

News For South Carolina Beekeepers



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LOCAL NEWS

South Carolina Beekeepers Spring Meeting - The South Carolina Beekeepers will hold their 1-day spring meeting Saturday, March 3, at the Palmetto GBA Building, 17 Technology Circle, Columbia, SC 29203. Remember this is a new location for our spring meeting. In the past, we have met at the SC Farm Bureau Building in Cayce, but we had to move to a building that had more space for seating. This new meeting site will provide plenty of parking and meeting space plus will include extra space for registration/vendors to set up. A special thanks to local beekeeper Jerry Faulkenburg for arranging to have this building made available for our spring meeting.

The meeting site can be reached easily by taking exit 19 off I-77 north (Farrow Rd. exit). Take Farrow Road toward Midlands Tech for .7 miles and the building will be on your right. If you are traveling east on I-20, another option would be to take exit 72 (Rd. 555), Farrow Rd. exit and go left toward Midlands Tech. Go 1.7 miles and the Palmetto GBA will be on your left. Registration will begin at 7:45 AM and the meeting program will get underway at 8:30. Registration cost is \$5 per person, \$8 per family, or \$10 for non-SCBA members. A couple of nearby hotels are Court Yard – Marriott, 803-476-0184 at \$96 and Residence Inn, 803-788-8850 at \$104. There are other hotels in the general area of the meeting site.

Our President, Eck Miller, will be the first speaker and welcome us and deliver his "President's Comments." South Carolina Department of Agriculture Commissioner Hugh E. Weathers will bring us up to date on agricultural news in the state. Many other interesting speakers will give presentations during the day. You may refer to the meeting program which is included in this newsletter for other meeting details. All beekeepers or anyone interested in honey bees and beekeeping are invited to attend this very informative meeting. For further meeting information, contact Mike Hood, Extension Apiculturist, School of Agricultural, Forest, and Environmental Sciences, Clemson University (864-656-0346 or email: mhood@clemson.edu).

Other Local News – A new local beekeepers association, the Blackwater Beekeepers, was established in fall 2011. This new association is based in Conway which is located in coastal Horry County. Their organizational meeting which took place in November

had over 50 beekeepers in attendance. They are hosting a beginner level beekeeping short course this winter/spring. Welcome Blackwater Beekeepers as our newest local association in South Carolina.

If you are having problems with small hive beetles in your bee colonies, you can order a free copy (while copies last) of my just published booklet titled "Small Hive Beetle Integrated Pest Management" by going to the website: <http://www.clemson.edu/psapublishing/> and type in the words "small hive beetle." You will find this booklet is loaded with various methods and recommendations on how to control this hive pest.

Thanks to SC House of Representative Tom Corbin (District 17, Greenville County) for taking the lead role in sponsoring the "Honey Bill" which has been recently approved by our legislators and now awaits Governor Nikki Haley's signature. Until she signs this bill, our current regulations will still be in effect. The new bill is listed below:

A BILL

TO AMEND SECTION 39-25-20, CODE OF LAWS OF SOUTH CAROLINA, 1976, RELATING TO TERMS AND THEIR DEFINITIONS REGARDING ADULTERATED OR MISBRANDED FOOD AND COSMETICS, SO AS TO PROVIDE A DEFINITION FOR THE TERM "HONEY" AND TO PROVIDE LABELING REQUIREMENTS FOR HONEY.

Amend Title To Conform

Be it enacted by the General Assembly of the State of South Carolina:

SECTION 1. Section 39-25-20 of the 1976 Code is amended by adding at the end:

"() The term 'honey' means the raw food product produced by honeybees for human consumption. Honey and honey products are subject to all labeling requirements of this chapter. Honey sold wholesale to other retail outlets for resale must be processed and packaged in an inspected and registered food processing facility in accordance with the act regardless of the amount of overall honey produced by the beekeeper.

Beekeepers producing no more than four hundred gallons (4,800 pounds) of honey annually and who only sell directly to the end consumer are exempt from

inspections and regulations requiring honey to be processed, extracted and packaged in an inspected food processing establishment, or from being required to obtain a registration verification certificate (RVC) from the Department of Agriculture. However, labels are required on all container of honey that are sold in South Carolina. Beekeepers must file for the exemption on forms to be provided by the Department of Agriculture.”

SECTION 2. This act takes effect upon approval by the Governor.

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EDITORS NOTE: As a result of drastic cuts in the Clemson University Public Service Activities budget, there are no funds available to print and mail paper copies of this “News for South Carolina Beekeepers” newsletter. This newsletter will continue to be published in the same format, but it will be accessible in electronic form only. There are three avenues for you to access the newsletter which will continue to be published three times annually (February, June, and November). You may find the newsletters available on two websites, the SCBA website, scstatebeekeepers.org, or my website at Clemson University www.clemson.edu/extension/beekeepers/newsletters. The newsletter will be emailed to each local beekeepers association in the state through a designated person who will further distribute the newsletter to their membership. It is important that an accurate email listing of membership be maintained at the local level. This newsletter has now been published and mailed for 23 years to South Carolina beekeepers and I hope that you will continue to access and review it electronically.

THE BEEKEEPER NEXT DOOR: URBAN BEEKEEPING ON THE RISE IN THE U.S.

Mike Barrett does not have much of a yard at his two-story row house in Astoria, Queens, NY. But that fact has not kept him from his new hobby of beekeeping – he put the hive on his roof. When it was harvest time this fall, he just tied ropes around each of the two honey-filled boxes in the five, and lowered them to the ground.

Eventually, Mr. Barrett loaded the boxes into his car, took off his white beekeeper suit and set off for a commercial kitchen in Brooklyn. There, along with other members of the New York City Beekeeping Club, he extracted his honey, eventually lugging home 40 pounds of the stuff.

He was happy with his successful harvest, but he also reaped something he did not expect. “I was surprised how much I really care about the bees,” said Mr. Barrett, 49, a systems administrator for New York University, in reflecting on his inaugural season as a beekeeper. “You start to think about the ways to make their lives better.

Until last spring, Mr. Barrett would have been breaking the law and risking a \$2,000 fine for engaging in his sticky new hobby. But in March, New York City made

beekeeping legal, and in so doing it joined a long list of other municipalities, from Denver to Milwaukee to Minneapolis to Salt Lake City, that also lifted beekeeping bans in the last two years. Many towns, like Hillsboro, Oregon, have done the same, and still other places, like Oak Park, Illinois, and Santa Monica, California, are reconsidering their prohibitions.

Nationwide, hives are being tucked into small backyards and set alongside driveways; even the White House has installed some. Beekeeping classes are filling up quickly, and new beekeeping clubs are forming at the same time that established ones are reporting large jumps in membership.

At Mr. Barrett’s club, for instance, membership has more than doubled, to about 900, in the last year. In Los Angeles, the Backwards Beekeepers club has 400 members – up from six members two years ago. And in Denver, a club that was formed last year already boasts a roster of 200.

“Everyone who teaches a beekeeping course is finding themselves popular all of a sudden,” said James Fischer, 53, an instructor at New York City Beekeeping.

One force behind this rise of beekeeping is the growing desire for homegrown and organic food. Another, more complex one is the urge to stem the worrisome decline in the nation’s bee population.

The number of bees has been falling since the end of World War II, when farmers stopped rotating crops with clover, a good pollen source for bees, and started using fertilizers. Pesticides and herbicides became common as well. In cities, native plants were ripped out in favor of exotic ones that were not good for bees.

Then, four years ago, honey bee colonies mysteriously started to die around the country. This drop-off, called colony collapse disorder, added to the mounting health problems, like mites and diseases, that bees are facing. About 30 percent of the country’s managed colonies have died; around third of the deaths are related to colony collapse disorder, according to the Agriculture Department.

“We don’t know the primary cause, but we know the combination of poor nutrition, heavy pesticide use and bee diseases have put bees into a tail-spin,” said Marla Spivak, an entomology professor at the University of Minnesota and a recipient of a MacArthur Foundation “genius” grant for her work on honey bee health.

Whatever the cause of colony collapse disorder, “People want to feel that they are doing something to help,” said Dave Mendes, president of the American Beekeeping Federation in Atlanta. “Having a few beehives in your backyard can make you feel better.”

But beekeeping is forbidden in many places. Some of the bans arose after World War II. Cities, seeking to eradicate any traces of agriculture within their limits in order to show they were full-fledged municipalities,

forbade the raising of livestock, chicken and other creatures used in food production.

Another wave of prohibitions came 20 years ago with the arrival of “killer bees” from Mexico.

“People thought, ‘Oh, my God, I’m going to die, my kids are going to die and my dogs are going to die,’” said Kim Flottum, editor of *Bee Culture* magazine in Medina, Ohio. “At the time, people didn’t know what killer bees would do because they kept moving.” (Fortunately, the bees turned out not to be the threat that people feared.)

Nurturing flowers, fruits and vegetables is another factor in the rise in beekeeping, and it ranks high for Marygael Meister, who runs the Denver Beekeepers Association. In 2008, when Ms. Meister took a beekeeping class and set up two hives in her backyard in Denver, her goal was to help her more than 300 rosebushes thrive.

Ms. Meister said she had initially called the city information line and had been told it was legal to keep bees. The information was incorrect, and she received a cease-and-desist order when a neighbor complained about her hives. But instead of giving up, Ms. Meister decided to fight, showing the zeal of the nation’s new crop of beekeepers.

“I was livid,” Ms. Meister said. “I really enjoyed my bees and it was not like I was keeping a mountain lion in my backyard. It was absurd to me that the city was perpetuating the idea that Denver is so green and we’re not.”

Ms. Meister spent the next five months urging city officials to legalize beekeeping. In November 2008, the Denver City Council did so, and shortly thereafter Ms. Meister started the city’s first beekeeping club.

But legalization does not give beekeepers free rein. Cities often impose conditions on beekeepers – an annual fee, a permit, and a minimum required distance between hives and nearby structures.

The City of Minneapolis, which legalized beekeeping last year, has set particularly stringent restrictions. Besides paying a \$100 annual fee per hive, beekeepers there must obtain signed permission from all the neighbors within a 100-foot radius of the hives, and for neighbors within a 300-foot radius, they need 80 percent of the signatures.

For Jacquelynn Goessling, having her neighbors sign off on her hives was hardly a problem. People in her Minneapolis neighborhood of Kingfield, which she calls a “hotbed of liberal politics,” were so supportive that some wanted to host one of her hives in their own yards, or to help by planting their gardens with the kinds of flowers bees like. “Power to the bees” became a rallying cry for many of her friends. A year later, she has 12 hives citywide.

Ms. Goessling has also forged new relationships with neighbors – including the grumpy ones. Since she

became the neighborhood’s “bee lady,” people want to buy her honey, either with cash or in trade for things like raspberry jam. Grateful neighbors also tell her they are getting more apples on their trees and, for the first time, seeing fruit on their arctic kiwi plants.

Eventually, Ms. Goessling would like to become a full-time beekeeper. She will be working with a local business center this winter to draft a business plan.

“If I could make \$50,000 from bees, I’d quit my job so I could spend more time with my kids and have the summers off,” said Ms. Goessling, 48, a database administrator.

As Ms. Goessling dreams of a new career, other bee lovers, like Daniel Salisbury of Santa Monica, are fighting for the same opportunity.

Santa Monica models itself as an environmentally conscious city, but it has long banned beekeeping. So when city inspectors found three hives in Daniel Salisbury’s backyard two years ago, they insisted he move them. He took the hives north to his mother’s house in San Luis Obispo County, where beekeeping is legal, but he also began a drive to legalize hives in Santa Monica.

He has become so well known that people at his city-owned trailer park call to alert him when exterminators, retained by the Santa Monica housing agency, are headed toward bee swarms.

“I would chase down the swarms and literally run with my clippers to get the branch before Orkin showed up,” said Mr. Salisbury, 47, an antiques dealer, referring to a large pest-control company.

Over the last two years, Mr. Salisbury has attended Santa Monica City Council meetings, recruited a Los Angeles beekeeping club to help, and launched an e-mail legalization campaign joined by hundreds worldwide. On Tuesday, the Santa Monica City Council is scheduled to reconsider the beekeeping ban, and supporters of legalization are optimistic.

Max Wong, a Los Angeles beekeeper who has been helping Mr. Salisbury with his drive, hopes to wield some of the same political techniques in a legalization push in her city. Beekeeping rules there are a patchwork, with the hobby legal on one side of a street and illegal on the other.

“We’re in trouble and the bees are in trouble,” said Ms. Wong, 42, a member of the Backwards Beekeepers club. “We need to do something.”

Ms. Wong, a film producer who started keeping bees a year ago, wants to legalize bees not just to help hobbyists like herself, but to help feed and employ others. She sees bees as the best way to increase vegetable pollination in local community gardens and thinks that some people, like a few members of her club, could even become professional beekeepers.

Like Mr. Barrett from Queens and other new beekeepers, Ms. Wong is developing a close relationship with her bees, and she wants to ensure that others can enjoy the hobby as much as she does.

"It's like having 35,000 pets," she said. "I'm hyperactive, so anything that shuts down my brain is a good thing. When I'm working at a hive, I'm quite and meditative."

SOURCE: *The Speedy Bee*, Winter 2010, Vol. 39, No. 4.

BEE INFORMED: PETITION FOR STANDARD OF IDENTITY REJECTED BY FDA

The FDA recently rejected the application for a standard of identity for honey, concluding that the petition did not provide reasonable grounds for the FDA to adopt the Codex standard for honey. It also concluded that the agency's existing enforcement tools are sufficient to address the concerns of the petition and "the establishment of a standard of identity would not aid the agency in its enforcement efforts or help insure industry compliance."

The argument presented in the original petition was that a standard of identity for honey would promote honesty and fair dealing in the interest of consumers, because consumers are confused about what the term "honey" means in terms of the food's composition. The FDA concluded that establishing a standard of identity for honey would not provide additional assurance that consumers would be informed any better. The label should provide any information on what might be added to the honey and it is the label that should alleviate any confusion that consumers might have.

While it is certainly true that some products are mislabeled, the proposed standard of identity would not provide any additional enforcement authority beyond what currently exists for improperly branded foods. The proposed goals are 1) informing consumers who are confused about what "honey" means in terms of the food's composition; 2) combating economic adulteration by aiding enforcement and industry compliance; and 3) promoting honesty and fair dealing within the food trade in general, where pure honey is highly valued as an ingredient in other foods. Those goals "can all be achieved using existing FDA enforcement tools" and concluded that a standard of identity for honey would not provide any "additional support toward the achievement of these goals."

While we in the industry tend to disagree, it will be a difficult hurdle to get the FDA to reconsider any time in the near future, so it will be necessary to continue efforts at the state level for individual standard of identity establishment.

Honey Tips & Tricks

- Lower baking temperature by 25°. Honey makes baked goods brown faster.
- Measure honey easily by coating cup or spoons with oil or non-stick spray.
- Substitute 2/3 to 3/4 cup of honey per cup of sugar (depending on taste.)
- Decrease the amount of liquids by 1/4 cup per cup of honey used.
- Store honey at room temperature
- If honey crystallizes, remove lid and place jar in warm water until crystals dissolve, or microwave honey on HIGH for 2 to 3 minutes or until crystals dissolve, stirring every 30 seconds. Do not scorch.
- Honey should not be fed to babies under one year of age. Honey is a safe and wholesome food for older children and adults.

(provided by www.honey.com)

SOURCE: *ABF E-Buzz*

BEE AWARE: IMIDACLOPRID ON ALMONDS MAY BE HISTORY

BREAKING NEWS...*Bee Culture* has received a call from Steve Ellis, a member of the National Honey Bee Advisory Board, the group of dedicated beekeepers working to make beekeeping a safer place by making pesticide businesses, as well as farmers, applicators, sellers, manufacturers and researchers, more aware of the incredible damage their products can do to honey bees and pollinators.

The National Honey Bee Advisory Board is in Washington, D.C., this week, meeting with, among others, representatives of the EPA and Bayer CropScience. During the discussions it became apparent that Bayer was voluntarily removing almond trees from the label of their imidacloprid products.

Our call this morning was to inform us, and now you, that the EPA is reviewing this request. Yes, reviewing. It seems that crops are so seldom removed from a label, especially by voluntary request, that the internal engine at EPA isn't quite sure how to make that happen. So, they are reviewing it.

Mr. Ellis was quite sure the review process would be swift and action taken very soon. Hopefully, before it is to be used on almonds during the coming season, thus saving billions of honey bees from the opportunity of exposure to this chemical.

Members of the National Honey Bee Advisory Board are all volunteers, not supported by any national or regional beekeeping organization. They are to be commended for their ongoing pursuit of a better, safer life for honey bees, beekeepers, and all pollinators.

SOURCE: *Bee Culture Magazine*

MITE AWAY QUICK STRIPS™ NOW APPROVED IN ALL 50 STATES

BASF Corporation News Release

WYANDOTTE, MI, November 8, 2011 – NOD Apiary Products obtained state-level pesticide registration for Mite Away Quick Strips™ (MAQS) in all 50 states, as of May 31, 2011. Since their launch in Hawaii in 2008, MAQS have revolutionized the beekeeping industry, providing a pest control solution that is both effective and sustainable. The backbone of this easy-to-use strip is a film made of BASF's biodegradable plastic Ecoflex®, which is filled with formic acid in a saccharide (plant sugar) formulation. With the final phase of registration now complete across the United States, MAQS have the potential of increasing protection to more than 2.5 million honey bee colonies.

MAQS protect hives from *Varroa destructor*, a parasitic mite that threatens bee populations and reduces honey production. The strip is designed to penetrate the brood cap, stopping the mite where it reproduces. It is the first mite treatment to successfully target this area of mite infestation in the hive, destroying the male mite, as well as immature female mites infesting the bee brood.

By combining the Ecoflex product with NOD Apiary's mite-control technologies, the companies have not only created a convenient and effective solution, but also demonstrated their commitment to sustainability: By utilizing formic acid in a saccharide (plant sugar) formulation, these strips reproduce a defense mechanism observed in nature. Formic acid is found in the venom of bees and the bite of many insects, and as a result, is biodegradable, leaving no lasting residue.

"BASF has brought the technology and expertise from our Agricultural and Specialty Polymer divisions together to help create a sustainable solution for bee farmers," said Keith Edwards, Manager, Biodegradable Polymers, for BASF in North America. "MAQS are addressing a challenge that directly impacts the economic losses beekeepers have been experience. This product will help reverse the annual loss cycle for beekeepers, facilitating the sustainability of both the bee farming community and our environment."

Now that NOD has completed U.S. registration, they are working on completing the registration process in Canada. The application for full federal pesticide registration in Canada has been submitted to Health Canada and is currently undergoing the regulatory process. In Europe, NOD and BASF have been actively working together with registration authorities to extend this product to their beekeeping communities by 2012.

SOURCE: *American Bee Journal*, January 2012.

NATIVE BEES MAKE THE BEST POLLINATORS

The honeybee has hogged the pollination spotlight for centuries, but native bees are now getting their fair share of buzz: They are two to three times better pollinators than honeybees, are more plentiful than previously thought, and not as prone to the headline-catching colony collapse disorder (CCD) that has decimated honeybee populations, says Cornell University entomology professor Bryan Danforth.

He is one of a dozen researchers across the Northeast involved in a five-year, \$3.3 million project to study whether the pathogens, viruses, and fungi that are harming the honeybee also affect native bee species. The grant, led by Anne Averill of the University of Massachusetts-Amherst, will also investigate how native bee abundance and diversity are influenced by the size, pesticide use, landscape, and crop diversity on farms.

Danforth is also the lead researcher on a four-year, \$450,000 grant from USDA and Food Research Initiative that will fund research on native bee species abundance in New York state apple orchards.

His findings so far are "very good news" for New York apple growers, who contribute nearly \$261 million per year to the state economy. Along with graduate student Mia Park and postdoctoral researcher Eleanor Blitzer, Danforth discovered that native bees are actually more effective pollinators than the honeybee – "two to three times better," he said.

"An individual visit by a native bee is actually worth far more than an individual visit by a honeybee," Danforth added. "Honeybees are more interested in the nectar. They don't really want the pollen if they can avoid it. The wild, native bees are mostly pollen collectors. They are collecting the pollen to take back to their nests."

They are also more plentiful than once thought. In 25 surveyed orchards near Ithaca, NY, and Lake Ontario, Danforth and his team expected to find 40 to 50 native bee species. They found almost 100.

Honeybees are considered valuable because, unlike most native species, they can be moved from farm to farm. For example, honeybees are critical in pollinating California almond fields in February when there are no native bees around, Danforth said.

However, the mobility of the honeybee has exposed it to a wide variety of pathogens and stresses, which likely contribute to colony collapse disorder, he said.

There are more than 20,000 bee species in the world, including roughly 450 in New York State, Danforth said. The species in New York can help pick up the slack of the declining honeybee, which is not native to North America. In fact, native bees may have been doing a lot of pollinating work all along but not getting credit for it, Danforth said.

"In the past, the attitude has always been, 'Well, you have the crop, and you have the honeybee, and that's all you really need.' But nobody has ever bothered to ask, well what about all these other bees that are out there?" Danforth said. "The role of native bees in crop pollination has been largely unappreciated – until colony collapse disorder created a crisis."

SOURCE: Cornell University, From American/Western Fruit Grower News.

HONEYBEE DEATHS LINKED TO SEED INSECTICIDE EXPOSURE, RESEARCHERS REPORT

Honeybee populations have been in serious decline for years, and Purdue University scientists may have identified one of the factors that cause bee deaths around agricultural fields.

WEST LAFAYETTE, Ind. - Honeybee populations have been in serious decline for years, and Purdue University scientists may have identified one of the factors that cause bee deaths around agricultural fields.

Analyses of bees found dead in and around hives from several apiaries over two years in Indiana showed the presence of neonicotinoid insecticides, which are commonly used to coat corn and soybean seeds before planting. The research showed that those insecticides were present at high concentrations in waste talc that is exhausted from farm machinery during planting.

The insecticides clothianidin and thiamethoxam were also consistently found at low levels in soil - up to two years after treated seed was planted - on nearby dandelion flowers and in corn pollen gathered by the bees, according to the findings released in the journal PLoS One this month.

"We know that these insecticides are highly toxic to bees; we found them in each sample of dead and dying bees," said Christian Krupke, associate professor of entomology and a co-author of the findings.

The United States is losing about one-third of its honeybee hives each year, according to Greg Hunt, a Purdue professor of behavioral genetics, honeybee specialist and co-author of the findings. Hunt said no one factor is to blame, though scientists believe that others such as mites and insecticides are all working against the bees, which are important for pollinating food crops and wild plants.

"It's like death by a thousand cuts for these bees," Hunt said.

Krupke and Hunt received reports that bee deaths in 2010 and 2011 were occurring at planting time in hives near agricultural fields. Toxicological screenings performed by Brian Eitzer, a co-author of the study from the Connecticut Agricultural Experiment Station, for an

array of pesticides showed that the neonicotinoids used to treat corn and soybean seed were present in each sample of affected bees. Krupke said other bees at those hives exhibited tremors, uncoordinated movement and convulsions, all signs of insecticide poisoning.

Seeds of most annual crops are coated in neonicotinoid insecticides for protection after planting. All corn seed and about half of all soybean seed is treated. The coatings are sticky, and in order to keep seeds flowing freely in the vacuum systems used in planters, they are mixed with talc. Excess talc used in the process is released during planting and routine planter cleaning procedures.

"Given the rates of corn planting and talc usage, we are blowing large amounts of contaminated talc into the environment. The dust is quite light and appears to be quite mobile," Krupke said.

Krupke said the corn pollen that bees were bringing back to hives later in the year tested positive for neonicotinoids at levels roughly below 100 parts per billion.

"That's enough to kill bees if sufficient amounts are consumed, but it is not acutely toxic," he said. On the other hand, the exhausted talc showed extremely high levels of the insecticides - up to about 700,000 times the lethal contact dose for a bee.

"Whatever was on the seed was being exhausted into the environment," Krupke said. "This material is so concentrated that even small amounts landing on flowering plants around a field can kill foragers or be transported to the hive in contaminated pollen. This might be why we found these insecticides in pollen that the bees had collected and brought back to their hives."

Krupke suggested that efforts could be made to limit or eliminate talc emissions during planting. "That's the first target for corrective action," he said. "It stands out as being an enormous source of potential environmental contamination, not just for honeybees, but for any insects living in or near these fields. The fact that these compounds can persist for months or years means that plants growing in these soils can take up these compounds in leaf tissue or pollen."

Although corn and soybean production does not require insect pollinators, that is not the case for most plants that provide food. Krupke said protecting bees benefits agriculture since most fruit, nut and vegetable crop plants depend upon honeybees for pollination. The U.S. Department of Agriculture estimates the value of honeybees to commercial agriculture at \$15 billion to \$20 billion annually.

Hunt said he would continue to study the sublethal effects of neonicotinoids. He said for bees that do not die from the insecticide there could be other effects, such as loss of homing ability or less resistance to disease or

mites. "I think we need to stop and try to understand the risks associated with these insecticides," Hunt said.

The North American Pollinator Protection Campaign and the USDA's Agriculture and Food Research Initiative funded the research.

Source: *Purdue Ag News*

IMPORTANCE OF POLLEN FOR HONEY BEES

(Excerpts of Article by Zachary Huang, Michigan State University)

Pollen provides bees with protein, minerals, lipids, and vitamins (Herbert and Shimanuki, 1978). All animals need essential amino acids, which must be obtained externally and cannot be synthesized by animals. Honey bees also need the same 10 amino acids (see section 2.5) as other animals (e.g., humans). These amino acids are obtained from pollen only, because honey bees do not have any other sources of protein. Pollen collection by a colony ranges from 10-26 kg per year (Wille et al., 1985). When honey bees are provided with insufficient pollen, or pollen with low nutritional value, brood rearing decreases (Turner et al., 1973; Kleinschmidt and Kondos, 1976, 1977) and workers live shorter lives (Knox et al., 1971). These effects ultimately affect colony productivity (reviewed by Keller et al., 2005). Shortages of pollen during rainy seasons can cause colony decline or collapse (Neupane and Thapa, 2005). Recent studies have shown that spring pollen supplement can work as insurance (when spring weather is bad) for faster spring buildup and higher honey yield (Mattila and Otis, 2006a), and can reduce the effects of varroa parasitism (Janmaat and Winston, 2000) and nosema infection (Mattila and Otis, 2006b).

Collection of Pollen - Pollen is collected either by pollen foragers, which specialize on pollen collection, or nectar-foragers, which happen to be dusted with pollen. Pollen is brushed off the worker's body by the front and middle legs, and transferred to a special structure in the hind leg called the corbicula, or pollen basket. Pollen foragers unload their pollen by "kicking" the pollen pellets off their legs into a cell, which often already has pollen in it, and then the pollen pellets are "hammered" into a paste-like consistency by other workers. Due to the secretions added by bees, the pollens in each cell go through a lactic fermentation. The main effects of fermentation seem to be the reduction of starch (from 2% to 0%), increases in both reducing sugars and fiber, and reduction of ash and pH (Herbert and Shimanuki, 1978). Three bacteria that might contribute to lactic acid fermentation are found in bee bread: *Pseudomonas*, *Lactobacillus*, and *Saccharomyces*. Recently, it is shown that pollen collected by bees can easily be inoculated and fermented, and bees consumed it in the same way they consume unfermented pollen (Ellis and Hayes, 2009).

The weight of two pollen pellets from a pollen forager ranges from 7.7-8.6 mg (Rose et al., 2007). A colony will collect more pollen if it has more brood pheromone, more queen pheromone, or is genetically disposed to collect more pollen. Robert Page (currently at Arizona State University) has selected high and low pollen hoarding lines, whereby the high pollen line will collect so much pollen that there is no room to rear brood, and the low pollen line will perish without supplementing pollen artificially.

Processing Pollen into Proteins - Pollen is mixed with glandular secretions to produce "bee bread," which is consumed by young bees, considered the "social stomach" for protein digestion (because foragers cannot digest pollen directly, but still need protein (Moritz and Creilsheim, 1987). Rearing one larva requires 25-37.5 mg protein, equivalent to 125-187.5 mg pollen (Hrassnigg and Crailsheim, 2005). Newly emerged bees have undeveloped hypopharyngeal and mandibular glands. Hypopharyngeal glands are paired glands inside worker's head, consisting of a long central duct with many "grapes" (acini) attached. The glands will only develop after consuming a lot of pollen for the first 7-10 days. The glands first secrete the protein-rich component of royal jelly in young bees, but then secrete invertase, which is used to convert sucrose to simple sugars (fructose and glucose), in foragers. Mandibular glands are simple, sac-like structures attached to the base of each mandible. The glands secrete lipid-rich components of the royal jelly in young bees, but produce an alarm pheromone (2-heptanone) in foragers.

Royal Jelly Composition - Royal jelly (RJ) is 67% water and 32% dry matter. The dry matter is composed of 12.1% carbohydrates, 4.0% lipids, 12.9% proteins, and 1.1% ash (Wangchai and Ratanavalacai, 2002). These percentages vary slightly in different seasons. RJ also contains many trace minerals, some enzymes, antibacterial and antibiotic components, and trace amounts of vitamin C. The fat-soluble vitamins, A, D, E and K, are absent from royal jelly. The 13% of total proteins consists of 52 different proteins (Yu et al., 2009). The majority of the identified proteins (47 out of 52) are major royal jelly proteins (MRJPs), named as MRJP1 through 6, each of which has many variations. Three enzymes were also detected in the RJ: glucose oxidase, peroxiredoxin, and glutathione S-transferase.

It is no doubt that RJ is highly nutritious for bee larvae. Bee larvae grow exponentially during their first 4.5 days of life, from 0.36 + 0.008 mg (12 hr larvae) to 131.44±18.7 mg (4.5 days), reaching a weight of 159.66±12.91 mg after being capped (Petz et al., 2004). The weight gain is nearly 1000 times when compared to the weight of the eggs (0.17 mg, Taber et al., 1963). Furthermore, bee larvae do not defecate at all during the first 5 days of life, which is necessary because otherwise larvae would be feeding on their own waste. The midgut and hindgut are not connected until the last molt into the mature larvae, therefore preventing the possibility of defecation. After defecation, the larva stops feeding,

starts spinning a cocoon, and straightens itself along the cell axis, and becomes a prepupae. Three days later it will pupate and eventually, (after one week) emerge as an adult. It is not yet clear what role(s) the major royal jelly proteins play in honey bee larvae nutrition. Larvae can survive on an artificial medium without RJ or proteins for 3-4 days, but they all die 1-2 days before defecation (Z.Y. Huang, unpublished results). Until a chemically defined media is available for honey bee larvae, we will not know the roles various components of RJ play in larval growth and development.

Measurements of Pollen Quality - Pollen quality can be measured by two methods: crude protein levels or the composition of amino acids. Ten amino acids have been found to be “essential” for honey bees (deGroot, 1953), meaning that bees cannot synthesize or even convert other amino acids to acquire them, and therefore must obtain them directly from food, either as free amino acids or digested from protein. These 10 amino acids are listed in Fig. 1. The crude protein level tells us how much protein a particular plant pollen has, and higher crude protein levels are better than lower ones. However, if the 10 amino acids are not balanced, bees cannot fully use what is available in the pollen. For example, Fig. 1 shows that honey bees need 4% isoleucine from the total available amino acids, if one type of pollen has only 2% isoleucine, then bees can only use 50% of the total protein because isoleucine will be the limiting factor (Stace, 1996), forcing bees to ingest twice the amount of total pollen to obtain the needed isoleucine, essentially wasting half of the total protein.

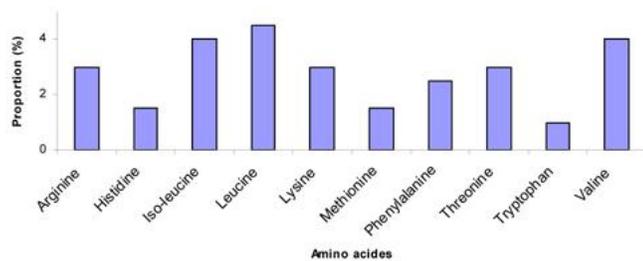


Fig. 1. Proportion (%) of the 10 essential amino acids needed by honey bees (deGroot, 1953).

Not All Pollens Are Created Equal - Different pollens have different nutritional value to honey bees. Schmidt et al. (1987) studied the nutritional value of 25 pure pollens by feeding caged bees the different pollens, using sugar as a negative control, and mixed pollen as a positive control. Consumption of test pollen diets varied dramatically among test pollens, with a mean consumption of 16.5 mg pollen per bee for the first 10 days and a range of 1.9-29.0 mg per bee. Both pollen consumption rates and crude protein levels are correlated with the ability to improve longevity. Pollens that decreased worker longevity include ragweed (Ambrosia), a rust spore (Uromyces), cattail (Typha), and Mexican poppy (Kallstroemia). Those that slightly improved worker longevity include terpentine bush (Haplopappus), desert broom (Baccharis), and dandelion

(Taraxacum). The best pollens are those from Mormon tea (Ephedra), mesquite (Prosopis), blackberry (Rubus), and cottonwood (Populus) Mixed pollen consistently performed very well. In another study, Schmidt et al. (1995) concluded that bees foraging in sesame and sunflower fields should be supplemented with other pollen, but rapeseed (canola) pollen is highly nutritious to bees and does not need supplementing. Through these studies, Schmidt concluded that factors contributing to increased bee longevity include presence of attractants and phagostimulants, so that bees will readily consume large amounts of pollen; lack of toxic compounds; and a good nutrient balance or level. No studies have tried to correlate the amino acid profile of a pollen and its ability to improve worker longevity.

A few pollens are toxic to honey bees, with some killing the adults (e.g., Zigadenus), others killing the brood (e.g., Heliconia). Other plants with toxic pollen are balsa (Ochroma lagopus), California buckeye (Aesculus californica), and Flame of the Forest (Spathodea campanulata).

Pollen Substitute for Bees - A good pollen substitute for honey bees should have the same features as a good pollen: 1). palatability (bees will readily consume it), 2). Digestibility (it is easily digested by bees), and 3). Balance (it has the correct the amino acid balance and enough crude proteins). Currently there are four commercial pollen substitutes for honey bees in the U.S.: Bee-Pol®, Bee-Pro®, Feed-Bee®, and MegaBee®. It appears that Bee-Pro® is soy-based, and Feed-Bee® and MegaBee are non-soy-based. I have insufficient information for Bee-Pol.

Cremonez et al. (1998) fed caged bees various diets and used hemolymph protein titer to assess their quality, with higher protein titer suggesting higher quality. Six day old bees had protein concentration of 27.6, 24.1, 11.4, 3.98, and 2.2 ug/ul, for bee bread, soybean/yeast, pollen, corn meal and sucrose, respectively. De Jong et al. (2009) used the same assay to assess the quality of commercial pollen substitutes. They found that bees feeding on Feed-Bee®, Bee-Pro®, pollen, acacia pod flour diets and sucrose had hemolymph titers of 9.42, 8.95, 6.26, 6.0 and 3.56 ug/ul, respectively. It would be informative to see if the high protein in blood translates to longer life in either cages or small colonies.

Gregory (2006) reported that for longevity inside small colonies of bees fed different diets, ranked by superiority: fresh pollen > Feed-Bee® > Bee-Pro® > old pollen. In cage studies, Feed-Bee® had similar hemolymph protein to fresh pollen. She also reported that Feed-Bee® contained 34.9 mg sucrose and 2.03 mg stachyose, while Bee-Pro® contained 8.85 mg sucrose and 4.55 mg stachyose. Stachyose is toxic to honey bees unless it is diluted to below 4% with 50% sucrose.

Degrandi-Hoffman et al. (2008) evaluated three diets, Bee-Pro®, Feed-Bee®, and MegaBee®, in two separate trials. In both trials, Bee-Pro® and MegaBee® patties were consumed at rates similar to pollen cake, but Feed-

Bee® was consumed significantly less. Higher food consumption was significantly correlated with increase in brood area and adult population size. According to this study, MegaBee appeared to be superior to both Bee-Pro® and Feed-Bee® in terms of brood production or adult population.

Pollen Nutrition May Play a Role in CCD - Recently, a new threat, Colony Collapse Disorder (CCD), emerged to attack the honey bees in the U.S. and has caused 30%-40% loss of bee colonies each year since the fall of 2006 (CCD working group, 2007). CCD-affected colonies have greatly reduced adult bee populations, with only a few hundred workers and the queen left, but with many frames of brood, which suggests rapid depopulation of adults. The cause of CCD remains unknown, but many scientists believe that it may be caused by a combination of factors, such as pesticides, parasites, nutritional stress, and stress from long distance transportation. There is a growing body of evidence showing that poor nutrition can be a major player in affecting honey bee health. Eischen and Graham (2008) demonstrated that well-nourished honey bees are less susceptible to *Nosema ceranae* than poorly nourished bees. Honey bees that were treated with imidacloprid and fed *Nosema* spp. spores suffered reduced longevity and reduced glucose oxidase activity, indicating an interaction between the two factors (Alaux et al., 2010a). Naug (2009) tested the hypothesis that nutritional stress due to habitat loss has played a major role in causing CCD by analyzing the land use data in U.S. He showed a significant correlation between the number of colony loss due to CCD from each state and the state's ratio of open land relative to its developed land area. Furthermore, Naug showed that these states with the largest areas of open land have significantly higher honey production. It therefore appears that honey plants (especially those in natural, undeveloped areas) might play a major role in honey bee health.

Polyfloral Diets Healthier for Honey Bees - Schmidt conducted a series of studies and convincingly showed that in general, mixed pollen given to caged bees let bees live longer than those on a single species of pollen (Schmidt, 1984; Schmidt et al., 1987, 1995). In a very recent study, Alaux et al. (2010b) showed that polyfloral diets from mixed pollen enhanced some immune functions compared with monofloral diets, in particular glucose oxidase activity, suggesting that the diversity in floral resources provided bees with better in-hive antiseptic protection. These studies suggest that bees feeding on a single type of pollen are not as healthy as those on a variety of pollens. With the modern way of agriculture— increasingly larger areas of mono-cultured crops— honey bee health might be adversely affected.

CONCLUSIONS

Honey bees can obtain all of their nutrients naturally if bees are in a natural setting. Unfortunately, modern agriculture has necessitated large scale mono-cropping which can be harmful to honey bees. This is mainly because each plant species has a specific nectar or

pollen characteristic. Much like humans, a lack of variety in foods can cause problems. Many studies have shown poly-floral pollen diets are superior to a single species of pollen, with perhaps one exception (rape seed pollen alone can be excellent). We urgently need to understand the implication of each mono-culture crop on honey bees. For example, how much stress do bees experience when feeding exclusively on almond nectar and pollen for 3-4 weeks? How long do they need to (or can they?) recover after the stressful period? Are there “supplemental” crops available to reduce or eliminate such a stress? By understanding these questions and providing solutions to them, we will be able to make bees as healthy as possible.

FURTHER READING

- Brodschneider, R., K. Crailsheim. 2010. Nutrition and health in honey bees. *Apidologie* DOI: 10.1051/apido/2010012
- De Groot, A.P. 1953. Protein and amino acid requirements of the honeybee *Apis mellifera*. *Physiologia Comparata et d'Ecologia*. 3: 195-285.
- Schmidt J.O., S.C. Thoenes, M.D. Levin. 1987. Survival of honey bees, *Apis mellifera* (Hymenoptera: Apidae), fed various pollen sources, *Ann Entomol. Soc. Am.* 80: 176–183.
- Somerville, D. 2005. FAT BEES SKINNY BEES - a manual on honey bee nutrition for beekeepers. NSW Department of Primary Industries. RIRDC Publication No 05/054. <https://rirdc.infoservices.com.au/downloads/05-054.pdf>

SOURCE: Jointly published in the *American Bee Journal* and in *Bee Culture*, August 2010.

Calendar for 2012

February 18, 2012 – Georgia Beekeepers will meet at Coweeta Fairgrounds

March 3, 2012 – SCBA Spring Meeting, Palmetto GBA Building, Columbia, SC

March 9-10, 2012 - NCSB Spring Meeting, Morganton, NC

July 12-14, 2012 – NCSB Summer Meeting, Lumberton, NC

July 19-21, 2012 – SCBA Summer Meeting, Clemson, SC

August 13-17, 2012 – Eastern Apicultural Society Annual Conference, Burlington, VT – www.easternapiculture.org for more details

**SOUTH CAROLINA BEEKEEPERS ASSOCIATION
2012 SPRING MEETING/COLUMBIA, SC
MARCH 3, 2012**

- 7:45 a.m. Registration & Coffee
Meeting Registration Fee - \$5/person, \$8/family, \$10/non-SCBA members
- 8:30 Invocation – Buddy May, Piedmont Beekeepers Association, Greenville
Welcome & President’s Comments - President Eck Miller, York, SC
Introductions & Announcements - Mike Hood, Clemson Univ, Exec Sec. SCBA
- 8:45 South Carolina Legislative Update – TBA
- 9:00 South Carolina Department of Agriculture News - Commissioner Hugh E. Weathers, Bowman, SC
- 9:20 Honey Processing and Sales Regulations, Angie Culler – State Manager, Food Safety and Compliance, South Carolina Department of Agriculture, Columbia
- 9:50 **BREAK**
- 10:20 Door Prizes and Business Meeting - SCBA President Eck Miller
- 10:40 Invasive Species: A Challenge for Bees & Beekeepers, Mike Hood, Clemson University
- 11:10 Savannah Bee Company - How We Operate – Ted Dennard, Savannah, Georgia
- 11:40 **Lunch On Your Own**
- 1:00 p.m. Door Prizes
- 1:10 2011 State Fair Report – Frank Blanchard, Mid-State Beekeeper, Chapin, SC
- 1:20 American Beekeeping Federation Report - TBA
- 1:25 Eastern Apicultural Society News - Steve Genta, EAS Director, Piedmont Beekeeper, Simpsonville, SC
- 1:30 Beekeeping in Afghanistan – Major John Roache, Information Systems Branch Chief, 263rd Army Air & Missile Defense Command, SC National Guard, Anderson, SC, Anderson County Beekeeper
- 2:00 **Short Break**
- 2:15 Beekeeping in Germany – J. Travis Bayne, Piedmont Beekeeper, Simpsonville, SC
- 2:45 Moving On Up from a Small Scale Beekeeper – Kerry Owen, Bee Well Honey Farm, Pickens County Beekeeper, Pickens, SC, SCBA Upstate Director
- 3:15 Cucumber Pollination Research Using Bumble Bees – David MacFawn, Mid-State Beekeeper, Lexington, SC
- 3:45 Final Comments – SCBA President Eck Miller

END - Have a Safe Trip Home & See You in Clemson on July 19-21.

*** SCBA Executive Committee will meet at end of Meeting**

RECIPE CORNER

HONEY RIBS

Yield 6 servings

Ingredients

- 1 (10.5 ounce) can beef broth
- 3 tablespoons honey mustard
- 1/4 cup honey
- 1/2 cup water
- 1/4 cup honey barbeque sauce
- 1/4 cup soy sauce
- 1/4 cup maple syrup
- 3 pounds baby back pork ribs



Directions

In the crock of a slow cooker, mix together the beef broth, honey mustard, honey, water, barbeque sauce, soy sauce, and maple syrup. Slice ribs apart, leaving an even amount of meat on each side of the bone. Place them into the slow cooker so that they are covered by the sauce. If there is not enough sauce, you may add a little water or beef broth to compensate.

Cover, and cook on High for 5 hours, or until the meat falls easily from the bones.

SOURCE: <http://allrecipes.com/recipe/honey-ribs/detail.aspx>

EDIBLE PLAY DOUGH

Yield 4 servings

Ingredients

- 2 cups powdered milk
- 2 cups honey
- 2 cups peanut butter



Directions

Mix together the milk, honey, and peanut butter; shape into balls.

SOURCE: <http://allrecipes.com/recipe/edible-play-dough/detail.aspx>

BUFFALO WING SAUCE

Yield 1 1/4 cup sauce

Ingredients

- 1/2 cup butter
- 1/3 cup hot pepper sauce
- 1/3 cup ketchup
- 2 tablespoons honey

Directions

Combine the butter, hot sauce, ketchup, and honey in a small saucepan. Bring to a boil over medium-high heat. Reduce heat to low and simmer for 15 minutes. Use as a sauce for cooked chicken wings or pieces.

SOURCE: <http://allrecipes.com/recipe/scotts-buffalo-wing-sauce/detail.aspx>

HOT MUSTARD PRETZEL DIP

Yield 4 servings

Ingredients

- 1/4 cup ground mustard
- 1/4 cup vinegar
- 1/4 cup sugar
- 1 egg yolk
- 2 tablespoons honey
- Pretzels

Directions

In a small saucepan, combine mustard and vinegar; let stand for 30 minutes. Whisk in the sugar and egg yolk until smooth. Cook over medium heat, whisking constantly, until mixture just begins to simmer and is thickened, about 7 minutes. Remove from the heat; whisk in honey. Chill. Serve with pretzels. Store in the refrigerator.

SOURCE: <http://allrecipes.com/recipe/hot-mustard-prezel-dip/detail.aspx>



SWEET AND SPICY CHICKEN WINGS

Yield 24 servings

Ingredients

- 1 cup Pace® Picante Sauce
- 1/4 cup honey
- 1/2 teaspoon ground ginger
- 12 chicken wings (tips removed)



Directions

Stir the picante sauce, honey and ginger in a large bowl.

Cut the wings in half at the joints to make 24 pieces. Toss the wings with the picante sauce mixture. Place them in a foil-lined shallow baking pan.

Bake at 400°F for 55 minutes or until they're glazed and cooked through, turning and brushing often with the sauce during the last 30 minutes of baking time. Discard any remaining sauce.

SOURCE: <http://allrecipes.com/recipe/sweet-and-spicy-chicken-wings/detail.aspx>

Respectfully submitted,

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