

January/February 2000

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## Winter Loss

We've been through this before, but perhaps not as badly. We've had "autumn collapse," "disappearing disease," "spring dwindling" and devastation caused by pesticides, tracheal and Varroa mites. So, what caused the severe losses during the fall and winter of 1999?

We could blame Y2K, but I don't imagine that honey bees are too concerned about arbitrary time measurements concocted by humans. They are dealing with their environment on a daily basis, and the environment can be harsh.

As I understand the season, things were going close to normal the first half of the year. However, some beekeepers noticed that early season fluvalinate (Apistan®) treatments accomplished less than they had hoped. It did not appear that the presence of more mites in the colonies was particularly hard on the bees.

Honey production was variable, as always, but it wasn't a drought year and crops were respectable (too bad the prices aren't!).

Late summer and fall forage plants weren't too plentiful in many locations. That is typical in California and puts a real stress on the bees. It takes the equivalent of a cell of pollen and a cell of honey to rear a new worker bee. That cell equivalent of pollen has to be made up of numerous different pollens, especially in the fall,

to provide all the nutrients required by developing brood. When nutrients, particularly proteins, are in short supply, royal jelly production is limited. Larvae that are fed the bare minimum of nutrients tend to be smaller than normal, are less vigorous, and have a shorter life expectancy. The bees that reared them suffer, also, since they mobilized nutrients that were stored in their body tissues in order to meet the demands of the brood. Now those nurse bees can be expected to have reduced life spans. Feeding pollen substitutes or supplements can reduce the severity of the consequences of pollen shortages, but they do not come close to providing the nutrition of a good mix of pollens.

A pollen shortage is one of the worse "stress" conditions that affect our bees. Stress conditions lead to stressed bees. Stressed bees are much less able to deal with other negative environmental challenges than healthy bees. Their natural resistance to diseases is lowered. Their ability to withstand toxic materials, such as insecticides, is reduced. And, the detrimental effects of being parasitized by tracheal and Varroa mites are magnified.

A description of our losses this winter is pretty similar to that used to describe "Parasitic Mite Syndrome." Starvation was not likely, since most of the hives contained frames of honey and some pollen. Brood rearing was slim to none (not typical for the relatively warm winter in many parts of California). Early on,

emerging brood seemed to be small and HAD NO WINGS. Later, shriveled pupae with no wings were being pulled from the cells or left to die under the cappings. By the time that things got this bad, not many Varroa were to be seen.

In some cases, quite a few bees could be seen crawling out of the hives. The signs were very similar to those associated with tracheal mite infestations. Not surprisingly, tracheal mites were found at various levels of infestation in the bees. Whether or not they were the cause of the problem probably never will be determined.

Another interesting observation made by a number of beekeepers was finding two queens in their hives during this winter or having a queen that wasn't laying. If the worker bees got the signals that the queen needed replacement in late fall or winter, at best the colony ended up with a virgin queen. That usually doesn't happen. Two-queen colonies normally become one-queen in October and stay that way over the winter. So, what is going on?

I believe that Varroa mites are the prime culprits in this rash of odd behavior and severe losses. While it is documented that Apis mellifera colonies can survive and be productive with summer Varroa populations exceeding 10,000 mites per colony, that only happens when the bees and mites are free of pathological viruses. With viruses being moved around by the mites, the level of infestation

can be orders of magnitude less than 10,000 and still cause massive destruction.

Examinations of the internal contents of Varroa have demonstrated that many, small RNA viruses from bees get into the mites feeding on them. The viruses get passed to the next host bee and the disease can become epidemic. Obviously, one of the most easily detected viruses is "deformed wing virus" which can kill pupae, deform pupae, or cause deformed adults depending upon how early and with how much virus the pupae are inoculated.

"Pockets of resistance" to fluvalinate showed up in various beekeeping operations around California in 1999. Some beekeepers treated their colonies in the normal manner and failed to realize that the treatment didn't work. Others noticed the treatment failure and either found a substitute treatment or decided to wait until later in the season to use the newly registered treatment, coumaphos (CheckMite®). Unfortunately, although the use of coumaphos strips was legal in California in July, the strips were not available, legally, until the supplier became a California licensed pesticide dealer in October.

As with fluvalinate strips, I believe that coumaphos is most valuable if placed in the hive from mid-August to the end of October. It is placed during this time that your "wintering bees" are being reared. If the acaricide treatment eliminates

most of the mites from your colonies at this time, then the brood is least likely to be fed upon or inoculated with diseases. It will be the healthiest population the colony can rear and forage will be the most important concern. It has been documented that a lot of mites can be brought into strong colonies by your robber bees and by foreign bees, covered with mites, that have abandoned their collapsing colonies and are seeking shelter in yours.

I believe that your healthy bees (not fed on as pupae) can handle a late season invasion of mites that will not have much brood to visit for months. Why not leave the strips in for an additional week, month, or longer and kill those mites, too? Three reasons: 1. it is illegal; 2. to preserve the purity of honey; and 3. to slow the development of resistance to the new acaricide.

With judicious use of the soon to be available formic acid gel (for "spot" treatments, whenever necessary) and coumaphos strips, beekeepers should be able to avoid the serious losses that we saw in 1999.

### Sugar Reveals Varroa

The following information on Varroa detection was published in the January 2000 issue of Bee Tidings prepared by Dr. Marion Ellis of the University of Nebraska.

### **Using Powdered Sugar to Detect Varroa**

While seeking ways to recover varroa mites from bees for

laboratory assays, Paula Macedo, a University of Nebraska graduate student, found a new way to check colonies for varroa that is more efficient than ether roll. In addition to being more efficient, it is not necessary to kill bees to conduct the test.

You will need the following:

1. A wide mouth canning jar (quart or pint) with two-piece lid.
2. #8 mesh hardware cloth (or any other mesh that will retain the bees while letting varroa pass through).
3. Window screen (or any other fine mesh hardware cloth that will let powdered sugar pass through but retain varroa.

Retain the metal ring that comes with the two-piece lid, and discard the center portion. Cut a circle of #8 mesh hardware cloth to fit inside the ring. Collect 200-300 bees in a wide mouth pint or quart-canning jar. Add powdered sugar to the jar through the #8 mesh lid (enough to coat the bees, 1 tsp. to 1 tbsp. should be adequate). Roll jar around to distribute the sugar. Allow the jar to sit for a few minutes while you collect additional samples. Then invert the jar and shake to recover the mites. The bees will remain in the jar, and the mites and sugar will pass through to a piece of paper. The sugar will make it difficult to count the mites. You can pour the sugar and mites into another jar

with a fine mesh lid. Shake again and allow the sugar to escape. Then, dump the mites on a clean sheet of paper and count them. A brief shaking will usually recover 70% of the mites. If you persist a little longer you can recover 90%.

We can think of three possible reasons for the efficacy of this technique. (1) Varroa mite legs have a sticky pad called the empodium that helps them adhere to their host. The presence of powdered sugar could make it difficult for mites to adhere to their host. (2) Powdered sugar stimulates the bees' grooming behavior. (3) The powdered sugar on the mite's body stimulates mites to release from feeding to groom themselves. Let us know how it works for you. It may be a problem in a windy Nebraska bee yard, but it works well in a lab.

Powdered sugar applied to a colony will dislodge a few mites from their host bees, but it is not highly efficient. Furthermore, the mites will eventually recover and return to their hosts. However, when bees are isolated from nest materials, the mite recovery from exposing them to powdered sugar is impressive. In fact, if you are willing to collect the adult population of a colony in jars and subject them to powdered sugar shaking, you can lower the mite infestation comparably to a chemical treatment. Continue shaking until mites cease to fall, and then return the bees to their colony unharmed. In future studies, we will examine the efficiency of the technique in bulk bee cages. One limitation to using this technique is that it

is only efficient when brood is not present. When brood is present, 70-80% of the mites will be in sealed brood cells.

We know that the method is a safe, inexpensive, and highly efficient way to check adult bees for mites. We hope that you will find creative ways to use the technique to lower varroa mite infestations and reduce the frequency of chemical treatments. Dare we even dream of eliminating them altogether?

### 2nd Big Issues Conference

Thirteen years ago the First International Conference on Africanized Honey Bees and Bee Mites was held in Columbus, OH. At that time, we were dealing with a new pest, tracheal mites, and Varroa would be detected a few months after the conference. Africanized bees arrived three years later.

In an effort to determine the current status of these pests and their control, another conference on the same topics is scheduled for April 10-12, 2000, in Tucson. The venue is the Windmill Inn, 4250 N. Campbell Ave., Tucson, AZ 85718 [(800)547-4747].

### **Conference Purpose**

Our objective is to bring together Acarologists and Bee Biologists who are working in basic and applied areas of research that relate to parasitic mites of honey bees, Africanization and other aspects of bee biology that impact colony viability; and further to provide a forum to facilitate global sharing of knowledge.

### About the Conference Topic

Since 1987, research conducted to mitigate the impact of parasitic mites and Africanized honey bees has produced significant new discoveries. Even so, many remain important issues that must be addressed by a shrinking cadre of scientists. These include a critical need for alternative control measures for Varroa, and a growing concern over the impact that miticides may be having on honey bee colony viability. Little is known about the role that microbial infections, transmitted or triggered by mites, may play in Varroasis. Yet to be developed are innovative methods of requeening Africanized colonies and effective methods for preventing or terminating mass attacks by Africanized honey bees. Strategies for slowing or reversing the process of Africanization are also needed. Intercontinental movement of other honey bee diseases/pests such as the Small Hive beetle must be anticipated. Clearly there are research challenges that must be met to sustain beekeeping and ensure crop pollination in the new millennium.

#### Africanized Honey Bees

- A. Ecology and reproduction
- B. Population biology and genetics
- C. Behavior
- D. Global systematics and taxonomy
- E. Management of Africanized honey bees

#### Mite Parasites of Bees

- F. Ecology and reproduction
- G. Population biology and genetics
- H. Behavior
- I. Global systematics and taxonomy
- J. Sampling, detection, and distribution
- K. Control and resistance to miticides

- L. Mite tolerance (Resistance) in honey bees
- M. Economic impact of honey bee mites
- N. Etiology of bee diseases transmitted/induced by mites
  - The Small Hive Beetle
- O. Ecology and reproduction
- P. Population biology and genetics
- Q. Behavior
- R. Control
  - Colony/Queen Viability
- S. Caste specific factors
- T. Environmental factors

Other Problems on the Horizon  
U. Preparing for future exigencies in  
apiculture

For more information, contact  
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### Sound Like Honey?

Imperial County Farm Advisor,  
Keith Mayberry, wrote the  
following article for the  
February 2000 issue of Imperial  
Agricultural Briefs. Has our bulk  
honey supply gotten into too few  
hands for the health of our  
producers?

#### **F.O.B. vs. RETAIL PRICE ON VEGETABLES**

Some of the nation's largest  
produce marketers are getting  
bigger and bigger. There has been  
speculation that the retailers  
now have the ability to increase  
their profit margins at grower  
expense. Less competition among  
retailers could potentially mean  
lower prices for growers, and  
high prices at retail could have  
the potential to decrease demand  
for grower products.

Retail prices in supermarkets  
reflect costs of in-store labor,  
additional packaging, transporta-  
tion, refrigeration, spoilage,  
and shrink. The overhead cost for  
produce is higher than for non-  
perishable foods. However,  
according to one study, vegetable  
sales accounts for 8.7 percent of  
overall retail market sales and  
yet they account for 20 percent  
of the overall net store profit.

Studies by the Market and  
Trade Economics Division of the  
Economics Research Service (ERS)  
of the USDA were conducted to

compare the Free-on-board  
shipping-point price (f.o.b.)  
with retail price of vegetables.  
Commodities studied

were carrots, celery, lettuce, onions, potatoes and tomatoes. They looked at prices from 1960 through 1999.

The conclusion of the study was that for celery, lettuce, onions, and potatoes there was no clear-cut evidence of price asymmetry. This means that for the most part, retail prices stayed parallel but not equal with grower f.o.b. prices, however, with carrots and tomatoes the retail prices rose more sharply than did an increase in f.o.b. grower price. The author of the study stated, "These results would lead to concern that retailers have gained enough market power with carrots and tomatoes to increase the f.o.b.-retail margin at grower's expense. Finding a price asymmetry exists is not enough to reach this conclusion." The author then states that more precise data on retailer expenses need to be explored before these conclusions could be made. And there is still a mystery why this trend only showed up with carrots and tomatoes.

The study also shows lag times between f.o.b. price increases vs. retail price increases as well as the effects of decreases on both. Data from the study is presented in graphs for each of these commodities and is available at the website or mail order.

The USDA Economic Research Service has valuable information on economic trends in imports, exports, price trends, per capita consumption, and overall ag outlook. Every grower should read

the current ERS reports on commodities of interest.

To obtain a complete copy of this report you may visit the ERS website at [www.econ.ag.gov/](http://www.econ.ag.gov/) or call 1-800-999-6779.

Abstracted from the F.o.b.-Retail Price Relationship for Selected Fresh Vegetables by Thomas Worth, Ag Economist-ERS-USDA. November 1999 Issue of Vegetables and Specialties Situation and Outlook Report, VGS-279.

### Almonds for Health

Because the commercial bee-keeping industry is so closely allied with the almond industry anything that can be done to increase almond consumption should benefit the beekeepers. An article in the November/December 1999 issue of Almond Facts, published by Blue Diamond®, explains the effort to promote almonds as a health food ("nutraceutical").

### **The Natural Way to Health**

Nutrition research on almonds is beginning to pay off with evidence that almonds have a positive effect on human health and disease prevention. This could be an important message that helps increase almond consumption world-wide, said Walt Payne, president and chief executive officer, during his address at the 89th annual meeting of Blue Diamond. To expand on that theme, Payne introduced Dr. Karen Lapsley, senior nutritionist with the Almond Board of California to describe the research projects and what has been learned.



Hired to coordinate the Board's nutritional research program and help spread the good news about almonds' link to health, Lapsley described what has been learned so far and how those results have been received by the scientific community and the public.

A recent visit to the American Heart Association's convention gave her reason for optimism, she said. "Physicians generally receive very little nutrition education," she explained, "but, I, found our message about almonds ability to lower blood cholesterol has begun to sink in with them."

That message has also been received by the media and their readers, she noted. "The American population is beginning to understand that, although almonds have a relatively high fat content, the quality and type of fat are what is important." She cited the recent Parade magazine article, "The Skinny on Fat," as an excellent example of favorable reporting on almonds, fats, and health. The Parade article described the different health effects of saturated and monounsaturated fats and pictured almonds among the good sources of monounsaturated fat. She said, "This kind of article will benefit the almond industry over the long term."

Promoting the link between almonds and the much-publicized Mediterranean Diet has tremendous potential for increasing the role of almonds and almond products in people's diets, Lapsley noted. "In Europe, for example, where issues have arisen about meat,

calling attention to the recommended daily intake of nuts in the Mediterranean Diet could reap important benefits for the almond industry."

#### **Much to Learn**

While the Almond Board has funded important, ground-breaking research on almonds for four years, there is still a lot to learn about the links between almonds, health and disease prevention, said Lapsley. "We know that almonds contain many wonderful compounds, such as protein, fats, fiber, sugars, vitamins and minerals, but we need to learn more about the less understood constituents of almonds, phytochemicals, for example, and how they benefit health."

Arginine, which occurs in significant amounts in almonds, only recently was recognized as playing a crucial role in heart health. "We have a lot more to learn about arginine and how it affects the heart and circulatory system," she said. "Arginine affects the elasticity of arteries and their ability to respond to change. We are looking into that mechanism and how arginine influences the quality of the arteries."

"Heart disease is a multi-factor disease," she added. "There is no magic bullet, no cure. It requires a change in life-style, but diet can play an important role. And in that respect, the role of almonds can be significant."

The almond industry funds studies in a variety of important health areas, including reducing

the risk of heart disease, fat absorption and satiety, glucose metabolism and insulin regulation, role of antioxidants in aging and cancer, micronutrient/phytochemical analysis, and allergenicity. Universities across America, as well as in England and China, are working with the almond industry in one or more of these areas.

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To date, a number of large-scale studies have established that the consumption of nuts, especially almonds, lowers cholesterol and the incidence of heart disease. Lapsley said, "Now we are following up on that good news with more focused studies."

Results from some of those studies will soon be making headlines, she predicted.

#### Honey Recipe

The top prize winning Blue Diamond recipe this year included honey as an ingredient. Rose Wollenberg calls her treat Blue Diamond Almond Bars. Give this recipe a try!

Crust: 2 cups flour  
1 cup powdered sugar  
1 cup butter, softened

Topping: 1 cup brown sugar  
1/4 cup sugar  
1/3 cup honey  
1 cup butter  
1/4 cup heavy cream  
3 cups sliced almonds

Preparation: Heat oven to 375 degrees. In medium bowl, combine crust ingredients until soft and crumbly. Press mixture into 15"x10" jellyroll pan. Bake until golden,

about 10 minutes. Set aside. In  
saucepan combine brown sugar,  
sugar, honey and butter. Cook  
over low heat, stirring  
occasionally until sugar  
dissolves. Bring to a boil  
without stirring, boil 3 minutes.  
Remove from heat; stir in cream and  
almonds. Spread over crust. Bake  
until bubbly, about 15 minutes. Cool.  
Cut into diamonds, triangles or bars.

Sincerely,

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