At the bottom of the left-hand Contents page is what's commonly called the Masthead. It lists the folks who do the work here, who put up with my deadline panic and make it happen anyway. There's more there, most of it required by the post office, or just how to reach us.

On the top of the Contents page on the right are the volume number (number of years published) and number number (number of issues published this year). Below that are listed the current articles, and a bit about the cover. Contents over. Next.

A few pages in there's the Reader Assistance page. With it you can subscribe, resubscribe, change your address (permanently or for only those four months you spend in the south each year), and more how-to-contact-us stuff. Next door is Next Month – what's in store and more.

The Mailbox is your platform, your opportunity to tell all, ask all or sound-off. After that comes the monthly Honey Report, then the meat of the book – the articles, the departments and columns.

Scattered throughout are the display ads. Which are really great opportunities to see what's happening in the commercial world of beekeeping, what's new, how much it costs and where you can get it. There's a world of information in those ads if you take the time to look. You'll learn a lot.

Towards the back you'll find Gleanings (a familiar title, I'm sure), chock full of those newsy bits you don't find in most places that have direct or peripheral impact on bees, beekeeping or beekeepers. Then comes Calendar (your group could stand a bit more publicity, right?), the classifieds, then the Display Index – a useful and functional half page of information, once you look and use. Do look and use it.

And finally, Bottom Board, an unpredictable, sometimes informative, sometimes humorous, sometimes thought provoking last page. And that's it.

Any questions?

•

May and June are the months of many greens here in the north. But many may not be enough, for a million million greens come to be in our woods and fields and lawns and meadows each spring. Some are here and gone, changing from nearly transpar-

Continued on Page 364

What's Inside; Green Green, On The Far Side Of The Hill.

Reader Assistance

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NEXT MONTH

July is usually a frenzy month. In the far north they're in the honey flow, mid-country is getting ready to pull and in the south they're filling barrels. Nobody sits still in July for long – there's just too much to do.

But one of the things to do is catch the next issue of *Bee Culture*. It's loaded with July stuff to use, and other stuff to help get ready for what's to come.

Honey bees are too often blamed for the evil of other insects – especially Yellow Jackets. Charles Simon has an adventure that only he can tell about Yellow Jackets and beekeeping. If you ever have to deal with these – don't miss this one.

But sometimes honey bees just end up in the wrong place at the wrong time – and they gotta go. Removing honey bees as a part time business can be both lucrative and generate great P.R. Find out how one Massachusetts beekeeper does both.

Cowen Manufacturing is celebrating their 25th year in business this season, and during that quarter century they have changed the way thousands of beekeepers process honey. Get a glimpse of history, and the future when we take a look at this Utah operation.

One of the most often mentioned, but most difficult to measure aspects of honey bees is their value to wild life, both floral and faunal.

We've found a plant, an exceptionally endangered plant that is pollinated by only honey bees – no bees, no plants. But better, we have a beautiful cover art of this endangered beauty that we're making into a limited edition print. The original painting is by Carol Happ, a much honored artist of rare and endangered flowers that we've convinced to help us out with this story. Each print will be signed and numbered by the artist. Check out this endangered beauty, right here next month.

But there's more of course. Working African honey bees in Mexico, dealing with chalkbrood here at home, bees and gardens, keeping bees and kids together, and how to use the information super highway to get news and more about bees and more.

All right here, in June.

MAILBOX

■ Needs Plans

I am a middle and high school science teacher and became interested in beekeeping through a science lab that I did with my students. We do a unit on social insects in my classroom and at the conclusion of that unit the students help with the extraction process at my house.

This past year we borrowed an extractor from a neighboring beekeeper. I would like to make an extractor to use with my personal hives and one that could be used with the hives we plan to place in our school nature area. Are you aware of any plans that one can obtain to produce an extractor?

Al Neufeld
Moundridge High School
526 E. Cole Street
Moundridge, KS 67107

■ Not Win-Win?

I just opened my April '94 copy and read the first item in the "Inner Cover."

You get absolutely NO sympathy from me and I suspect many of your other readers either.

It was probably the same person(s) who tore us out of the "kind and gentle world" of *Gleanings In Bee Culture* and kicked us "screaming all the way" into the "harsh reality" of just plain *Bee Culture.*

The switch in both cases was a business decision which YOU made but WE had no voice in.

So suffer with a better system while we suffer with a good magazine with a shorter name.

Henry Harris
Elkhart, IN

•

What is going on here? First you change the name of the magazine, and now you switch from Macintosh to IBM! This is unbelievable! Has all sanity departed?

Arlie D. Rauch
Glendive, MT

■ Foreign Correspondence

I need your help! I would like to get in contact with some American beekeepers.

I'm an Argentinean beekeeper and I'm planning to visit your country in July. I'll visit the Washington, Oregon and California states and I would like to know one or two beekeepers in order to exchange ideas and experience. I'm also interested in finding places to buy some supplies.

If you are interested please send your address and phone number to me.

Atilio Isasi
Avenida 9 De Julio 462
Buenos Aires
Argentina

•

I would introduce myself as a beekeeper, searcher, and merchant of bees, honey and equipment.

We have been the dealers of Baxter Woodman, and still represent J. Vernet, Carl Fritz and Eugen Herzog.

I participated in all the Apimondia International Congresses (Congress of Maryland) and presented several papers on beekeeping in the Arabic countries.

Also, I am in The Lebanese Beekeepers Union, and I was elected as the vice-president of The Arabic Beekeepers Union.

As I found a school for beekeeping by a Presidential decree, I would return to The United States this summer for work for one week in a queen rearing farm.

Can you help me to find this farm? I will be very grateful

Rashid Yazbek Est.
Jdeidet Beirut, Lebanon
Tif: 890644
Tix: 41236

■ Promoting U.S. Honey

I accepted the chairmanship of the AHPA Committee on Promotion of U.S. Honey, PUSH, with a few reservations. I was not concerned about the difficulty of the task, or, whether we would win or lose. Instead, my concerns had to do with the willingness of beekeepers to become involved. Will they pitch in and help?

The objective of the PUSH Committee, as I view the matter, is to publish favorable and factual material that will be beamed to the tax-paying constituency of the Honey Board. In addition to this, I will carefully examine all pro and con material, paying special attention to the conclusions and examples, that, in reality, do nothing except avoid and cloud the issue (this arguing in circles with extraneous data is commonly called 'begging the question').

The opening salvo that defends the status quo (promote world honey) comes in a letter from the Honey Board. Subject letter, which was addressed to "Domestic Honey Producers" was published in the bee journals. Some producers have privately expressed concern about the propriety of our Honey Board participating in a debate on political issues.

Continued on Next Page

MAILBOX

They say that the debaters should come from the tax-paying constituency. In my view, two conclusions in the letter beg the question. They are:

- "Consumer research indicates that an 'American Only' promotion may not be very effective. Consumers are not inclined to think about where a product comes from. Just ask yourself about the last time you purchased grapes. Did you buy Chilean grapes or California grapes?"
- "The elimination of imported honey from the honey promotion program would eliminate the import assessment and would give imported honey a cost advantage of a penny pound."

I am not aware of any research that studied the buying habits of U.S. honey consumers. However, this certainly doesn't mean that nothing is known about the subject. Hundreds, perhaps thousands of small producer-packers do an excellent job of selling U.S. honey in their locality. Unfortunately figures are not available that will tell how many are involved and the poundage they handle. It is a well-known fact that "local honey" outsells the "shipped-in" honey in most instances.

A large body of U.S. agricultural producers are convinced that promotion of their domestic produce pays. Fifty farm groups in a number of states have organized state commodity commissions. Promotion of Washington apples and Idaho potatoes are notable examples.

Would eliminating the assessment on imported honey give foreign producers a cost advantage of one cent per pound? It is my understanding that the additional shipping charges would offset this advantage.

Will a promotional program of U.S. honey be effective? I think it would, but, merely saying so won't do the job. Much work needs to be done.

Glenn Gibson
Minco, OK

■ About Bears, and Such

I hear so much about bear damage to beekeepers. Well, I live in bear country in Laytonville, CA. Actually a bit north, where bears are a problem to city type folks. I use a special five watt fluorescent, 'no flicker' light that fits into any water proof 110V socket. It puts out 40 watts of light for pennies a day. And it is strong enough to let me draw a bead on a big-ole bear 50 feet away.

I've yet to see one, because I have a Norwegian Elk Hound that sees all, hears all and smells all. I put her on my payroll five years ago and she hasn't missed a skunk, bear or coon to date. This light is available in 7-9-12 watt sizes. I had fears of loosing my bees, but my dog and my light work.

For outyards I use a 12V electric fence that will knock your socks off and costs about $250. There's also one that's run by 110V for about $125. Both take one mile of line.

My bee light is attached to the inside of my honey house and it shines out the window through the connecting chicken house that is 50 feet from my six hives. It goes day and night and when skunks, coons or bears decide to have a honey or chicken dinner Dusty runs them up a tree, wakes me up and I go pay them a visit with my long Tom. If anybody has good tips on how to clean coons or cook 'em, please contact me because I have been using them for fertilizer.

Del Gallant
47370 N. #101
Laytonville, CA 95454

■ Start Early

I enjoy *Bee Culture* very much, and the more I read the more questions seem to surface. The February '94 issue of *Bee Culture* featured an article "Bees in the Upper Midwest" by Marla Spivak. After reading this article I became interested in how this concept of establishing a package of bees in the snow in April may apply to our area in upper St. Lawrence County, NY. During this time of year (4/15) the weather can vary from a sunny 60°F one day to 20°F with 8-10 inches of new snow the next day.

I spoke to a beekeeper friend of mine with whom I have been in training. I would characterize him as a successful beekeeper for two reasons: 1) He is successful and 2) He probably will be reading this letter in his own issue of *Bee Culture*. He does raise some good points that I would like addressed concerning this article.

What happens when you establish a package of bees mid-April as suggested and the weather drops very cold? The article guidelines suggest that the new package should be checked at intervals from 1-7 days. What concerns should there be about chilling the brood as you are poking into the hive?

How soon after feeding would the bees need to have a cleansing flight? If the temperature has dropped below the acceptable level at which bees can fly, what concerns should there be about losing precious bees or causing dysentery within the hive?

Would the expense of pollen substitute and sugar syrup justify establishing colonies this early in the season?

Tom Bertrand
Ogdensburg, NY

Response From Marla Spivak: 1) If the weather turns cold after you hive your packages (as it just did here in Minnesota), do not open up the hives. Wait until the weather is 50° or so before you pull out brood frames. Do make sure the colony has a continuous supply of sugar syrup. It is best to use an inverted feel pail placed over the hole in the inner cover, as shown in the March issue of *Bee Culture*, so the bees can reach the syrup while maintaining their cluster. You should also give them a pollen "patty" (substitute) to maintain their protein intake for brood rearing until natural pollen is available.

2) It is a very wise idea to give package bees Fumidil-B to prevent the bees from contracting Nosema disease and defecating in the colony due to prolonged confinement. Put the Fumidil in the sugar syrup according to the directions on the label. The bees in the new package will take cleansing flights when the temperatures reach 40-50°F.

3) The expense of pollen substitute and sugar syrup does justify hiving packages in mid-April. In northern states with short but intense honey flows it is critical for the colonies to have as many workers of foraging age as possible when the honey flow begins in July. There is at least a 21 day lag time between when you hive the new package and when new workers will emerge. It takes another 3-4 weeks for

MAILBOX

the colony to start approaching it's maximum strength. If you wait to hive a package until mid-May (when dandelions and fruit trees are blooming), you won't have to feed them as much sugar syrup and pollen sub, but you also won't have as many bees to collect nectar in July, which means they may not bring in enough honey to make it through winter.

■ What Size is Best?

Information Bulletin #187, Cornell Cooperative Extension Publication "Bait Hives for Honey Bees" by Thomas D. Seeley, Roger A. Morse and Richard Nowogrodzki contains data as to recommended volume bait hives. It would appear that the 1.4 cubic feet box was preferred by most swarms with some swarms accepting up to 3.5 cubic feet.

Now, lets change the focus from catching a swarm to installing a package of bees. In this case we're not trying to "coax" bees to come but rather are trying to "coax" them to stay. I have decided to standardize my colonies and use 6-5/8" supers for brood and honey supers. I also wish to try to install package bees using this same super. A single 6-5/8" super contains *approximately* 1.2 cubic feet of volume – less than the successful 1.4 cubic foot box stated in bulletin #187 above. However, two 6-5/8" supers would contain *approximately* 2.4 cubic feet of volume – within the acceptable range listed in the bulletin. A deep super of 9-5/8" contains about 1.7 cubic feet of volume.

Given the above considerations, what percent success or failure rate during installation of package bees could be attributed by choosing a 9-5/8" deep hive body and using two 6-5/8" medium supers.

Tom Bertrand
Ogdensburg, NY

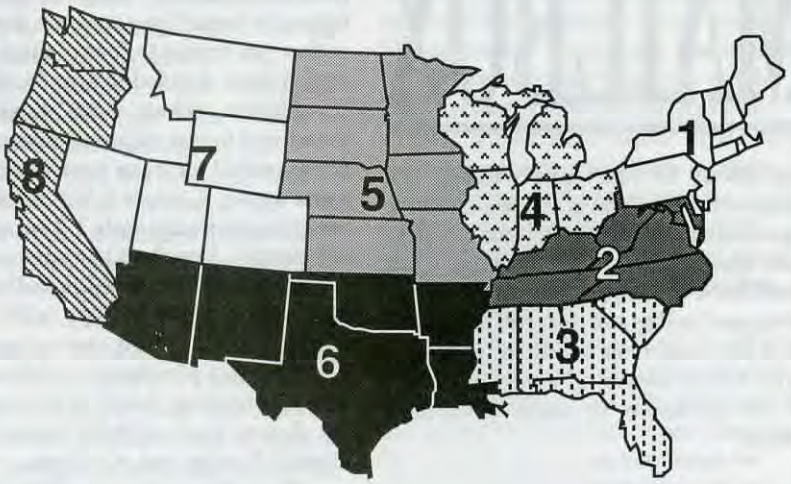
Roger Morse Answers: A single 6-5/8" super is as acceptable for package bees as is a standard 9-5/8" deep super. Many tests with various sizes of hives have been made since the first data were taken and the bait hive bulletin written. Honey bees are adaptable animals. They will accept a home of even smaller size. Bees in a swarm (or a package) want a home that is dry and dark. Probably the most important part of successful package installation is to make certain the bees are well fed during the first few weeks.

JUNE Honey Report

June1, 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	41.79	42.08	44.00	36.00	43.00	42.53	42.00	42.07	27.00-56.00	44.06	42.78	46.07
60 # Amber	40.41	42.58	38.40	41.68	44.70	40.62	40.00	37.27	25.20-54.00	42.93	43.59	43.14
55 gal. Light	.57	.55	.52	.49	.54	.57	.52	.60	.45-.90	.60	.59	.599
55 gal. Amber	.52	.53	.48	.40	.50	.50	.50	.52	.42-.78	.55	.58	.547
Wholesale – Case Lots												
1/2 # 24's	20.51	22.82	17.50	21.60	21.62	20.10	22.50	19.60	16.75-26.00	21.71	19.79	20.73
1 # 24's	29.60	31.11	27.20	31.00	30.72	30.00	29.75	28.60	24.00-38.40	30.49	29.73	30.34
2 # 12's	27.00	29.12	25.00	30.00	24.76	26.25	28.75	32.00	25.25-36.00	29.25	28.85	28.50
12 oz. Bears 24's	26.51	28.28	26.40	25.00	24.43	24.98	27.50	24.10	22.90-37.90	28.24	28.45	26.66
5 # 6's	28.06	27.34	24.78	32.00	29.35	27.00	27.75	29.15	27.05-36.00	30.14	29.97	31.21
Retail Honey Prices												
1/2 #	1.35	2.15	1.04	1.89	1.10	1.32	1.10	1.19	.82-1.75	1.26	1.37	1.18
12 oz. Plastic	1.53	1.62	1.80	1.59	1.53	1.46	1.50	1.45	1.24-2.00	1.66	1.63	1.53
1 #	1.69	1.90	1.71	1.32	1.69	1.61	1.85	1.76	1.20-3.25	1.82	1.67	1.78
2 #	3.02	3.30	3.08	3.65	2.77	2.97	2.95	3.17	2.65-4.55	3.39	3.16	3.14
3 #	4.09	4.63	4.40	4.44	3.86	3.84	4.35	4.27	3.65-4.99	4.24	4.32	4.33
4 #	4.75	5.38	5.50	4.21	5.29	4.84	4.95	6.45	4.95-6.99	5.64	5.46	5.43
5 #	6.36	6.57	6.00	7.40	6.25	6.09	5.95	6.04	1.24-8.95	6.31	6.58	6.45
1 # Cream	2.21	2.43	2.56	2.56	1.93	3.26	2.10	1.84	1.10-3.50	2.20	2.40	2.26
1 # Comb	3.05	3.13	2.75	3.99	2.95	3.68	3.50	2.59	2.65-4.10	2.86	3.25	2.99
Round Plastic	2.58	2.75	2.82	3.50	2.82	3.45	2.82	2.64	1.93-4.00	2.89	2.79	2.57
Wax (Light)	1.80	1.27	1.63	1.15	2.28	2.35	1.20	1.40	1.20-3.80	1.73	1.68	1.79
Wax (Dark)	1.38	1.10	1.25	1.05	1.40	1.58	1.10	1.30	1.00-4.00	1.76	1.40	1.39
Poll. Fee/Col.	29.53	21.67	30.00	32.50	25.00	22.50	35.00	32.00	15.00-55.00	30.77	32.04	29.43

MARKET SHARE

It's not too late to make those farm market contacts for late summer sales. Stress LOCAL HONEY, show your appropriate label, lay out your service (replacing, restocking) schedule and talk about price. Your might want to discuss a possible promotion (contest, etc.) to be held later so plans can start. This works in places other than farm markets - but they are particularly appealing for a *LOCAL*-tie in.

Region 1

New Season Retail markets appear steady, as do the wholesale purchasing prices. All, however, are down a bit. Sales stronger than anticipated due to cooler weather. Early flows average to a bit better due to coolness. Swarming below average so far.

Region 2

Retail and wholesale prices steady with little change noted. Swarming behavior this year delayed, but appears will be reduced some fewer bees primarily. Early flows strong and long in most places.

Region 3

Prices steady to decreasing, especially in retail (strong competition for shelf space) and even wholesale (reduced prices, period). Swarming reports so far are at average or below, but early flows were mixed for build up.

Region 4

Retail prices edging up just a bit but not much. Wholesale prices, though, not very strong. Early swarming activity slow, slow, slow due to cool, wet spring in much of area. Early flows steady and long for same reason.

Region 5

Prices at both wholesale and retail appear steady so far, but lower prices are threatening - so far. Swarming appears above normal, so far, as are early flows. A bit early to predict though.

Region 6

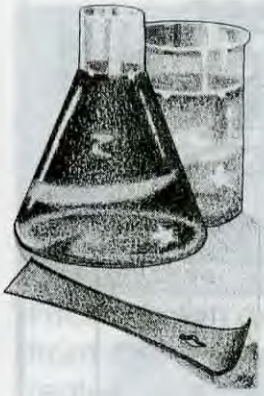
Prices steady to increasing, at least at retail. Wholesale steady, to decreasing, depending on color. Swarming at or just below average for May, but early flows seem strong for good build-up.

Region 7

Prices only steady this month, not increasing substantially. Swarming and early honey flows about average to a bit reduced. However, late spring could catch up and compress everything.

Region 8

Prices steady to increasing just a bit, especially at retail. Wholesale up in the air right now. Early swarms about average, as are early flows - but concern growing over lack of moisture.



RESEARCH REVIEW

roger morse cornell university ithaca ny

"Bees use magnetism in orientation, but we don't know how."

New research shows that when honey bees are confronted with a new learning experience they consistently face in one direction. That direction is magnetic south. This is further proof that honey bees can recognize and somehow use the earth's magnetic field. Not every bee has a perfect orientation and the data show there is considerable variation among them.

This information was obtained by placing a small dish with sugar syrup on a circular board nearly 70" in diameter. The position of the food on the board was marked using a black cylinder a little over an inch in diameter and about seven inches tall as a landmark. The landmark was always kept about six inches away from the food whenever it was moved. After training for a day, the food was removed and the flight pattern of a bee searching for it was recorded from above with a videocamera. The cylinder used as a landmark was left in place. The videotape was later examined to determine the bee's position and orientation.

Bees searching for food south of the training cylinder proved to be an exception. Apparently, the landmark was in the way of their orientation. When the landmark was in this position the bees responded by searching from the northwest.

Cloudy skies had no effect on the bee's orientation. However, when the food was placed in a man-made artificial magnetic field, a bee would orient in the field as directed by the researcher. The man-made field was built under a white tarpaulin, which filtered out ultraviolet and polarized light.

Honey bees have eyes that are different from those found in humans and other mammals. We have one lens in each eye. However, honey bees have about 5,000 individual eyes in each of their two compound eyes. Each of these 5,000 eyes, called ommatidia, has its own lens. It is thought that bees use these many eyes to memorize landmarks. The researchers write, "We suggest that the main benefit of inspecting the world from one favored direction is to simplify the storage and retrieval of retinotopic memories."

This is only one of several papers reporting on the fact that honey bees use the earth's magnetic field in their day-to-day lives. For example, bees in a swarm will build comb in the same plane as their parent colony using the magnetic field. However, I hasten to point out that bees in an artificial swarm will not do so. Bees also use the magnetic field when performing their wag-tail dance.

Gould and his colleagues (1978) showed that bees have a magnetic remanence in their abdomens in the form of magnetite, a highly magnetic form of iron. The precise location of the particles is not clear. In the spring bees have only a very small quantity of magnetite but in the fall, they have a large fat body and the cells in it contain a great deal of iron but in a different form. Older bees contain more iron than young bees.

This still does not answer the question of how bees are able to sense magnetism or the earth's magnetic field. The iron appears to be passive; not active in any way that we recognize. One of my colleagues said it "creates some torque on the abdomen." However, no magnetic sensory system has been found or described in honey bees. While this is all interesting, if not fascinating, it is still a mystery.

World Bee Health Report

Every few years the International Bee Research Association reports on the health of honey bee colonies in different countries and publishes maps showing the distribution of various diseases. The report is rather glum, for year after year it shows that the major bee diseases are spreading.

There is, however, one general exception; Africa remains relatively free of many of the common diseases. Are the bees there different? Are they more resistant to many of the common diseases? There have been many opportunities for bee diseases to be transmitted. A great number of people travel and work with bees in Africa and surely the major diseases, at least a disease like American foulbrood, would have been noticed. We know too that many people have carried or shipped European honey bees, from all parts of the world, into Africa. The African bees need study and attention they are not receiving.

Copies of the world health report are available for a small charge from International Bee Research Association, 18 North Road, Cardiff, Wales CF1, 3DY, UK.

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? DO YOU KNOW ?

Honey Bee Management

clarence collison

Honey bee management requires the beekeeper to have a thorough understanding of basic honey bee biology and ability to recognize a few key signs that describe the condition of the colony. As a result, management is a real challenge to most individuals. Possibly that is why so many people find beekeeping to be such a fascinating endeavor. How familiar are you with honey bee biology and what factors impact colony development?

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. ____ Young worker bees less than one day old are unable to sting.
2. ____ The queen honey bee normally goes on her mating flight in the morning.
3. ____ The crop or honey stomach of the worker bee is located in the thorax.
4. ____ Beeswax is canary yellow when it is secreted by the worker honey bee.
5. ____ Worker honey bees work in teams as they build comb.
6. ____ At the time of swarming the colony population is made up of a large percentage of very young bees.
7. ____ The "whir dance" is associated with the workers driving a virgin queen out of the hive to go on her mating flight.
8. ____ Honey bees are vegetarians since all of their nutrient requirements are derived from plants.
9. ____ Laying workers lay eggs faster than queens, since multiple eggs are laid per cell.

Multiple Choice Questions (1 point each)

10. ____ A queen honey bee becomes sexually mature when she:
    A. is 5 to 6 days old.
    B. emerges from her queen cell.
    C. is 2 to 3 days old.
    D. is 11-12 days old.
    E. is 8 to 9 days old.

11. ____ The antennae are sensory organs primarily responsive to:
    A. Hearing and Touch
    B. Odor and Taste
    C. Taste and Touch
    D. Touch and Odor
    E. Hearing and Odor

12. ____ When the queen goes on her mating flight(s): she normally mates with ____ drone(s).
    A. 1-4
    B. 17-21
    C. 5-9
    D. 22-27
    E. 8-15

13. ____ If you find dead bees with their heads inserted into cells, the most probable cause of their death is:
    A. Pesticide Poisoning
    B. Starvation
    C. Dysentery
    D. Tracheal Mites
    E. Nosema Disease

14. Name three impulses or colony conditions that result in the rearing of new queens. (3 points)

15. Explain why these are important considerations in keeping bees.
    A. Hive entrance facing in an easterly or southerly direction.
    B. Keeping the hive up off the ground.
    C. Having the front of the hive slightly lower than the rear of the hive.
    D. Feeding all colonies some sugar syrup early in the spring.

16. What time of year (Fall, Winter, Spring, or Summer) would the following be present in the greatest amounts or numbers?
    A. Tracheal Mites
    B. European Foulbrood
    C. Chalkbrood
    D. Nosema
    E. Varroa Mites

Answers on Page 360

DETECTION AT PARTS PER BILLION

Finding Dirty Honey

mark winston

The success of our industry is based on the taste, texture, aroma and image of honey. Today's food shopper is obsessed with nutrition and health and honey's image as an organic product that provides natural food is highly attractive to consumers. The reality is that honey is mostly sugar and expensive sugar at that, but beekeepers have been successful at marketing honey because of its various desirable flavors and the public perception of honey as a somewhat mystical and healthful food product. Indeed, if beekeepers were included in one of those "what profession do you most respect" polls, we would be right near the top for providing consumers with this clean, pure commodity.

Clean and pure from the consumer's point of view, that is. From a chemist's perspective, honey is a dirty product, full of hundreds of compounds and contaminants, natural and beekeeper-added, and a nightmare to analyze. Luckily, most of the trace compounds found in honey are floral in origin or bee-produced, and many of these minor substances are what give honey its various tastes and aromas. However, the purity of honey is increasingly threatened by poor beekeeping practices that contaminate honey with repellents, pesticides and antibiotics, and we continue to find significant quantities of honey that have been adulterated with artificial sweeteners.

Most of us are blissfully unaware of the extensive food analysis subculture that keeps our food products pure, including honey analysis. I wrote to just a few of the experts in this field to get some background material on how contaminants are identified in honey and was deluged with reprints and articles that describe the various techniques used to analyze honeys. Food chemists have devised clever methods to detect literally hundreds of compounds in honey, from the natural sugars and aromatic compounds that belong in honey to pesticides that have no business in our product. Their techniques are elegant and chemically sophisticated and involve numerous methods to separate each compound from the others and then identify compounds by their chemical "signatures" It's a wonder that any honey passes inspection given the nature of these analytical techniques. In Canada, honey generally is considered to be contaminated if it contains only one part in ten million of an unregistered agricultural chemical, yet chemists can identify as little as one part per billion of many compounds. One chemist described his analytical capabilities to me by saying that he could find a level of contaminant equivalent to one grain of sand on a beach!

Today, numerous laboratories world-wide routinely examine honey because potential honey contamination with products used for beekeeping is a significant problem and adulteration of honey with sweeteners continues to surface in national and international markets. However, the problem of honey analysis is not as simple as it might appear. Our sophisticated ability to analyze minute quantities of compounds in honey also has revealed that many substances considered contaminants are actually "natural," produced in floral nectars or the result of bees processing nectar into honey.

Formic acid and menthol are two good examples of compounds used in beekeeping that also occur naturally. Canadian beekeepers wanted to register formic acid for use against tracheal mites and *Varroa*, and preliminary tests indicated that it was effective when properly used. However, formic acid residue levels of about two parts per million were being found in honey from treated colonies, which is about 20 times higher than the Canadian tolerance level of one part in ten million. Studies of honey from untreated colonies in British Columbia and Alberta indicated that natural levels of formic acid were about one to three parts per million, demonstrating that the apparent residue levels from treatments were no higher than natural levels of formic acid in honey. Colonies treated during the summer honeyflow showed formic acid levels of about eight parts per million, approximately four times higher than the natural levels. These

Continued on Next Page

"Our sophisticated ability to analyze minute quantities of compounds in honey also has revealed that many substances considered contaminants are actually "natural," produced in floral nectars or the result of bees processing nectar into honey."

DIRTY HONEY ... Cont. From Pg. 337

results had two important implications. First, we were able to register formic acid for use in Canada, because proper applications did not result in residue levels that were higher than naturally occurring amounts of formic acid. Second, they emphasized the importance of not applying formic acid during honeyflows, because summer applications resulted in residue levels above those normally found in honey.

Menthol is another compound used in mite control that also is found naturally in honey. In the case of menthol, natural levels usually are at or below our one part in 10 million tolerance level, but honey from treated colonies may have one to two parts per million of menthol remaining in the honey, about 10 to 20 times higher than our Canadian standard for unregistered chemicals. Further, menthol in honey persists during storage, and so this high level could pose some problems according to standards used for agricultural chemicals. However, tests indicated that menthol was undetectable to consumers at levels below about 36 parts per million. Further, the beekeeping industry argued successfully that menthol's status as an already approved food additive should give it a higher tolerance standard than that typically used for agricultural chemicals and so menthol use is permitted in Canada, as it is in the United States. However, treatments immediately preceding and during the honeyflow are not recommended because such treatments can result in unacceptably high menthol residues in honey.

Bee repellents such as phenol (carbolic acid) are another good example of how our increasing capability to detect foreign substances in honey has interacted with beekeeping practice. Beekeepers use repellents to drive bees out of honey supers prior to bringing honey in for extraction. Phenol is not licensed for use in Canada or the United States and maximum allowable levels of phenol in honey are low (one and five parts in 10 million for Canada and Germany respectively, and zero in the United States). Yet, a 1985 survey of phenol in honey found that 40 of 67 samples contained phenol levels from one to 11 parts per million with average values of five parts per million. A more recent study indicated that phenol levels in honey diminish over time so the high levels found in those samples would best be explained by phenol use that year. The impact of these chemical analyses was to increase regulatory vigilance in Canada and the United States and illegal use of phenol has been decreased.

Another area in which improved analytical techniques have resulted in increased regulatory activity has been the detection of antibiotics such as fumagillin (Fumidil), oxytetracycline (Terramycin) and sulphathiazole. The presence of antibiotic residues is of concern because of potential allergic reactions in consumers, and also because the organisms responsible for the foulbrood and nosema diseases targeted by these drugs could be come resistant if overexposed to medication. Thus, most countries have zero or very low tolerances for any antibiotic residues and require that imported honey be completely free of these substances. In addition, sulphathiazole is not registered for use almost anywhere in the world so its presence in honey is particularly troublesome. Honey is routinely tested for these antibiotics, especially when being imported, and loads are rejected when even trace residues of any of these three compounds are found. Surprisingly, sulphathiazole residues still appear in honey although it has been illegal to use this drug for well over a decade.

The most recent honey residue problem has been acaracide contamination following treatments against tracheal mites and *Varroa*. Unacceptable levels of legal compounds such as fluvalinate are found when treatments are done close to or during the honeyflow and there is some concern that increasing levels of fluvalinate in wax due to repeated treatments could lead to honey contamination. However, proper use of fluvalinate does not result in contaminated honey; of greater concern is the appearance of agricultural chemicals in honey that are not licensed for use in bee colonies or are banned entirely from use in any context. For example, loads of honey were recently rejected for importation to both the United States and Canada because of contamination with chlordimeform, an acaracide previously used against mites on crops and ticks on cattle, among other things. This chemical is banned in most countries around the world because it has been linked to high levels of bladder cancer. The presence of chlordimeform in honey is alarming as it indicates that beekeepers are using banned and possibly dangerous substances to combat tracheal mite and *Varroa* infestations. The only good news is that loads of such contaminated honey are refused entry to North America, which relieves some of the economic pressures caused by cheap imported honey!

"Loads of honey were recently rejected for importation to both the United States and Canada because of contamination with chlordimeform, an acaracide previously used against mites on crops and ticks on cattle, among other things. This chemical is banned in most countries around the world because it has been linked to high levels of bladder cancer."

A final adulteration problem is the addition of sweeteners to honey. The relatively low price of commercially available sugars has made it very attractive for unscrupulous producers, importers and packers to extend the volume of honey sold with sweeteners. High fructose corn syrup (HFCS) has been a particular problem, because its sugar profile is very similar to honey, and adulteration with HFCS can be difficult to detect. For example, pure citrus and mesquite honeys can test as being adulterated with corn-syrup when their sugar profiles alone are analyzed. However, recent advances in honey analysis have considerably improved our detection capabilities for corn syrup adulteration. Interestingly, the techniques used today do not test for sugars, but rather for minute quantities of proteins found in honey and corn syrup that can be used to differentiate the two substances with great accuracy.

Given our ability to test for sweetener adulteration and the common use of these tests in both national and international markets, it is surprising that loads of adulterated honey still appear on the market. Nevertheless, both U.S. and Canadian officials recently rejected large loads of honey for import from an overseas source that were heavily contaminated with corn syrup. Virtually every load tested was adulterated at some level and one load tested as containing 47% corn syrup!

The take-home message here is clear, but the continued presence of contaminants in some commercial honey indicates that not everyone has gotten it. Honey sales depend on its reputation as a pure product; improper use of licensed chemicals, the use of unlicensed chemicals and the adulteration of honey with cheap sweeteners threatens that reputation. However, if you don't care about our industry as a whole, have little regard for the purity of our product and are the type of maverick beekeeper who disregards regulations, then consider this: adulterate and contaminate your honey and you're very likely to get caught. Techniques for honey analysis can detect the presence of the most minute quantities of contaminants and regulatory officials have become increasingly aggressive at sampling all of our food products, especially honey. We all need to remember that honey is a marvelous product and is as natural a substance as any food on the market today. Let's keep it that way.

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

WANDERING BEES

dick bonney

Foraging Behavior Can Tell You Much About Your Bees

Where are your wandering bees today? Do you know? Do you need to know? No but it may help if you do.

Most beekeepers today have some thoughts on the where's, when's, and how's of foraging. Some of those thoughts may be wrong, being based on the literature of years past and on old beekeepers' tales. For instance, an implicit assumption made by many is that an experienced field bee, released anywhere within a two-mile radius of her hive, would find her way home. The understanding of bee behavior that has developed in more recent years tells us that this is probably not true. Neither the colony as a whole nor the individual bees may do what we have been led to believe.

Consider the colony's foraging range — that radius around their hive that the bees may cover in their daily flight activities. A two-mile radius is not unreasonable. This is the generally accepted figure to define the range of a colony in an average situation. However, the bees will only travel that far if they must. The colony is efficient. If there is adequate forage of reasonable quality at a closer distance, they will go to it first. Foraging distances of at least eight miles have been recorded, but when the bees travel these greater distances, you can be sure that no bloom of consequence is to be found any closer. Every foot traveled requires an expenditure of energy, and the nectar collected must return that much energy and a certain amount more to make the trip worthwhile. Excessive distance does not allow for that return. The bees somehow know this.

Direction is another consideration. We assume that the bees will go in any direction from the hive. A few scouts may, but the bulk of the bees go only in the directions in which food is to be found, guided by information from scouts and other foragers. In most instances, they travel a few limited paths. It is a rare hive location that has forage available in all directions at the same time. By the same time I mean a one- or two-week period, which is a very generous field bee life time. Of course, over a full season the bees of a colony may travel over large areas of their range, but that is the long term, the field life of several generations of bees. We are concerned here only with the current period and active body of foragers.

Forage quality must also be considered. Bees don't work every species of flowering plant. The sugar content may not be as high as that of other flower species in bloom at the time. Some desirable forage source may be ignored completely, while not too far away another field of the same plant species is abuzz with bees. In this instance we can assume they simply don't need that field. They found the other field first and are getting all the nectar they can handle from it.

> Updating your maps will help explain, and predict honey crops.

So far, we have been looking at foraging for the colony as a whole. We should also consider activities of individual bees. Bees are constant to a single flower species on a single foraging trip and to a specific site — the same field, or the same tree, or the same patch of shrubbery, for the duration of its bloom. She may never forage anywhere else during her entire life as a field bee. As long as a particular source is yielding adequate quantities of nectar of a quality that is accepted readily by the hive bees, there is no reason for the field bee to go elsewhere. Generally speaking, a field bee is not venturesome. She sticks with the tried and true until signals in the hive tell her to go elsewhere.

What are some of the practical applications of this information? Perhaps you must move a hive or a yard, and you have a desirable new site available a mile or so down the road. Conventional wisdom tells us that the new location is too close, that it should be beyond a two-mile radius to minimize chances of the foragers becoming confused by old landmarks and returning to their original home site. Perhaps two miles are not necessary, though. As we will see, perhaps you can place your new yard closer than you first thought.

Or, perhaps you wish to establish a new outyard, but you don't want it too far from home. You would normally expect to put this new yard far enough away — say three miles or more — so that its range would not overlap seriously with that of your home yard. For both of these situations, a close look at the foraging range of your home yard may be give you some options.

Start by making a sketch of the area within the two-mile radius of your home yard showing major features — roads, rivers, residential and industrial areas, farms, woods — anything that might influence the direction and distance your bees travel. Then plot out the directions you see bees actually going as they leave the hive, and put these on the map. You will probably discover that the bees' flight paths are fairly well defined, and are in only one or a few specific directions.

After developing your map, tour the area and try to find the specific places the bees are foraging, and what blooms they have found. Add these forage locations to the map. It's worthwhile to go through this procedure several times over the season and develop a set of plots, or perhaps a composite, reflecting the succession

of blooming plants over that period and the flight patterns as the bees shift with the different blooms.

You should find that you have some interesting information about your bees' activities. Perhaps you will discover that their range is not circular at all, but some irregular shape that relates to specific routes, to forage availability, and to natural and man-made barriers. If you happen to live in a valley, for instance, you might find that most foraging is done along the valley rather than up and over the hillsides. Further, your bees are not likely to fly over some large body of water if there are good alternatives, nor are they likely to fly over any great expanse of densely wooded area if there is more open and inviting terrain in another direction. Of course they will cross any of these if they have no better choice.

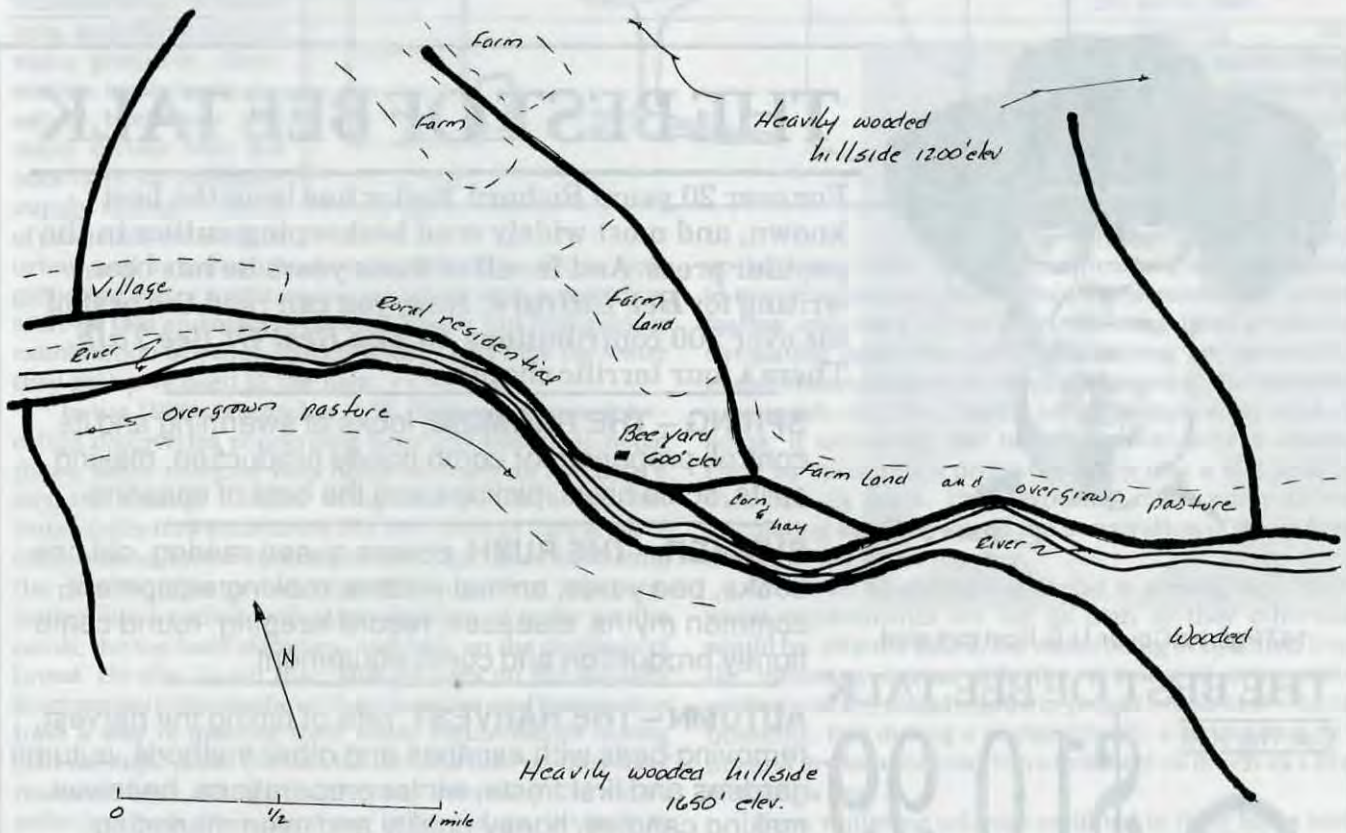
Especially in more rural areas, you may find that your bees have not found a need to go more than some fraction of a mile to do all of their foraging, rather than the conventional two miles we have generally assumed. You may also find that they do not travel into a particular quadrant of their potential range, or even into two or three of those quadrants. These sections may never have any forage of consequence during the season, or may be blocked off by some barrier. Your plot, reflecting all of this information, now gives you a great deal of freedom in relocating your bees, or establishing a new yard.

Of course, you cannot base your choice of new sites strictly on the old foraging range. You must make some kind of an evaluation of the probable new range as well. This is a little more difficult since you don't have the bees to guide you, (unless you place a hive or a nuc at the site temporarily) but you can tour the area and try to get a sense of where they will go based on what forage sites you can identify and what barriers might exist. Again, a plot will help.

You may realize that you cannot relocate your bees two miles away if you have discovered an attractive and busy foraging area, say a field of clover, half way between the two sites. The relocated field bees would very likely go home to their original location as they pick up familiar landmarks.

Guidance for hive relocation or setting up new yards is not the only benefit to be gained here. In fact, since most of us don't move our hives or establish new outyards very often, these may be the least important reasons to plot foraging ranges. A more important reason might be pesticides, which unfortunately, are a problem to many of us at one time or another. The information you put together in mapping your bees' foraging range will be very useful if you suddenly have a pesticide kill and wish to track down the source. It will also help if you must temporarily move your bees to get them away from the problem.

You can also use this data to help understand your honey crops. Many of us do not have consistent yields from our hives; there are too many variables — weather, forage availability, changing landscapes and competition from other beekeepers. If you



This map shows that the bees' foraging opportunities are east and west along the river. By adding specific information about nectar and pollen sources during the course of the season, you can build up a better understanding of your bees' foraging activities.

WANDERING ... Cont. From Pg. 341

update your maps periodically the exact reasons for a boom or bust crop in a given year may be more clear to you. You may discover that some choice forage crop is no longer being grown, or development has wiped out a large expanse of goldenrod or other "weed" crop. Maybe you have too many hives at this location. Conversely, you may discover some new nectar source has been added that will allow you to add a few hives to a particular location.

An outgrowth of this might be a bloom chart for your area. When does each forage plant come into bloom? How long does the bloom last? You can relate this information to honey production, especially if you measure gains during these specific bloom periods with a hive scale. Carried further, you might be able to get some long term guidance for shifting hives. It might become apparent that while you should not have more hives at a particular site on a continuing basis, perhaps you could bring in an extra hive or two temporarily to benefit from an exceptional honey flow.

The most important reason for this research may be much less tangible. Plotting, measuring, and generally gathering information, you have opened your eyes more widely to a different facet of the bees' world and consequently, you have come to know them better.

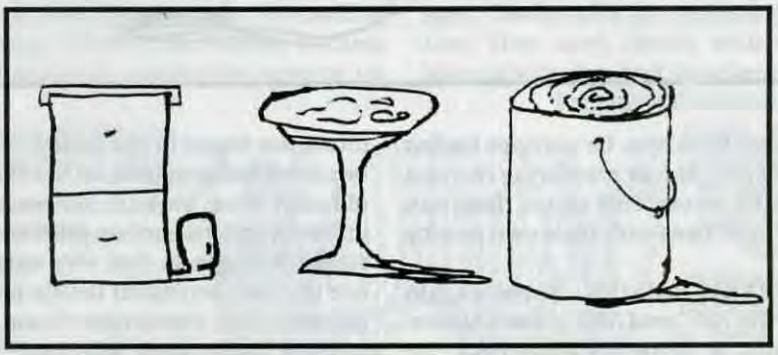
Dick Bonney is the Extension Apiculturist for the state of Massachusetts and the author of two books on beekeeping.

WHAT ABOUT WATER?

richard dalby

It is a fact often overlooked by beekeepers that bees, at certain times of the year, gather and use substantial amounts of water. Water is an essential part of the intricate economy of the hive. An old edition of the *ABC and XYZ of Bee Culture* states the case very well: "Like all other live stock, bees need water. The amount required depends largely on how much brood-rearing is going on, and whether nectar is coming in to a considerable extent from the fields."

Availability of nectar and pollen is essential to the success of a colony of bees. Availability of water is of equal importance, though often given little consideration. Water is essential to these bee activities and processes: (a) preparation and dilution of the larval food; (b) maintenance of optimal temperature and humidity inside hive, particularly in the brood nest; (c) metabolism of food, transportation of nutrients, and elimination of waste products. Given water's importance, an astute beekeeper will make certain that his bees have an adequate supply nearby. This is of particular concern in urban and suburban beekeeping locations, where bees gathering water might cause problems with a neighbor. More on this and ways to prevent it later, but first a closer examination of water-collecting bees and how the water they gather is used in the hive.



In the 1920s researcher O.W. Park made some interesting discoveries concerning bees and water. He noted that a water-collector may make as many as 100 trips a day, the average number being near 50. He found that water-collectors sometimes do a recruitment dance, especially when a hive's water needs are high, thus increasing the number of water-collectors. Park observed that bees, during hot weather, will place droplets of water on the comb, the top bars of frames, and even on the cappings of brood. He also found that, though bees do not actually store water in the combs as they do pollen and honey, they have a way of meeting their water requirements during cold no-flight days. Certain house bees take on the role of reservoir-bees, filling up with water offered by the water-collecting bees. Then, as water is needed, particularly in the brood area, these reservoir bees can supply it.

Many later bee scientists added to our understanding of the importance of water to a colony of bees. They found, for example, that the rate of water collection by a colony is determined by how eager the house bees are to receive a water-collector's load. House bees that are eager for water mean that water collection at a high rate will continue. House bees less eager for water mean that the rate of collection will go down. House bees showing no interest in a proffered load of water mean that water collection will cease.

A colony has a high water requirement during periods of high brood rearing. Nurse bees use water in the elaboration and dilution of the brood food. Though the composition of the brood food changes somewhat as the larvae develop, this food always contains a substantial amount of water, sometimes over 60%. The amount of water needed by the average hive during spring brood rearing has been estimated at 150 to 200 grams per day. Warmer than average weather can raise this amount.

Research has shown that the degree of relative humidity in the brood nest is very important. Optimal egg hatching requires a relative humidity of 90 to 95%. At 50% relative humidity, less than a third of the eggs produce normal larvae. Few if any eggs will hatch at levels below 50%. So it is understandable that bees strive to maintain the optimal relative humidity level in the brood nest. One way they have of doing this is by depositing droplets of water right in the brood nest, on the sides of cells containing eggs and larvae. As the water evaporates, it raises the relative humidity of the surrounding air. Such droplets of water also help prevent drying of the larvae and the larval food.

During hot weather, particularly when little nectar is being gathered, bees use a form of evaporative cooling to maintain an ideal hive temperature. The way in which they do this is worthy of explanation. Incoming water is spread in tiny droplets over the surface of the comb, top bars of frames and walls of the hive. Fanning bees create air circulation inside the hive. The moving air speeds the evaporation of the water droplets, lowering the temperature inside the hive, much as a swamp cooler cools a home. If necessary, the bees can increase the cooling effect by spreading a droplet of water into a film held by their mouth parts, thus exposing more water to the circulating air. They speed the evaporation of water from nectar in the same manner.

When an abundance of nectar is coming in, a hive's water requirements are not as high as they otherwise would be. At such times, the water being evaporated from the incoming nectar aids the process of evaporative cooling and the maintenance of proper brood nest relative humidity. But during a nectar dearth, a strong hive in a hot and dry location may have to collect as much as a liter of water a day.

Even wintering colonies confined to their hives need some water to maintain bodily processes and to aid in the liquification of granulated honey. Such bees cannot, of course, leave the hive to obtain water. But as they use

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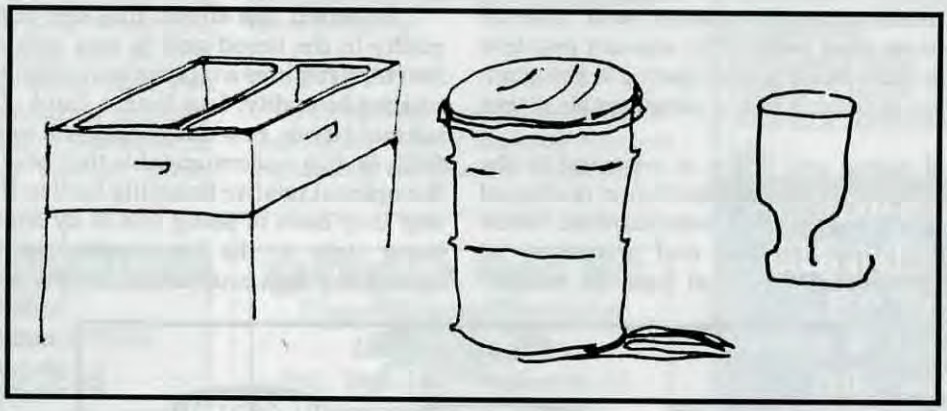
WHAT ABOUT WATER? ... Cont. From Pg. 343

their stored reserves of honey, large quantities of water in the form of vapor are released into the hive by bee respiration. This water is a product of the metabolism of honey. The amount released is much greater than the amount already present in the honey itself. Some of this water vapor condenses inside the hive where it is available to the bees. This is so even in hives which have (as they should) an upper ventilation hole.

Now back to potential problems and ways to avoid them. Bear in mind that when your bees need water, they are going to go find it someplace. If they can find none close to the hive, they will perhaps discover your neighbor's leaky faucet. All of this may seem rather unimportant until your neighbor goes outside some warm spring day and finds his faucet covered with bees. Or perhaps he grabs the faucet without paying much attention and gets stung two or three times on the hand. If he knows you have a hive or two nearby, you'll no doubt hear from him. Or perhaps he has a bird bath or a swimming pool or just a watering can and your bees are going there for water. This sort of thing can be avoided if you provide your bees with their own nearby source.



There are a number of ways to do this. To quote again from the 1923 edition of the *ABC and XYZ of Bee Culture*: "A tub of water with chips or corncobs floating on the surface, a Mason jar filled with water inverted over a small plate, or, better, a crock placed over a dinner plate, will furnish bees water on the atmospheric principle all day or several days, in fact." These methods will work just as well today as they did then. Short lengths of two by fours will substitute nicely for the corncobs if you use a tub. The idea is to provide the bees with a place to light and fill with water. Another possibility is to use a large plate or tray, cover it with small pebbles, then add water. The pebbles provide the water-collectors with good footing as they land, fill up and take off for the hive. A burlap sack or old towel kept wet by a trickle of water is another good device.

One other point. Bees prefer warm water to cold, at least during the cool spring months. So if you can warm the water a bit by placing your watering device where it catches the warmth of the sun, that should be all to the good.

Bear in mind that bees used to going to a particular place for water are likely to continue going there, so it may take a while before all the water-collectors are utilizing your own water source. Remember also not to let the water you supply become stale or stagnant, or your bees are likely to look elsewhere.

One last intriguing bit of lore concerning bees and water. A number of old bee books state that water-collectors prefer water that is a bit salty. Research tells us that various minerals, including sodium, are found in the bodies of bees. But there seems to be no solid information on the exact mineral requirements of honey bees. Various minerals are found in pollen, but different pollens contain different mineral amounts. Some research suggests that very small amounts of salt in the bee diet are beneficial (levels on the order of 1/5 of one percent). One researcher found that bees will not use a sucrose (table sugar) solution if it has a salt content above one percent. So my best advice is to stick with pure water for your bees. A typical hive gathers over 40 pounds of water in a year, not counting the water in collected nectar. Make it easy for your bees to find it.

Richard Dalby keeps his bees watered in Levan, UT.

RASPBERRY HONEY

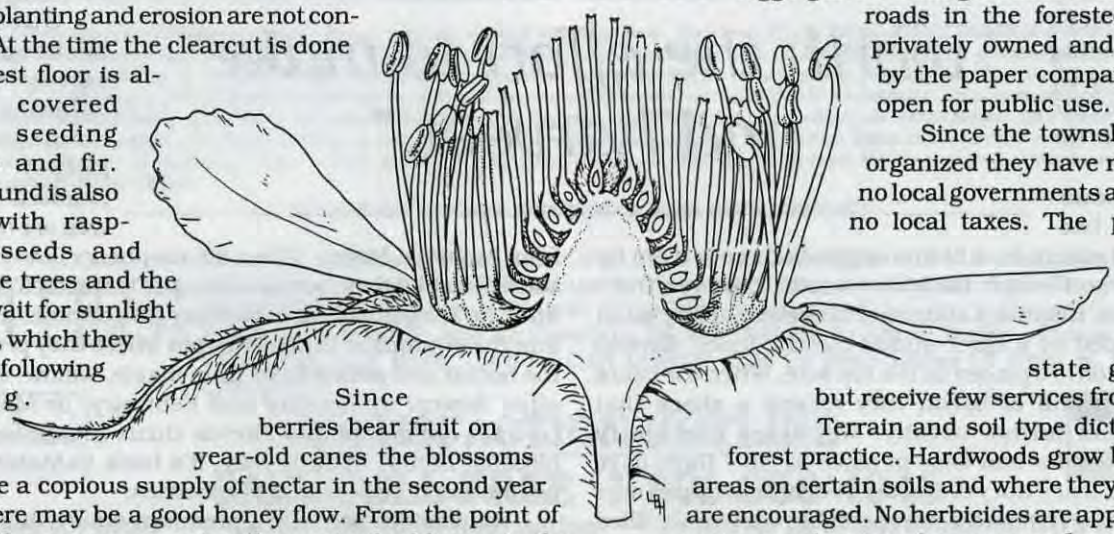
roger morse

About 8,000 colonies of honey bees are moved into the managed forest areas of northern Maine for raspberry honey production each year. It has been only in the past 15 to 20 years that this has become an important honey-producing area. Honey production may approach one million pounds in a good year though colonies usually produce about 60 pounds annually. The plants yield nectar from late June until about the end of the third week of July with peak bloom being July 4-10.

Raspberry picking is done on a limited basis because the plants are adversely affected by a virus. The virus does not affect flowering but it does reduce fruit production.

Much of northern Maine, about 350 undeveloped townships each about six miles square, is owned by lumber companies. The paper companies are chiefly interested in producing logs for pulp for their paper mills. Clear cutting, that is, removing all of the growing trees at one time, is the favored method of production. This is done about every 30 to 35 years. When clear cutting became popular, thousands of acres of raspberries sprang up after the cut.

Replanting and erosion are not concerns. At the time the clearcut is done the forest floor is already covered with seeding spruce and fir. The ground is also filled with raspberry seeds and both the trees and the seeds wait for sunlight to grow, which they do the following spring. Since raspberries bear fruit on one-year-old canes the blossoms produce a copious supply of nectar in the second year and there may be a good honey flow. From the point of view of the paper companies, the most valuable species for pulp are the spruce and fir. Raspberries and hardwoods are a nuisance and deter the growth of both. Spruce and fir are slow growing and are soon shaded by the overgrowth.



A herbicide (Roundup) is applied (by air) to this overgrowth between about August 15 to September 15, two to three years after the clearcut. At that time of the year the raspberries and hardwoods are still growing and are susceptible to the herbicide. However, the spruce and fir have finished growing for the season and their growth the following year does not suffer.

At the time of the herbicide application there are about 20,000 spruce and fir trees per acre, which is much too dense for good tree growth. Four to six years later the evergreens are thinned (with power saws) and their number reduced to about an eight-by-eight-foot spacing. This leaves about 800 to 900 trees per acre. The spruce and fir are now six to eight feet tall and there is much growing space between them. The year following the thinning, raspberry plants again appear in numbers and there may be a good nectar flow for the next two to six years. This continues until the raspberries are shaded out by the growing spruce and fir. The trees are harvested when they are eight to nine inches in diameter and the process starts over again. Since there is some pulpwood harvesting done every year there is always a new crop of raspberries in the works.

My personal experience is limited to the Rangeley, Maine area and a visit with Maine-Florida migratory beekeeper Paul Dumont. The land owned by the paper companies is not posted and recreational use is encouraged. Beekeepers are not charged any fees for this location. They work closely with the company foresters to learn about the best raspberry areas and which active logging and trucking areas to avoid. The gravel roads in the forested areas are privately owned and maintained by the paper companies but are open for public use.

Since the townships are unorganized they have no residents, no local governments and therefore no local taxes. The paper companies pay a small tax per acre directly to the state government but receive few services from the state. Terrain and soil type dictate the best forest practice. Hardwoods grow best in some areas on certain soils and where they do well they are encouraged. No herbicides are applied. In such areas, raspberries also prosper for several years following a clearcut.

About 40% of the Rangeley areas is used for hardwood pulp and lumber production and 60% for spruce and fir. Where spruce and fir grow well, herbicides are used to kill the hardwoods. Fast growing poplar trees are found in limited areas and represent a third group of trees harvested for pulp. The Agricultural Stabilization and Conservation Service of the U.S. Department of Agriculture has begun mapping the soils of the area. When the maps are completed they will help the foresters, paper companies and beekeepers.

Honey production from wild raspberries is limited largely to the northeastern and central United States and southern Canada. Until the 1920's, when Michigan's

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forests were cut, that state was also noted for wild raspberry honey production. Raspberry honey was also produced in quantity in limited areas in the Adirondack Mountains in New York both as the land was being cleared and again as it was being abandoned to agriculture and was growing back into woods. Franklin County in the central northern part of the Adirondacks was especially productive. Many years ago a small amount of raspberry honey was produced in parts of the Catskill Mountains in New York but these areas are heavily wooded today. Northern Vermont and New Hampshire have also been important raspberry honey producing areas in the past. In the 1920's when much was written about honey plants in the United States, raspberry honey production in northern Maine was not mentioned – where there is selective or infrequent cutting, raspberries do not flourish.

When I went to Maine in the middle of the nectar flow I expected to see vast fields of white raspberry flowers. Driving along the macadam and gravel roads I had to look hard to see the inconspicuous raspberry blossoms. In this respect, raspberries are quite different from their close relatives, blackberries, which produce tall stems covered with clusters of white flowers. As the flowering season progresses there are flowers deep in the mass of raspberry canes. You may hear the bees without seeing them as they fly from one flower to another under the overstory.

"Raspberry honey is light, mild and delicate. It is worth the effort to make and harvest."

My discussions with beekeepers and others from Maine suggests there is room for more colonies of bees in the Maine woods. However, there are problems. Bears are abundant and every apiary must be surrounded by a three-strand electric fence. Several pieces of bacon are placed on the top wire. When the bears grasp a mouthful of bacon they receive a shock that usually deters further activity. We visited one apiary where the colonies had been in place for only three days and the bear fence not yet erected. A bear had tipped over one colony and removed several combs. One comb, filled with brood (eggs, larvae and pupae) had been carried about 20 feet to a little rise where the bear had obviously consumed it at its leisure. Bears typically take only one to four or five colonies a night when they are working in an apiary but if not deterred will destroy all of the colonies within a week.

I am frequently asked if bears prefer honey or brood. The fact is that a bear will eat just about anything dead or alive, sweet or sour. They appear to like brood, bees and honey equally well but in this case the bear concentrated on brood. It carried the combs several feet away from the hives and the stinging bees. In this way, many of the guard bees fly around the area where the hive had been and the area they thought they should defend. No doubt some bees followed but the bear received fewer stings by moving away from the apiary site. A bear that has never tasted brood, bees and honey and that is shocked by a fence around an apiary usually moves away and does not return. However, once a bear has savored the contents of a hive it is often not deterred by electrical shocks.

Moose are also a problem for beekeepers in northern Maine. A moose may wander into an apiary and not be stopped by an electrical shock or a fence. They are huge animals and males may weigh a thousand pounds. Beekeepers have found fencing, fence posts, batteries and other paraphernalia that were entangled in the moose's legs and horns and carried several hundred feet away. They do not appear to fear humans. We saw three, two cows and a bull during one 24-hour period in the Rangeley, Maine area.

At one time, spruce budworms were a problem in the area and insecticides were applied. No insecticides are used today and probably the fact that the forest area has a mix of species results in little damage from this or other insects.

It is expected that there will be an increasing demand for pulpwood and paper because of an expanding U.S. population with an increased focus on literacy. The clearcutting management practices are practical and sound and raspberry honey production should continue in Maine for many years.

Successful beekeeping involves moving colonies many times a year. Beekeeper Paul Dumont and his wife are originally from Augusta, Maine. When the raspberry flowering season is finished their bees are trucked to western New York State for the goldenrod. In October, the colonies are taken into the swamps in central Florida where they prosper on the nectar and pollen flows from maple, willow, oaks and other flowers in January and February. In March, the colonies are moved into Florida citrus groves for orange blossom honey. In early May, it's back to Maine for the pollination of apples and blueberries.

Raspberries produce a premium quality honey. It is light in color and mild in flavor. It granulates fairly rapidly and it is important that the crop be removed from the colonies soon after the honey flow has stopped. In recent years much of the raspberry honey produced in the United States has been sold to Japan and/or Saudi Arabia. Both countries have some commercial beekeeping but demand exceeds supply and much of the quality honey, including raspberry, that is produced in the U.S. is exported.

Raspberries bloom about the same time milkweed do in much of the country. Inevitably the two honeys are mixed, but the result is a marvelous product – light, delicate and unlike any other honey I know. If you are in one of these areas, strive to remove either the raspberry or raspberry/milkweed mix – it is well worth your while.

SPRING & SUMMER

BEEKEEPING IN THE MIDWEST – PART 3

marla spivak

In the last couple ofarticles, I explained the basics of Dr. Basil Furgala's Horizontal 2-Queen System, and described how and when to hive packages and make divides in the upper Midwest. Now, I'll outline late spring and summer management of the packages, divides and parent colonies. In the last part of this article, I'm going to do some bragging about how much honey we produced last summer using this management scheme and explain some modifications to it I've been experimenting with over the last two years.

As before, the following instructions come straight from the Basic Management short course manual developed by Dr. Furgala.

LATE SPRING AND SUMMER

PACKAGES

A. **Every 7-10 days** until the major honey flow (in Minnesota, this will be around July 1 when the clovers bloom) do the following five procedures:

• Check bees and brood. Bee populations will dwindle for first 21 days after hiving package, until new workers emerge. Look for eggs, unsealed and sealed brood.

• Treat with Terramycin® Give a total of four treatments using recommended dosage.

• **FEED FEED FEED**. Continue providing a continuous supply of sugar syrup until nectar is available in the field. (Remember, the first two gallons of syrup should contain fumagillin to prevent nosema.)

• Switch foundation if needed. Rapid comb construction can be facilitated by switching the position of frames containing undrawn foundation with those containing drawn, broodless comb.

• Provide room for expansion. The *second deep hive body* should be added to each colony when 80% of the comb surface has been drawn (approx. 4-6 weeks following hiving if using foundation, one week earlier if starting with drawn comb.)

When the second hive body is added, one broodless frame should be removed from the original hive body (leaving nine frames) and placed in the center of the second hive body to encourage colony expansion. Adjust the entrance reducer to the next largest opening at this time.

• Add the *3rd deep hive body* when bees are using 80% of the frames in the 2nd hive body (approx. 8-10 weeks following hiving if using foundation, two weeks earlier if starting with drawn comb.)

• The 10th frame in the second hive body should be placed in the center of the third hive body when the latter is added to encourage colony expansion. Remove the entrance reducer at this time.

• Remove the tenth frame from the third hive body when all frames of foundation have been completely drawn.

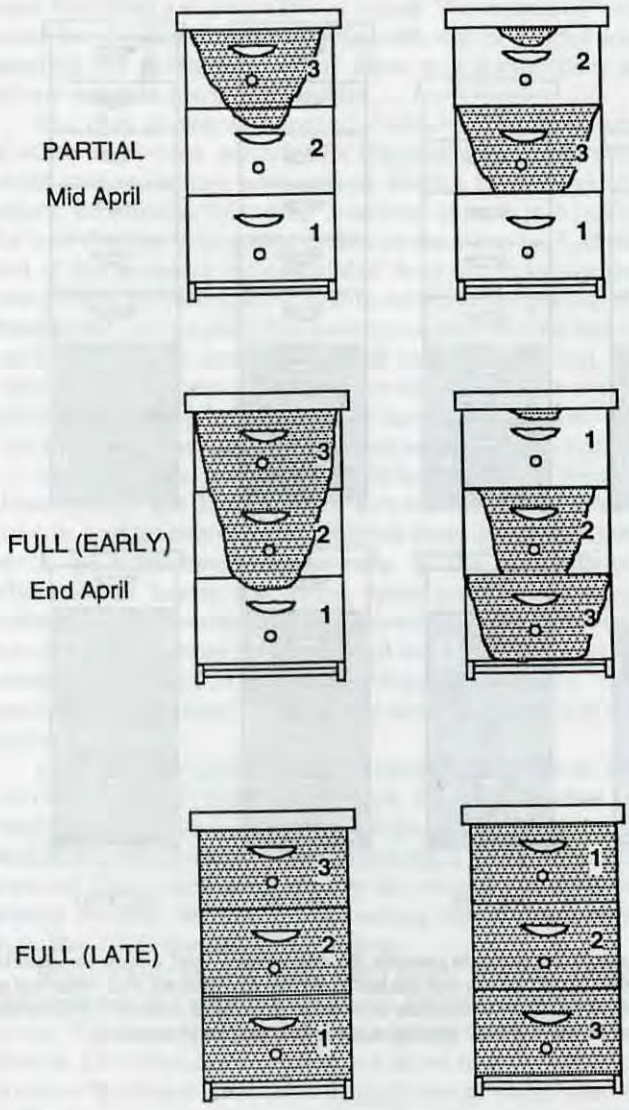
B. **Reversal of Hive Bodies (Figure 1).** At least one reversal (partial or full) of hive bodies is desirable before or during the beginning of the major nectar flow. Reversals involve rotating brood boxes so the heaviest ones (those filled with bees, brood, and stored honey) are placed on the bottom of the stack, and the lighter ones are moved up. The reversals ensure that there will be room for expansion. Also, dark comb will be in the top hive body, an important criterion for wintering.

C. **Supering**. Honey supers should be added if/when necessary during the major nectar flow. Supers containing foundation should go on top of the brood nest. Supers containing drawn comb can go on top of the stack of other honey supers. Remove menthol and fluvalinate strips before adding supers.

DIVIDES

• The **divide** should be built up to fill three deep hive bodies as described above for packages. Each time the bees have filled over eight frames in one brood box, it is time to add the next box.

• As with packages, **reversal of hive bodies** is desirable before the beginning of the major nectar flow. The reversal ensures that the bees have room for expansion and that dark comb will be in the top hive body, an important criterion for wintering.



Reversal of Hive Bodies. A partial reversal (top diagram) involves rotating the 2nd and 3rd boxes. This would be done in early spring when the colony is occupying the top box. Full reversals (bottom two diagrams) involve rotating the 1st and 3rd boxes, leaving the 2nd one in the middle. Reversals should be performed every 7-10 days as necessary to provide room for expansion, and to ensure that dark brood combs are in the top box for winter.

- Add **honey supers** as needed at the beginning of the honey flow. Remove menthol and/or fluvalinate before adding supers.

Your goal the first year for both new packages and divides is to build a strong "three-story" colony for wintering.

PARENT COLONY

- The **parent** colony is the honey producing colony. Manage the parent in two brood boxes until the major nectar flow. On seven to ten day inspections, reverse the two hive bodies to provide room for expansion, and check for swarm cells.

- Add supers when necessary. Supers are added to keep space ahead of cluster size. Two empty supers should be available for the bees throughout the main nectar flow (in addition to any already filled with honey). If the supers contain drawn comb they can be added to the top. If they have foundation they should be put *directly above* the brood nest.

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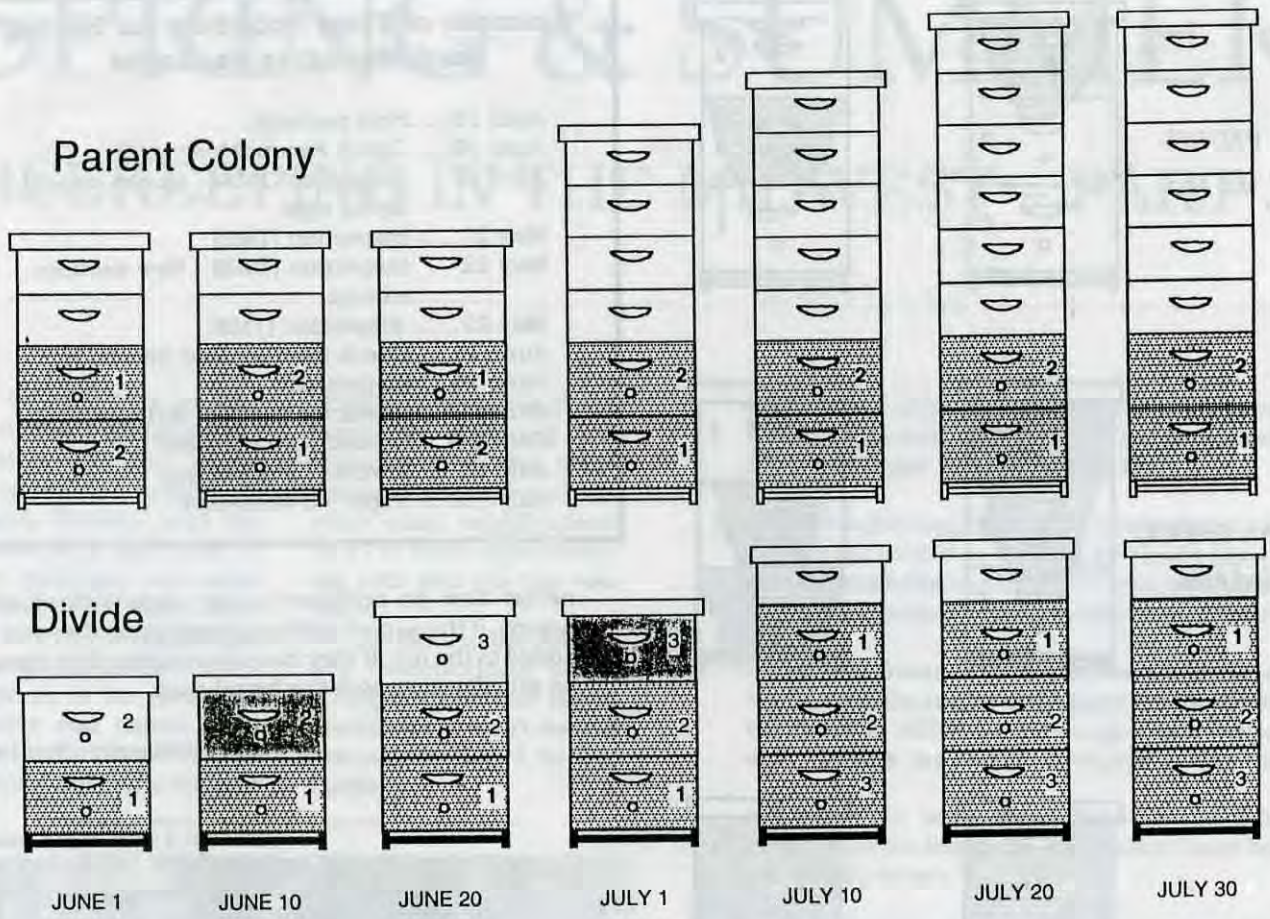
Example of Time Schedule for Hiving and Managing Packages

April 15	Hive package.
April 16	Check Syrup (Medicated)
April 22	Inspection (TM®) - Queen should be laying eggs
May 2	Inspection (TM®)
May 12	Inspection (TM®) - New workers emerge
May 22	Inspection (TM®)
June 1	Check need for 2nd hive body
June 10	Inspection
June 20	Check for need for 3rd hive body
June 30	Reverse - if necessary
July 10	Reverse - if necessary
July	Super - if necessary

Divide in 3 deep brood boxes.



Management of Parent Colony (top row) and Divide (bottom row) in late spring and summer. The divide was made from a 3-deep parent colony in mid-May. The parent is left in 2-deep brood boxes and topped with honey supers. The 2 brood boxes are reversed every 7-10 days to provide for expansion, and check for swarm cells. Brood boxes are added to divide as needed. Full reversal of brood boxes in the divide is needed in July to ensure dark combs are in the top box. Honey supers are added if needed.

SPRING & SUMMER ... Cont. From 349

Now for the bragging part. Last summer was one of the coldest, wettest summers in recent history in Minnesota. *Varroa* mites were beginning to make their presence known to many beekeepers and the combination of cold weather, endless days of rain and clouds, spotty nectar flow and heavy mite infestations prevented many beekeepers from making a honey crop. The University bees, on the other hand, produced a bumper crop, but only in the two apiaries where we used Furgala's Horizontal 2-Queen System. The parent colonies in one apiary produced an average of 157 pounds per colony. The divides in the other apiary produced an average of 35 pounds. If we count each parent and divide as one Horizontal 2-queen colony (as Basil would), we averaged about 200 lbs. per colony! Beekeepers around me were producing less than 100 lbs. per colony. What was going on?

I called Basil after we extracted the honey to tell him the news. He said those apiary locations hadn't yielded a crop like that in about 20 years. I'd like to think it was my magic touch, but I know better. Part of the good fortune came from the farmers' inability to get into the wet fields to plow the alfalfa, so it was left to bloom. But I'm convinced much of the good fortune came from using solid management techniques.

We have been running a simple experiment in the two apiaries that produced all the honey. The experiment consisted of comparing honey production between colonies headed by queens reared in the South with queens we reared in Minnesota. Where will we purchase our queen bees in the next five to ten years? I'm confident that commercial queen breeders will sell queens reared from certified European breeder stock. (If they don't, they'll probably go out of business, right?) But if those European queens become hybridized by mating with both European and Africanized drones, how will they perform in the North? I've decided to focus on using Basil's management system to winter colonies with queens reared in Minnesota. I have nothing against southern queen breeders; it's a matter of having as many options as possible.

So, for the last two summers, we have made a set of divides in mid-May, as outlined last time. We introduced mated "Starline" queens, purchased from a southern queen breeder, into these divides. We also made a second set of divides and introduced queen cells into them (in 1992 we made the second set of divides on June 1). We did not perform any fancy selection for breeder colonies; we simply chose a Starline colony that had a marked queen and looked clean and strong in the spring, and we reared queens from it. At the end of the first summer, August 1992, the divides occupied three deep brood boxes and

most had filled a super or two of honey. We compared how much honey was harvested from both sets of divides and weighed the colonies to see if there was a difference in colony weights going into winter.

The next spring we counted survivors from both sets of wintered divides, sampled for tracheal and *Varroa* mite levels and made two new sets of divides from them. As before, we introduced mated "Starline" queens into half of the new divides, and queen cells into the other half. At the end of the summer we calculated how much honey the new divides and the parent (wintered) colonies produced. Remember, at this point the parent colonies are the honey producers – they are in two deep brood boxes and are topped with supers. The new divides are built up to occupy three deep brood boxes to survive the winter, but if all goes well, they too will produce some surplus honey.

In both years, we harvested an average of 50 pounds of honey from the divides into which we introduced mated queens, and an average of 20 pounds from the divides into which we introduced queen cells. That's a significant difference in honey harvested (both economically and statistically). However, it's a trade-off. We didn't have to purchase the queens in the second set of divides, and we know that they didn't mate with Africanized drones. This trade-off may become increasingly important in five to ten years.

Last summer (1993), we harvested an average of 162 pounds of honey from the parent colonies headed by Starline queens, and 152 pounds from the parent colonies containing our queens. This is not a significant difference because the ranges produced by the colonies in each set greatly overlap. We will be measuring honey production from the 1993 divides this summer.

What about winter loss? Both years, the two sets of divides went into winter with about 100 pounds of stored honey. The first winter we lost one colony from each set of divides. On February 17 1994, we skied into the apiaries to take a head count and found all of them alive and strong (O.K., two looked a bit weak, but after the intensely cold winter I was amazed to see any of them alive).

> *"Getting colonies through midwest winters and producing a good honey crop is my testomonial to Furgala's system."*

Something that I find very interesting is that the tracheal mite levels in these colonies have remained under 10%. We treated them all with menthol each spring, but given Minnesota weather and the way the bees encase the menthol bags in propolis and avoid coming near the bags, I have to wonder if the crystals were effective. Although Basil and Steve Duff conducted several years of research on the use of menthol to control tracheal mites in Minnesota, I have a feeling that the act of dividing colonies (causing many old, infested bees to return to the parent colony), introducing a new queen into the divide, and killing off the parent colonies in the fall keeps the mite levels down. We will be conducing some research on this possibility beginning this summer.

Getting the colonies through these crazy winters and producing a good honey crop is my testimonial to the value of Basil's management system. It also explores the option of rearing your own queens in the North and using them in Basil's system. Years of research and practice have demonstrated that Basil's system works. Time will tell if the queen rearing option will be necessary and viable.

The last article in this series will discuss how to prepare colonies to survive a Minnesota winter.

Marla Spivak is Assistant Professor and Extension Apiculturist at the University of Minnesota, St. Paul. She has worked with AHB in the tropics, and is teaching a queen rearing course this summer.

DANCIN' WITH THE BEES

dewey caron

"Hi. I'm Cliff Sunflower."

"Say 'Hi Cliff!'" You do say "Hi Cliff." And so you begin *Dancin' with the honey bees!* Over the next hour you become drawn into the commanding presence of Cliff Wright-Sunflower, beekeeper and environmentalist.

Imagine you're walking into the multipurpose room of an elementary school needing to gain the enthusiastic participation of 300+ students, their teachers and several parents as you use honey bees to teach environmental awareness. Cliff Sunflower does that four days a week, over 128 times a year, reaching 67,000 students annually. Of course he is well prepared – you must be to get everyone in the room joining your dance. It is the participation that feeds his energy to do the assembly and the workshops that follow.

Cliff doesn't so much as walk into the assembly – he conquers it. His energy controls it and you follow his eyes, his darting hands, his props, and you laugh, sing, clap your hands and eagerly become part of the drama. Before the hour ends all the students, teachers and parents will be nurse bees, or funeral bees, or drones, or brood or flowers to be pollinated by classmates who are foragers.

As you are drawn into the presentation, you will learn about keeping honey bees, honey bee social existence, duties of adult bees, the honey bee life cycle and especially about the need to **SAVE THE BEES.** This last connection will start by raising your hand to indicate you like to eat. The kids eagerly respond to the next request asking if they know an adult who likes to eat. The association of bees pollinating flowers and producing food for us to eat is then made. We now have 300+ new converts thinking about safeguarding the environment so bees are safe and we have food to eat.

Dancin' with the honey bees is not merely a performance by Cliff Sunflower, it is clever integration of kinetic movement theory teaching youngsters how to think, it is an assault on all your senses and it imparts the environmental message in a meaningful and fun experience. You enjoy the experience and you learn. Think what school would be like if this happened every day!

Cliff Sunflower has developed and perfected his participatory *Dancin' with the honey bees* program over the

Continued on Next Page

Part of Cliff's program involves using one of his audience to help investigate the inside of an empty hive.

Using only his hands, Cliff can make you imagine a honey bee colony up in a tree.

Showing and telling about honey and other hive products, plus making a rolled candle rounds out the lesson.

DANCIN' ... Cont. From Pg. 353

last 12 years. He estimates he has given his program to over half a million youngsters in eight states plus Ontario, Canada. With four youngsters and 150 bee colonies waiting at home he prefers to visit schools convenient to where he lives in Eastern Pennsylvania. He even carries his concept theater technique directly to teachers through workshops.

Cliff is an active beekeeper and an EAS Master Beekeeper. He started in bees by volunteering as an unpaid apprentice to Harold Reimert of Kempton, PA who needed help lifting supers and managing his bees. He then bought his own bees and built his numbers to a 400-colony operation, thinking of becoming a commercial beekeeper. Today, Cliff has reduced fair and festival visits where he and his family sell honey and beeswax. He will always be a beekeeper as he feels it helps make his performance and message legitimate and part of the real world.

Concern for the environment and the welfare of his bees come naturally for Cliff. His college major was psychology and he began life as a teacher in recreation programs. His interest in ecology came from a love of the outdoors and teaching at Hawk Mountain, an environmental center in Southeast Pennsylvania. Now he is a 30% beekeeper, spending the rest of his time "Dancin" with the honey bees before schools, festivals and summer camps. His wife Lois is an accomplished beeswax artist – making candles, ornaments and the like.

I observed Cliff at Pennell Elementary School in Aston, PA. He gave one assembly to kindergarten through third grade students in the morning and another to fourth and fifth graders in the afternoon. The hour-long assembly was followed by two one-hour long workshops, each with half the number of students of the assembly.

The workshops consisted of six stations around the multipurpose room that students individually visited. One stop was an observation beehive, another, beeswax to smell and touch, another, a bee veil and gloves to try on and another, squeeze bears to taste honey. For the workshop portion Cliff asks his sponsors, usually the PTA of the school, to have six to eight parents assist the teachers. He considers education and his **SAVE THE BEES** message just as important for the teachers and parents as for the students.

The final activity of the workshop is to have students, teachers and parents make a foundation candle. Cliff takes the students and adults through the steps. Each person gets a piece of medium brood foundation cut on the diagonal and a length of wick. On the floor they position their piece of foundation, start the wick, make one roll and then they are told to roll the remainder of the wax. It is truly incredible to hear the students collectively exclaim their amazement that they "made a candle" at the end of the activity. It is this realization, it is something they did and one more reason to become willing volunteers in spreading the **SAVE THE BEES** message.

Not everyone can make concept theater work like Cliff Sunflower. He has honed his **SAVE THE BEES** message and *Dancin' with the Honey Bees* presentation through many performances. He finds lots of opportunities to perfect his skills since his schedule is booked six months in advance. His beekeeping helps him maintain perspective and balance and allows him to enjoy the outdoors. It also keeps him fresh as he presents his important **SAVE THE BEES** message.

Cliff Sunflower will be Dancin' With The Honey Bees at the annual EAS Conference in Lancaster, PA in July. This time he'll be 'Dancin' with the beekeepers though, as conference attendees will get to help Cliff do his thing.

Dewey Caron is Professor and Extension Entomologist at the University of Delaware. He is also chairman of the Eastern Apicultural Society.

PENNSYLVANIA POLLINATOR

john romanik

On Thursday, July 6, 1989, David Hackenberg's pollination operation was written up in *The Wall Street Journal*, a paper not known for front page art. But there on the front page was a black and white shot of David Hackenberg, in a white bee suit, with veil and smoker, surrounded by his bees.

But to see a stunning aerial color photo of the self-made, cheery beeman, hidden behind the wheel of his 70 foot tractor trailer hauling honey bees to Florida, check the May 1993 issue of *National Geographic* where Alan Mairson writes about "America's Beekeepers – Hives for Hire: Crisscrossing the country with truckloads of hives, they put their bees to work making honey and pollinating crops. Just who are these mobile, masked men?"

The Hackenberg History

It all started as "a voc-ag project in high school" in 1962. By graduation four years later, the young and enthusiastic Dave Hackenberg was the proud and productive owner of 200-plus colonies. Along the way wife Linda entered his life and together they added David, Kevin, Jeanne, and Betty.

His calling card might be the complimentary yellow ballpoint pen that shows a bright-eyed honey bee holding a daisy, advertising "Buffy Bee Honey." Imprinted on the pen are his Pennsylvania and Florida address and phone numbers.

William Penn Road

Lewisburg, his PA home, is a sleepy little town of 5,000, 65 miles north of Harrisburg. A first-time visitor to "Buffy Bee Apiaries" might breeze right past 1041 William Penn Road and wind up at the service entrance of the federal penitentiary a few blocks beyond, as a friend and I did. It's a small piece of property with a frame house and another structure, looking like an oversize tall garage which serves as honey plant and warehouse.

There is not one hive in sight. Just a rig with Florida license plates. Dave has just returned after dropping off a load of 1600 two-story colonies. Inside, the right-hand side of the building serves mostly for merchandise and equipment storage – he is a bee supply dealer also – while the other side serves largely as a honey extracting room.

Extracting Operation

At the heart of the honey-process operation are two

Continued on Next Page

Dave Hackenberg's logo makes his truck stand out.

"Hackenberg's likeness has been in both *The Wall Street Journal* and *National Geographic* – quite a feat for a beekeeper!"

PENNSYLVANIA POLLINATOR ... Cont. From Pg. 355

jumbo radial stainless steel extractors, capable of handling all size frames, the largest ever made by the now-defunct Hubbard Company. Mr. Hackenberg uses only deeps for honey, though handling heavy, deep supers doesn't phase him. The extractor is fed by a Dakota Gunness uncapper, which uncaps both sides of the frame as it rides between the top and bottom flailing chains simultaneously. The cappings go into a floor machine, made specifically for that purpose by a company no longer in operation. It looks like the piece of equipment now sold by Dadant & Sons called the mini-Melter – but much larger. The honey, still containing some pulverized wax is pumped into two large stainless steel settling tanks, then it is run through a narrow tube filter, about 15 inches long (perforated stainless steel covered by a cloth sock), and is then ready for final packaging.

The pulverized wax, which rises to the surface in the two settling tanks, is darker and is purified with hot water to cleanse it of its propolis content. Then it is cast into different sizes to suit David or the customer. For example, on my visit he was offering a small loaf-pan size, less than three pounds, for $5.00 to street customers while he was selling the darker 17-18 pound circular blocks, on special request. Since all of these were not taken, each of us bought one at $2.00 per pound. After the wax, bottle and honey purchases, we asked him if he had anything else to peddle; Dave replied "I'll sell you anything I have here, including the whole operation!"

The Florida Operation

I facetiously remarked "How nice it must be to spend the winters in Florida." David chuckled and went on to describe his January-to-April "vacation" at which time the Lewisburg location was mothballed.

His headquarters in Dade City – a small community on the Gulf coast about 40 miles northeast of Tampa – is part of a chain operation for both honey production and pollination. Starting in February, the two-story colonies are fed a diluted syrup from 55-gallon drums topped with burlap, for easy self-feeding. The sweeter the syrup, the better the attraction and the faster the disposal initially. It is periodically diluted so that the end product is like flower nectar.

With brood rearing thus stimulated, a shallow is put on top of the deep brood chamber in preparation for orange-tree pollination, with the promise of honey for customers back home.

The Florida operation is a paying proposition because it results in an increase of hive numbers – from 1600 to 2000 is not uncommon. In April, the bees are trucked northward for apple pollination in Pennsylvania. About mid-May the same bees are moved northward, to Debois, in northeastern Maine, for blueberry pollination. That state's famous "wild" plant produced 55 million pounds of blueberries in 1987 This tripling of production was prompted by both the migratory beekeeper, like Mr. Hackenberg, and by the E.I. Dupont chemical, Valpar®, responsible for "killing the weeds choking blueberry plants" "All this on wild blueberry plants?" I asked. David replied, "Call them what you will, they are planted, fertilized, and cultivated!" In a recent year his 1,500 hives were dropped off at Jasper Wyman & Son's 3,200 acres of blueberries, which handled 7,600 hives that year at a cost of $230,000; Dave Hackenberg collected $45,000 of that. Another $15,000 that year came from Pennsylvania apple pollination.

An offshoot of the pollination business sometimes results in surplus honey, the extraction of which is his next biggest job.

The Honey Harvest

Each year the Pennsylvanian winds up with about 300 barrels of honey which, when calculated at 55 gallons or 660 pounds per barrel, totals 198,000 pounds or 99 tons! "We sell what we don't pack to small packers." In mid-November 1992, they were selling a one-barrel minimum of "strained, ready-to-be-bottled" alfalfa, clover or orange blossom honey at 62¢ a pound and wildflower (his darkest – tulip poplar) for 60¢ per pound in customers' containers.

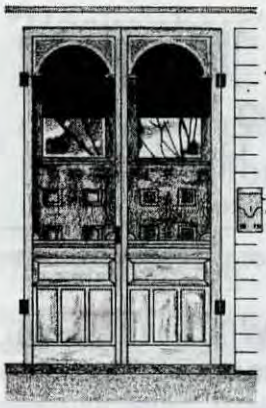
Another "business card" that Dave hands out is a keychain ring with a yellow plastic tag. It carries the smiling caricature of a honey bee holding a large daisy that sends the message. "My sweetest honey for you." Something to remember about the sweetness of life and working the bees.

The American Bee Federation officer also advertises buckwheat honey for sale along with tin/glassware, bee supplies, wax rendering and custom extraction. He also runs a monthly quarter-page ad in the Pennsylvania State Beekeepers Association Newsletter. Clover? Since his native state is not known as a major source of that variety, he admits that his comes from North Dakota where he has no honey bees but is in a partnership with a local beeman.

•

After this article was written, tragedy struck the Hackenberg apiary operation in the Keystone State, while he was at his Florida site. Back home in Lewisburg, Pennsylvania on January 20, his warehouse containing his entire honey operation and a tractor at the time burned down completely. The temperature outside was 25° below zero. The trailer, parked outside west of the warehouse, was saved by the prevailing westerly wind. However, his vacant home, east of the warehouse, was a victim of the same winds and partially burned. The honey in barrels was saved elsewhere. He suspects that the power company brownouts in effect at the time caused a motor to short out, overheat and catch fire. At least that's what the fire marshal theorizes. Unfazed Dave Hackenberg, in his 32nd year with the honey bee, asserts that the apple- and blueberry-pollination contracts will go forward. Now that's the tenacity of a Pennsylvania Dutchman's attitude of never say die!

John Romanik is a hobby beekeeper and part time explorer from Ellicott City, MD.



HOME HARMONY

ann harman

A Potpourri of Honey Recipes

Every once in a while it's time to empty my shoebox of honey recipes. I often find a magazine or newspaper with a recipe that will be delicious when honey is substituted for sugar or a friend will contribute a recipe from who knows what source. Organizing these is best done in fits and starts instead of methodically cataloging each one as it arrives. Therefore, this month's recipes — a complete mix — is the result of a rainy day and the urge to organize the shoebox. The cats, bored with a lack of mice, helped considerably by sleeping on my neat piles. Any disarrangement of recipes can be blamed on them. The dogs and horses didn't contribute anything useful or useless.

Local farm newspapers are a wonderful source of recipes, although I do deplore the frequency of "one box of cake mix" as an ingredient. Given a few minutes, farm people are the best cooks you can find. Recipes get handed down in families, with each generation making an interesting addition. If a recipe is worth handing down, it means someone enjoyed it, which means it's worth repeating. I always check the recipe section in my local farm paper and I contribute honey recipes to encourage the use of honey. Do you contribute honey recipes to your local newspaper? I hope so. All you need to do is give credit where appropriate. If you also include some hints on cooking with honey, those will be appreciated by the novice honey users who read the article.

Honey Delights

This recipe was found in a farm newspaper and sounded so good I baked a batch before tossing the clipping into the honey cookery shoebox.

1/2 cup butter
1/2 cup honey
2 cups flour
1/4 teaspoon cinnamon
1/4 teaspoon cloves
1/4 teaspoon allspice or nutmeg
1 teaspoon baking soda

Boil honey and butter for one minute. Cool. Sift flour and spices together. Combine dry ingredients with honey and butter mixture. Add enough more flour to make a soft dough. Roll on floured board to about 1/4-inch thick. Cut into desired shapes. Place on greased baking sheet at 350° for 10 to 15 minutes. Makes 2 dozen 2-inch cookies.

The Delmarva Farmer
Margaret M. Harless

Papaya Frappé

Summer is a time for refreshing, cool, fruit drinks. A variation on this recipe is to blend the fruit, honey and juices and store a pitcher of the blend in the refrigerator. Then the frappé can be made quickly by adding the ice cubes and yogurt and blending.

2 cups ripe papaya
2 cups orange juice
2 tablespoons honey
2 tablespoons lemon or lime juice
1 cup cold water
4 ice cubes
1 cup plain yogurt

Combine all ingredients in a blender and blend at high speed for 1 minute

Fresh Fields Newsletter

Zucchini Muffins With Lemon

It's no wonder there are so many recipes for zucchini — there are always so many. Don't cheat on the lemon rind; it makes these muffins absolutely delicious. And nobody will guess you are trying to use up an overabundance of zucchini.

1 cup whole wheat flour
1 cup all-purpose flour
1 tablespoon baking powder
1/2 teaspoon baking soda
1/4 teaspoon salt (optional)
1/4 teaspoon nutmeg
1 egg
3 tablespoons vegetable oil (preferably canola)
1/3 cup honey
1/2 cup skim or low-fat milk
1/2 cup plain nonfat or low-fat yogurt
1 cup firmly packed shredded zucchini
1 tablespoon grated lemon rind

In a large bowl combine the flours, baking powder, soda, salt and nutmeg. In a medium-sized bowl beat the egg, then add the oil, honey, milk, yogurt, zucchini and lemon rind, stirring to combine them well. Add the zucchini mixture to the flour mixture, stirring the ingredients until they are just moist. Place the batter in 12 greased muffin cups. Bake at 375° for 30 to 35 minutes or until the muffins are golden and firm. Allow to cool on a rack for 5 minutes before turning the muffins out to cool.

Good Food Gourmet
Jane Brody

Beer Bread

I participated in a craft fair with my honey and beeswax candles. One of the other crafters was a man with a gasoline-engine-driven mill. He was making cornmeal and several different flours. His recipe handout, with my purchase, simply said "Old Time Recipes" with no name or address. I did not notice this omission until the next day when I read through the recipes. Now I have no idea how to contact him if I want more buckwheat flour or cornmeal. I hope you don't make that mistake when you hand out honey recipes to your customers. Give this "old time recipe" a try — the bread is quickly made.

2 cups white flour
1 cup whole wheat flour
3 teaspoons baking powder
1/2 cup honey
1 teaspoon salt
1 12-ounce can beer

Combine all ingredients and stir until moist. Put in greased loaf pan. Let sit for 10 minutes at room temperature. Bake in 350° oven for about 50 minutes or until brown or sounds hollow when knocked on the bottom.

Old Time Recipes

Kiwi-Lime Salmon Salad

The tart-sweet distinctive flavor of the popular kiwi blends very well with many other fruits. Here we find it in a salad dressing The salad will make an excellent lunch on a warm summer day.

Lettuce leaves
1-1/2 cups cooked boneless salmon chunks
1 cup seedless grapes, halved
1 firm-ripe avocado, peeled, sliced
1 cup fresh pineapple chunks

Place lettuce leaves on each of four salad plates. Arrange salmon, grapes, avocado and pineapple on leaves. Drizzle with Kiwi-Lime Dressing

Kiwi-Lime Dressing:

1/4 cup canola oil
1/4 cup honey
1 tablespoon fresh lime juice
1 ripe kiwi fruit, peeled and diced
1 teaspoon grated fresh ginger

Combine all ingredients in blender. Blend on high speed until smooth. Makes 3/4 cup.

Modern Maturity Magazine

Grilled Halibut With Pineapple Salsa

Summer barbecues do not have to be chicken alternating with hamburgers and hot dogs. Fish can be grilled for a delicious dinner. Use the recipe in winter also (or during a summer thundershower) by broiling the fish. The accompanying salsa has an excellent sweet-sour character.

Salsa:

1 large pineapple, pared
1 tablespoon honey
1 tablespoon chopped fresh cilantro or parsley
2 teaspoons grated fresh ginger root
2 teaspoons grated lime peel
1 tablespoon lime juice

Slice 3 slices, 1/4-inch thick, of the pineapple and set aside. Coarsely chop remaining pineapple to have about 1-1/2 cups. Place in medium bowl. Stir in all remaining salsa ingredients. Set aside.

Halibut:

1/8 teaspoon salt
1/8 teaspoon coarsely ground pepper
2 tablespoons olive or vegetable oil
6 (6 ounces each) 1-inch thick halibut or swordfish steaks
6 lime slices, 1/8-inch thick

In small bowl stir together salt, pepper and oil. Brush fish steaks with oil, Place on grill or on broiler pan. Grill, basting and turning occasionally until fish flakes with a fork (12 to 15 minutes). If broiling, place 3 to 5 inches from heat and broil 10 to 12 minutes. Cut each pineapple slice in half. Place slices on grill or on broiler pan and grill or broil, turning once, until lightly browned. Serve fish steak on pineapple slices. Serve with salsa. Garnish with lime slices.

Land O'Lakes

Coleslaw With Sweet Dill Dressing

Coleslaw is a frequent dish at summer picnics. However, there is no reason to make the same coleslaw each time. Here is where the beekeeper can promote honey cookery and show how versatile honey can be in the kitchen.

1/3 cup honey
1 teaspoon salt
1 teaspoon celery seed
1/4 teaspoon black pepper
1 teaspoon dill weed
1 cup salad oil
1/4 cup white wine vinegar

Mix together the honey, salt, celery seed, pepper and dill weed. Beat in salad oil alternately with vinegar. Makes about 1-1/2 cups.

To Make Coleslaw:
Pour boiling water over 4 cups finely shredded cabbage. Drain at once! Dip in cold water. Drain thoroughly and chill. Toss with 1/3 cup Sweet Dill Dressing.

Collectors' Items — Superb Recipes From Spice Islands

That seems to have cleaned out the shoebox for the time being, unless there is a recipe still hidden under a sleeping cat. If so, I'll put it back in the box and save it for the next rainy day.

?Do You Know? Answers

1. **True** Very young bees less than a day old cannot sting. Their stings apparently are too soft and flexible to penetrate the flesh.

2. **False** Queen mating flights occur when the weather is warm, the wind is fairly calm and usually during the afternoon.

3. **False** The crop or honey stomach is located in the abdomen of the worker honey bee. The thorax is the bees locomotor center and is filled with muscles associated with crawling and flight.

4. **False** the color of feeswax is white when secreted by the bees. Freshly constructed beeswax combs, prior to their use for food storage or larval growth, are similarly bright white. The yellow color comes from the contact with pollen, propolis and developing brood.

5. **True** Hundreds of bees participate in the construction of a single cell; an individual worker may be active as little as half a minute. When comb is under construction, bees cluster in a curtain-like arrangement (called festooning). Many bees hang quietly producing wax scales while others are actively adding wax and shaping cell walls.

6. **True** At the time of swarming the colony population is made up of a large percentage of very young bees. Swarming is normally preceded by a great increase in egg laying. After several weeks of intensified brood rearing there is a population explosion within the colony when massive quantities of brood emerge as adults at about the same time. This congestion in the broodnest is considered to be the primary cause of swarming.

7 **False** The "whir dance" is associated with the emergence of a swarm from a colony rather than a virgin queen's mating flight. Shortly before the swarm departs the bees engorge with honey and a few scout bees begin the characteristic whir dance that seems to incite 20,000 to 30,000 bees to swarm. Highly excited, the scouts force their way among the bees in zigzag running steps, vibrating their abdomens and producing a perceptible whir with their wings. The number of whirring bees increases until the whole hive is in tumult and the swarm emerges in a frenzy.

8. **True** Bees by nature are vegetarians and consume only nectar and pollen. They derive their total nutrient requirements from these two resources.

9. **False** The egg-laying process by the queen requires approximately nine to 12 seconds. The time a laying worker spends in laying varies from 17 to 261 seconds, with an average of 50 to 75 seconds.

10. A) is 5 to 6 days old.

11. D) Touch and Odor

12. E) 8-15 drones

13. B) Starvation

14. New queens are reared by the colony under the emergency (queen is accidentally killed, lost, or dies unexpectedly), supersedure and swarming impulses.

15A A southern or easterly exposure gives colonies maximum sunshine throughout the day. With the early morning sun hitting the front of the hive, the bees begin foraging earlier in the day thus they have a greater potential of making a honey crop.

15B Keeping the hive up off from the ground reduces dampness in the hive, extends the life of the bottom board and helps keep the front entrance free of grass and weeds.

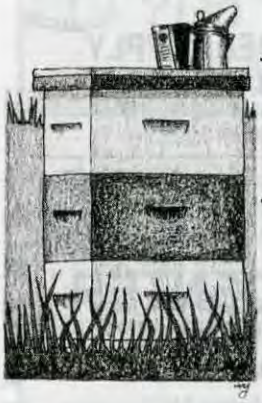
15C Since the bottom board is open in the front, the colony should be tilted forward slightly to prevent rain water from running into the hive, helping to keep a drier hive.

15D Feeding sugar syrup early in the spring acts like an artificial honey flow and serves as a strong stimulus for brood rearing.

16A Spring
16B Spring
16C Spring
16D Spring
16E Summer

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



BEE TALK

richard taylor

"Bees respect a space of about three-eighths of an inch. Violate that and they can be very unforgiving."

Modern apiculture rests upon the simplest principle imaginable, yet it is widely unappreciated, especially by beginners, and constantly violated, always at some cost. It is the principle of the bee space, which can be expressed thus: Bees respect a space of three-eighths of an inch. A larger space they fill with comb, and a smaller one with propolis.

The three-eighths inch space is just about wide enough for the bees to walk through, so they maintain passageways of this size. They have no tolerance for anything larger or smaller.

It took me years to appreciate this very simple fact. I always marveled at the human ingenuity displayed in moveable frames but I didn't really note what lay behind them. So I made some of the common mistakes, such as putting queen excluders on upside down, sometimes having inner covers with too much space on the bottom side, and so on. And I think there are very few beekeepers who have not, early in their beekeeping, left a comb out of a hive thinking they would replace it in a day or two, which is a real blunder.

It should be noted that the principle is not quite as rigid as it sounds. For example, you can have a slightly larger space between the outside combs and the sides of a super. When bees build natural combs, in a tree or box, for example, the outer ones usually have slightly more space between them than the center ones. But I can think of no other exceptions to the principle, and even this one is very small.

Why, then, can you have only nine frames in a ten-frame hive and get away with it, or only eight frames in an extracting super? Well, you have to be careful. If you are using foundation, then have all 10 frames there; otherwise you are apt to find that the bees have built two combs on one of them. The same for supers. But once the combs are drawn, you can take one out, or even two out of an extracting super – but then you have to be *very* careful with your spacing, especially with the super. Usually, with a nine-frame hive, you solve the problem just by squeezing the combs together from either side, leaving the extra spaces at the sides. But you've got to be more fastidious if you are reducing a super down to eight frames.

Then why do it? Because the combs from a super with only eight frames are vastly easier to uncap.

Langstroth, probably the most honored beekeeper who ever lived, is widely supposed to have discovered the principle of the bee space. I have even seen him referred to as having "invented" it, which makes as much sense as saying that Newton invented the law of universal gravitation. But Langstroth was not the first to see it. My friend Toge Johansson, who is never happier than when he is poring over old books or ferreting obscure things out of some dusty archive, has found several indications that writers long before Langstroth were familiar with this particular behavior of bees. He even found references to beekeeping in Greece in the 17th century when the principle was utilized. Well before Langstroth's revolutionary invention there were beekeepers who used so-called "bar hives," in which the bees were induced to build their combs down from wooden sticks laid side by side across the top of a hive. Of course they quickly discovered that it made a lot of difference how those bars, imprinted end-to-end with a bead of beeswax, were spaced. Hives embodying this basic idea are today widely used in Africa.

Langstroth's greatness rests on many things, all of which display the brilliance of his mind. In his day his fame rested primarily on his writings which, more than anything else, ushered in the era of modern beekeeping. But his single greatest contribution was his invention of the moveable frame, which is based on the principle of the bee space. It came about this way: Like all beekeepers, he found it very difficult to remove the cover of a hive, because it was so stuck down to the inner cover with propolis. One day he tried leaving a small space between the two, and to his astonishment, it worked – the bees left that space empty. So that solved the problem of getting covers off without damaging hives and combs. Later, it occurred to him that if the bees could be induced to build their comb in a *frame*, whose dimensions would be such as to leave precisely that three-eighths-inch space all around, then the combs could be removed and replaced at will, or even exchanged between hives, and so on – and there was the beginning of modern beekeeping. Before that, beekeepers had to be content

with bees attaching their combs to the sides of the hives and in order to remove a bar with a comb attached to its underside, the combs had to be scraped loose from the sides – a highly messy and destructive procedure.

Langstroth was not only an inventive beekeeper, but a great human being, deeply learned, deeply pious and humble. He was also profoundly unhappy for much of his life, suffering from a psychological disorder sometimes called manic depression, which he struggled against with much courage and spirit. I have always admired him so much that I wanted to name my eight-year-old after him, but his mother objected, settling instead for Aristotle Eli. ◊

INNER... Cont. From Pg. 324

ent light to dark – making seasonally appropriate fashion statements. Others start and last and stay the same from seed to leaf to flower to fall

Forests turn green from the bottom up and from the top down. On forest floors ground dwellers grow and swell and burst with green before covered by summer's light-tight canopy. They rush to the sun to get their share before settling for shade the rest of the year. It's an adrenalin rush – from parsley green that goes fast to dark – a rush for blossoms, fruit and finally seed.

Above, those nearest the sun are slower to unfold and come to life. The essence of green rises as it needs, when it will. There's less urgency with a wealth of light that lasts and lasts and lasts. Those penthouse leaves thrive in the luxury of full-time sun and warmth. Some aren't even green when they just start out. Oaks are some, first tinged with reds and pinks that lend an easy retreat from the botanical tint assult that keeps on greening up. Others yell yellow at birth and some are brown and some are a rich olive green when still in the bud.

Splashed across a hillside these colors blend and clash and touch. They run in rows, fall in bunches and sometimes stand alone. There's black-forest green mixed with sunflower yellow, last year's brown stands alone but next to lime green and grass green and light green clumps that all seem to edge around a stand of yet-dull evergreens. The French Impression painters saw it all, for this is more surreal than real and the hills are alive, nevertheless.

But green doesn't grow only in spring's first forests. Meadows and pastures have their own formula for shrugging winter's dearth-brown coat for summer's grass-green song. These are mostly treeless tracts, covered early with last year's growth. Those tall dead stalks, like sentinels, seem to guard this year's sprouts beneath. But those fuzzy fields soon shed those sentinels, a revolution that returns them to the soil to finish their cycle and grow again in seasons to come.

In corners of these meadows, pastures, and forgotten fields early risers shoot their mustard-yellow flowers forth, giving depth and life and a different shade of green to what will certainly be a verdant field later on.

On the expansive spots where grasses grow there's a checkerboard of light and dark, testimony to cattle calls. Those random spots of almost blueblack green shoot high, much higher than the ordinary. The fertile spots are spread each day and over time make the whole field rich, but in spring they give an emerald advantage to little islands in an only grassgreen sea.

Fields once worked make their own contribution to spring's growing green. Not yet tended, they're still sterile and mostly gray or brown or tan. Leftover 'cides from season's since keep this years growth at bay, and the only life is where the farmer failed and missed a row or spot or space. It's here where green springs fast – tender slender stalks rise as if they know there's only weeks or less to grow and mate and spread their kin in a mostly futile try to beat the odds – the farmer and his machines.

Plots just plowed or harrowed or planted somehow have their own command of color – not growing green (not yet), but rich in browns, blacks and chocolates. In some you see last year's stalks – the mostly buried bones of an ancient crop that are white, gold and sandy brown. Very soon, overnight it seems the green appears. Perfectly planned magic. Up and across and up some more and covering the brown, black and chocolate with waves and rows of green. Until harvest time when earth tones come again.

But there are fields that are already done. Planted last season for this, they green at autumn's end and stay that way – through Halloween and Christmas time and Easter day. Green already when the rest are only thinking color. Shimmer green in neatly combed rows of all kinds of wheat. Or alfalfa green in bunches and groups and tufts of, well, alfalfa – feed for the cows that feed the meadows, and feed for the bees that will visit the flowers, if the farmer lets them grow.

Yes, there's a million million greens in our woods and fields, meadows and yards in spring in the north. A famous frog (green of course) once said it's not easy being green. Rather, I think, it's not easy choosing which green to be, for there are a million million greens in spring.

Kim Flottum

QUESTIONS? ANSWERS!

Slatted Racks

Q. What are the advantages of using slatted racks on the bottom boards?

Tim Armstrong
Ashtabula, OH

A. Their purpose is to improve ventilation in the hive and thus reduce swarming, but in my opinion they do not reduce swarming and are only extra equipment. Others disagree however.

Moving Colonies

Q. I have to move my five hives about 60 feet. How does one do this?

Russell Willsey
Sebring, FL

A. A beekeeper who lives in the north can take advantage of winter, or early spring, to move hives a short distance. Any bees that return to the original location are old ones, soon to perish anyway. But that will not work where you are, so you have to move them just two or three feet at a time, every three or four days – a long process. Alternatively, you can move them to another spot at least two miles away, wait a month or so, then move them back to their new location, making these moves in the very early morning before the bees begin to fly.

New Queens

Q. When uniting two colonies, one with a new laying queen, is it necessary to murder the old queen or can I safely let nature take its course?

John W. Kingery
Plano, IL

A. It is fairly safe to let nature take her course, and certainly lots easier. Put the part with the new queen on top.

Editor's Note: To protect your investment in that new queen, however, removing the old queen before introducing your new queen is safer.

Looking For Mites

Q. I have heard that you can use sticky boards to check for mites. Where do you get them? And can you make them up yourself?

Ben Beiler
Stark City, MO

A. Sticky boards were introduced to check for *Varroa* mites only, not tracheal mites, but there are now much easier ways to check. The easiest way is to uncap a patch of drone comb. If you have *Varroa* you are almost sure to find the drone larvae obviously infected, and if you find it in one hive you probably have it in all of them. Another way is to scrape about a half cup of bees from a comb into a regular quart canning jar, spray a bit of quick-start (ether from the auto supply store) into the jar, replace lid and swirl the bees around. Any *Varroa* mites will be clearly visible, sticking to the glass.

Swarm Control

Q. Most of my 19 hives swarm every year. You have suggested replacing three combs of brood with three empty combs when swarming time approaches. Where do I put the three empty combs (or frames of foundation)? In the center or at the edges or where? Most of my hives are two-story, but my best producer is in a single story. So I have thought of just dividing the two-story ones and supering each part. Would this inhibit swarming?

Brett Bozeman
Andalusia, AL

A. Every effective swarm control system, in my opinion, involves splitting the colony, in one way or another. To remove combs of brood and replace them with empty combs is, in effect, to split the colony. You have several options. Probably splitting each colony into two colonies and supering both would not work well in your area. It works only where there are good fall honey flows. Whatever you do, your aim is to have empty comb space *in the brood nest* during the entire swarming season, so the queen will have room to lay. If your two-story hives have any empty, or near empty, combs, move them down into the brood nest, in exchange for combs full of brood. If you want to remove combs of brood, making up nucs with them, then put the replacement (empty) combs in the *center* of the brood nest.

Lots Of Work

Q. I want to requeen my hive, but can't find the queen. Maybe after 85 years my eyes are not up to it. Will the following work? (1) Move the entire hive about 50 feet away; (2) in its original location put a bottom board and new caged queen, to impart her pheromones; (3) shake all the bees into a large box; (4) place a queen excluder on the original bottom board, and on that, a new empty hive body and the brood combs from which the bees have been shaken, with the caged queen between two of the combs; (5) dump the bees in front of this new hive, and (6) remove the excluder after the queen has been accepted.

John Schildhauer
Homestead, FL

A. That should work, but you don't need to shake the bees into any box. Instead, move the original hive about 10 feet or so, and after placing a queen excluder on the new bottom board, and a hive body on this, shake the combs, one at a time, in front of the new hive on the old location, placing them then in the hive, and giving them their new queen.

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

Richard Taylor

Gleanings

JUNE, 1994 • ALL THE NEWS THAT FITS

ITC Recommendation Disregarded

CLINTON KILLS CHINA HONEY SANCTION

To the Congress of the United States:

After considering all relevant aspects of the investigation, including those set forth in section 202(c) of the Trade Act of 1974, I have determined that import relief for honey is not in the national economic interest of the U.S. However, I am directing the U.S. Trade Representative (USTR), in consultation with the appropriate agencies to develop a plan to monitor imports of honey from China. The monitoring program is to be developed within 30 days of this determination.

Since I have determined that the provision of import relief is not in the national economic interest of the U.S., I am required by that section 203(b) of the Trade Act of 1974 to report to Congress on the reasons underlying this determination.

In determining not to provide import relief, I considered its overall costs to the U.S. economy. The USITC majority recommendation for a quarterly tariff rate quota (a 25% ad valorem charge on the first 12.5 million pounds each quarter, increasing to 50% on amounts above that level), to be applied for three years would cost consumers about $7 million while increasing producers' income by just $4.9 million. The other forms of relief recommended by other Commissioners would also result in substantial costs to consumers while offering little benefit to producers.

In addition, the gap between production and consumption in the U.S. is approximately 100 million pounds, with imports of honey from China helping to fill that gap at the low end for industrial use. Any restrictions on imports of honey from China would likely lead to increased imports from other countries rather than significantly increased market share for U.S. producers.

Although rising somewhat since 1991, U.S. honey inventories are not large by historical experience, either in absolute amounts or relative to consumption. Honey stocks reported by the USDA were much higher in the mid-1980s (about 75% of consumption in 1985 and 1986), before falling to their lowest level in a decade in 1991 (26.6% of consumption). The 1993 stocks were 37.8% of consumption, well below the 1980-1993 average level of 46.4%.

The U.S. government has supported honey producers since 1950, in part to ensure enough honey bees would be available for crop pollination. This is an important national interest. I believe that current trends in the provision of pollination and honey production will not be significantly affected by not providing relief. Crop producers indicate that they believe pollination will still be cost effective even if service prices rise.

I have also concluded that, in this case, imposing trade restrictions on imports of honey would run counter to our policy of promoting an open and fair international trading system.

William J. Clinton

The White House, April 22, 1994

Another Honey Helper

HOTLINE HELPS EXPORTERS

U.S. companies looking to build sales and find trading partners overseas are plugging into the Export Hotline, a free international information service available to any company with a fax.

Launched in 1992 by International Strategies Inc., a Boston-based consulting firm, the Export Hotline offers access to a database of more than 4,500 reports covering 50 industries in 78 countries. The reports, which are updated weekly, provide information on such topics as a country's commercial environment, distribution and trade barriers, as well as trade shows, business protocol, and investment regulations.

The hotline was set up to provide small- and medium-sized businesses with information on the export/import industry, says Abby Shapiro, chairman of International Strategies. "There are very few sources of information that are provided to (small and medium-sized businesses) quickly and affordably."

To use the hotline, callers dial 1-800-USA-XPORT on their fax machine. A registration form pumps out with a directory of country reports and their menu codes. Users then call the database in Boston on their fax machine, keying in a five-digit code to specify which report they want to receive.

Callers pay no registration fee; the only cost is the regular call to the 24-hour Export Hotline database in Boston.

About 28,000 companies use the hotline, Shapiro says, which is sponsored by such companies as AT&T, Business Week, Delta Air Lines, and KPMG Peat Marwick. On average, the hotline receives 1,000 calls a day, she says. About 60% of calls come from companies with less than $5 million in sales; eight or nine percent of users record sales of more than $100 million.

The leading industry sector request is food and beverages, followed by telecommunications, medical equipment, and textile products. Mexico is the most frequently requested country by 2:1, Shapiro says. South America also is becoming a hot market, with Russia and China close behind.

Reprinted from Christian Science Monitor

But Still A Good Honey Plant

YELLOW STARTHISTLE CONTROL

Yellow starthistle weeds in several western states now face two new species of insects that are the weeds' natural enemies. Starthistle stabs hikers, poisons horses and crowds out desirable plants that cattle would eat. It infests more than eight million acres in the West. One imported insect, a quarter-inch-long weevil known as *Larinus curtus*, has settled in thistle-infested sites in CA, WA and OR. The second biocontrol insect, *Chaetorellia australis* fly, has established colonies in OR and WA for the first time. Extensive testing by ARS scientists in CA and Europe led to successful start-up of American colonies of these insects – and three other starthistle-eating species that were introduced earlier.

Entries Good, But Declining in Numbers

4-H WINNER FROM CA

Research into the myriad of honey and other hive products was the basis for the 1994 American Beekeeping Federation 4-H Essay Contest. An essay by Nicholas Broffman, a 12-year-old hobbyist beekeeper from San Anselmo, CA, was judged the best of 15 entries.

Nicholas found quotes from the Roman Pliny and from the prophet Mohammed on the goodness of honey, and researched nutrition of pollen and usefulness of propolis, beeswax and royal jelly. He found bee venom "the most intriguing." He even found that bee brood is eaten – grilled, lightly salted.

A seventh grader at Marin Horizon School in Mill Valley, CA, Nicholas "looks after 20 strong hives. When he's not keeping bees or going to school he plays the piano and rides his bike. For being first place winner, Nicholas earns a $250 cash prize.

Practice proved the answer for Emily Robin of Lafayette, LA. Entering the essay contest for the sixth time, she wrote the second place essay and won $100.

Emily concluded her essay with praise for the honey bee: "The honey bee is truly a gift from nature. The products of the hive are diverse in use and important to us. Honey bees are awesome."

Valerie Baker, a high school freshman from Florence, KY, was the third place essayist, winning a $50 cash award. Looking to the future, she wrote, "As more scientific investigation is done, I believe beehive products will become even more important in medical treatments."

These three and the other 12 state winners will each receive a copy of "Super Formulas – Arts and Crafts" donated by the author, Elaine C. White, as well as a basic beekeeping book.

For the 1995 Essay Contest, 4-H'ers will be asked to write a story about honey bees for elementary school age children. Complete rules and details on entering are available from local 4-H agents, or from The American Beekeeping Federation, P.O. Box 1038, Jesup, GA 31545.

Not Only For Bees

CITRUS A BOUNTY

If you squeeze fresh citrus juice, you probably throw away what's left of the orange or grapefruit. But what would you do with mountains of leftover peels and seeds?

Every season, Florida's citrus industry takes billions of pounds of what looks like garbage and turns it into millions of dollars in useful by-products.

One of the top uses for citrus waste may surprise you, unless you're a southern cow. It's turned into cattle feed. Once juice has been extracted from citrus, the peels, pulp and seeds are chopped up in a hammer mill.

This mixture goes into giant presses, where any liquid is squeezed out, then into a huge drier. The final mix makes an excellent feed, rich in minerals.

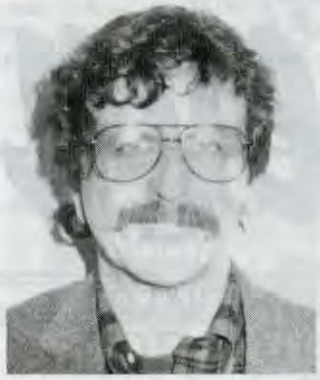
The liquid pressed from leftover peels is turned into citrus molasses. Citrus molasses also is fed to cattle and is used to make alcohol. Molasses-making also produces an oil used in paints and varnishes.

That's just a start. The spongy white of the citrus peel contains pectin, used in making jelly. The essential oils in citrus peel are used as food flavoring and in perfume and soap. The peel itself may turn up as candy or marmalade. Seeds can be pressed to make cooking and salad oil.

Citrus is also used in making ice cream, slushes, wine, cosmetics and bug spray. Sweet orange blossoms show up in perfume, tea and bakery products. And bees make much of Florida's honey from citrus blossom nectar.

Scientists continue to find new ways to use citrus. There's a lot more than just good eating inside that peel.

NEW NJ INSPECTORS



Bechmann

Stiles

Harold "Rip" Bechmann, State Apiarist and Grant Stiles, Bee Inspector have been appointed the replacements for J.C. Matthenius and Walt Wilson, who retired after many years of outstanding service to New Jersey Beekeepers as well as to the State.

Honey's Competitors

SWEETENER SUBSTITUTES ABOUND

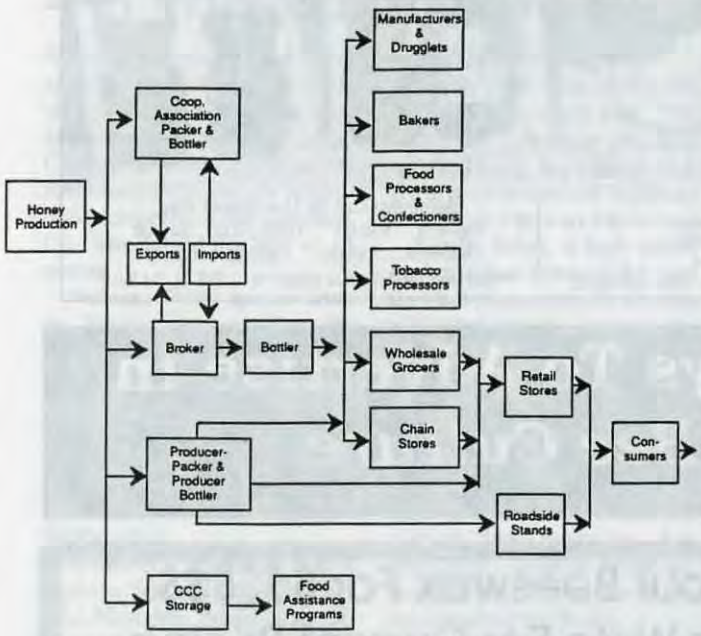
Research shows that Aspartame, now the leading high-intensity sweetener, is 200 times as sweet as sugar. Only small amounts are needed to achieve a sweetening effect equivalent to much larger amounts of sugar. It provides four calories per gram. Aspartame gradually loses its sweetness in liquids as a function of time and temperature. Its largest use is in diet soft drinks. Saccharin is 300 times sweeter than sugar. Saccharin is not metabolized, therefore it has no calories. Saccharin is the second most widely used high-intensity sweetener. Acesulfame-K, called Ace-K, is 200 times sweeter than sugar, has no calories, and is stable at cooking temperatures. It is usually used in chewing gum, puddings and imitation dairy products. Aspartame, saccharin, and ace-K are approved for use by the FDA. Pending FDA approval are sucralose and alitame. If these new high-intensity sweeteners are approved they could be used as a direct sugar substitute.

$8 Billion In U.S. Food

JAPAN/U.S. TRADE WILL CONTINUE

Don't expect a trade war between the United States and Japan. Ohio State University agricultural economist Luther Tweeten says that despite posturing by President Clinton and the Japanese government, both sides need each other too badly to get into a major scrap. But Tweeten does expect the Japanese to buckle some to U.S. pressure over the trade balance. They have much more to lose: Japan exports about twice as much to the United States as it imports from America. But while Americans could likely get along without Japanese electronics and cars, the Japanese are heavily dependent on U.S. food – of $50 billion in goods and services that Japan imports from the United States, about 16% is farm products. The United States has additional leverage because Japan also depends on it for international security. Tweeten says that's part of the reason Japan has been gradually opening its markets to beef, fruit and even rice in the past year.

Principal Distribution Channels For Honey Marketed In The U.S.



Source: Willett, L.S. "The U.S. Honey Industry: Analysis"

Commonly Available

CHALKBROOD MAY KILL FOULBROOD

A fungus that causes honey bee chalkbrood disease produces a substance that could become a new control for two serious diseases that threaten domestic honey bees. The substance, called linoleic acid, is a common unsaturated fatty acid produced by the chalkbrood fungus, *Ascosphaera apis*. Linoleic acid is commonly found in oils from peanuts, corn, soybeans, cottonseed, sunflower and other vegetables. In laboratory tests, linoleic acid inhibited the growth of two bacteria that cause European and American foulbrood diseases. Currently, in the U.S. only the antibiotic oxytetracycline is approved by the FDA for controlling those diseases, which could develop resistance to the drug. Both foulbrood diseases, found in all 50 states, infect honey bee larvae inside the colony and can kill the bees if unchecked. American foulbrood is considered the most serious disease threat to domestic honey bees, causing an estimated $8 million in losses each year.

Over 60 Entered

HONEY BOARD WINNERS

Oregon Apiaries' Raspberry Honey Syrup was awarded Best of Show in the National Honey Board's Third Annual Best Honey-Containing Product Contest, held Feb. 17, in San Francisco. Oregon Apiaries, Newberg, OR was one of 60 specialty and gourmet food manufacturers that entered the contest.

In addition to Best of Show, OR Apiaries products won awards in three other categories: Raspberry Honey Syrup took honors as Best Honey-Containing Condiment; Butter Rum Syrup was named the Best Honey-Containing Two-Ingredient Product and Honey Cream received a merit award for Best Honey-Containing Whipped/Creamed Product.

"I can't believe we won," exclaimed Marita Trunk, owner of OR Apiaries. "There were so many excellent products in the contest."

In addition to the awards won by Oregon Apiaries, the contest honored top contenders in four other categories:

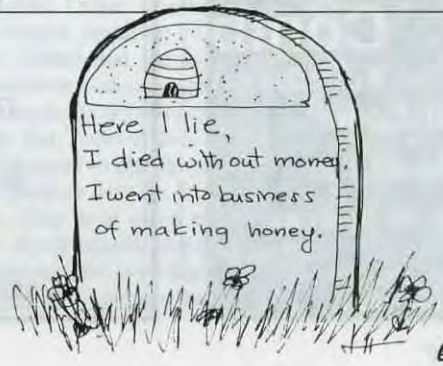
Best Honey-Containing Candy/Gum/Snack Product – *Hi-Honey Raspberry Fruit Bar, Honey Acres, Ashippun, WI.*

Best Honey-Containing Cereal Product – *Nutty Raisin Granola, Michaelene's Gourmet Granola, Clarkston, MI.*

Best Honey-Containing Processed Meat Product – *Ham Sweet Ham, Ham Sweet Ham, King of Prussia, PA.*

Best Honey-Containing Baked Good Product – *Honey Applesauce Cake in a Can, Honey House Bakery, Lansdale, PA.*

Over 133 products were judged in six categories, with winners awarded in each. Winners progressed to compete for the Best of Show award. A panel of prominent chefs and food industry representatives were judges.



☆ PENNSYLVANIA ☆

Delaware Valley College and Perkiomen Valley Apiaries will be hosting a summer bee meeting to be held at Delaware Valley College, Doylestown, PA 18901, on Saturday, June 11. The meeting will be proceeded by a bring your own picnic lunch starting at noon. The formal meeting will begin at 1:30 p.m. and it will be followed by an open house at the College's honey house and apiary.

The speaker for the meeting will be Dr. Andrzej Pidek, Associate Professor at the Research Institute of Pomoloy and Floriculture Bee Division, in Pulawy, Poland. The meeting is open to the public.

For more information contact Dr. Berthold (215) 345-1500.

☆ SOUTH CAROLINA ☆

The South Carolina Beekeepers Association will host their summer meeting at Clemson University on July 21-23, 1994. The meeting will feature an Apitherapy Symposium on July 22.

All beekeepers or anyone interested in beekeeping are invited to attend for a good time of education and fellowship. For further information call Mike Hood, Executive Secretary, South Carolina Beekeepers Association, Ph. (803) 656-3106.

BOTTOM ... Cont. From Pg. 376

Having returned from his chore, M pointed to the pile of rotting boxes, and said, "That's his stuff. The guy quit after a year and a half, and gave me everything. I never did find out how much he paid for those hives." Whether the story was told to us to offer assurance (we both had slightly worried expressions) that we could never mess up as bad as that guy, I'm not sure, but we certainly laughed a lot.

Anyhow, we chatted about the upcoming season. I asked a few questions and received clear, direct answers. In fact, all three beekeepers offered their own particular twist.

In his Woolworth order book, M wrote up a order slip, listing my items alongside prices (from memory), added them up in his head and I wrote out a check. I carried the boxes to my car. No fancy computerized cash register, no slick Visa Gold cards, no worrying about 20%-off sales, no glib sales spiel, no fancy packaging.

I got in my car, backed up, and wished everybody good luck, including M, who was going in the hospital shortly to have an operation. The Shadow said, "Real nice to meet you." Then I gently pressed down on the gas, and slowly drove out.

Driving home through those winding country roads, something was right. Yes, I was excited about the prospect of planting my bees in their homes that afternoon, but there was something else buzzing around in my heart. I had parted with hard-earned money. But neither that cagey feeling of having snagged a bargain nor that sucked-down sensation of being suckered into overpaying consumed me. I had received goods in exchange for payment. And in the process I had learned a thing or two. And I had spent pleasurable moments listening to people chat about something they care about.

Seems to me the great shopkeepers of their world, with all their high falutin' wand-pricing cash registers and employee training manuals and mastery of turnover, margins, inventory spread, and the like, could learn a thing or two from M.

Display Index

Buying Bee Stuff

howard scott

One of the reasons I keep doing bees is that I enjoy going shopping for my supplies. I don't mean to say that I abandon all fiscal conservatism, purchasing every wish-list item in sight, or that I become so excited by a new offering that my inner self craves to possess it, or even that I enjoy owning those nice, new, clean, shiny items.

Rather I like going to my local bee supplier and getting the goods and paying the bill because it is so different from any other shopping experience. In other consumer forays, I go to a store, examine the confusing selection, ask a question or two, receive an unhelpful, unknowledgeable answer, stare at either the bland salesgirl or the over-eager owner's face as they attempt to punch the right register keys, wait patiently for the computer to process the purchase, stuff the unintelligible paperwork in my pocket, and walk out, vaguely dissatisfied and wondering if I did the right thing.

When I make my bee supply purchases – mostly in the spring – I am charmed by the pace, the detours, the personalities, the stories, and the felicity of expression. This year, I bought two three-pound packages, one deep hive body with ten frames, medicine strips, and a Boardman feeder. As always, the experience reminded me of the way shopping used to be when people lived in small villages and knew everybody.

I won't embarrass my bee supplier by naming him, except to say that he's a tall, handsome, white-haired Irishman who has been into bees for more years than many of us have been around. We will call him M. When I first heard M speak 14 years ago at the bee school, I said to myself, "Here is a man who twinkles with a love of life."

Let me give you a brief description of what happened this April when I picked up my bee packages. I drove in and parked in his driveway. There were five people there, but I knew all weren't customers waiting in line. M is a friendly man who welcomes company. Indeed, two were assisting him on this busy day, and a third had called the night before, saying he was interested in bees, and M had invited him to hang around, saying he'd surely learn something. M introduced him as The Shadow.

M helped the waiting customer, offering him some advice. I listened. What I like about beekeeping is that there is really no textbook. Everybody has his or her way of doing things and an explanation for why it works. I enjoy partaking of this accumulated wisdom, evaluate its validity, and then choose what I like and discard what I don't.

Then M had to attend to some business out back with his geese. Waiting, I chatted with The Shadow. Then another customer drove up. We spoke, swapping suggestions. From him, I learned that one never feeds sugar water to bees at the entrance during this cold weather, but rather from above. Then M's assistant came into the supply room, and somehow we got to talking of how one customer really had trouble setting in his hives.

The assistant's story went like this: "The guy calls saying he's in trouble. M asks me to go help him out, saying it will only take a few minutes. I go, and I've never seen a backyard like that one. Half of his 15 packages had swarmed and were on trees. The wire of the packages were cut away to remove the bees. He had bought the hive boxes in Maine on a deal, and when I looked inside, each frame had only an inch of wax sheet. I started to climb up and bring down swarms, when I see he's going in other hives, and pulling the wrong cork out of a queen box, and watching her fly away. I told him to stand still, but he wouldn't or couldn't. He kept screwing up things. Three hours later, I got out of there. When I got back, I told M, 'Never again'."

Continued on Page 372

BOTTOM·BOARD