Kelley Beekeeping

SERVING THE BEEKEEPER SINCE 1924

ISSUE 52: DECEMBER 2014

IN THIS ISSUE

The Buzz

by Erin Wright

Courageous, humble, genuine, caring, hardworking, and giving—no matter who was asked to describe Mary Doris, these are the words that were used. Several times it was stated, *"I have never met someone as kind as her." "She would always remember your birthday and leave you a gift on your desk or work station, and would give you gifts at Christmas." "It was a pleasure to work with her,"* and, *"She worked harder than any two other people combined."* Everyone said the exact same things about this one woman, a woman like no other. She is a diamond among all the other precious gems, shining with her generosity.

Mary Doris began working for the Kelley's in 1976 at that time she was helping Mrs. Kelley at the house in the mornings, and working for the company in the afternoons. She worked here until 1991, left for a couple of years and came back in 1998 and worked until health issues dictated that she retire in September of 2014. She started in the wax building department and ended up in the shipping department, where she was considered the go-to person with any question anyone had. She could be found at lunch time sitting in a corner eating her lunch and reading. She was never one for gossip, but was always the first to have a kind word for someone who needed it.

While working at Kelley's, she managed to raise 7 children with her husband and never got tired of bragging about them. She has always been giving of her time and loves to volunteer with her church. Ev stated, *"When I grow up, I want to be just like Mary Doris."* She is greatly missed by everyone who had the wonderful opportunity to work with her. In her quiet, hard working way, she left an unsurpassable and enormous hole that cannot be filled in all of the hearts she touched while working here.

Mary Doris, a precious diamond at Kelley Beekeeping.

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From the Queen's Court

by Melanie Kirby

End of Year Tidings....

This season's close has been a reflective one. For starters, I hosted my first intern this past spring. She came to help at a very critical time when I was overseeing a pollinator lecture series and giving researchers the Land of Enchantment tour. Second was the blessed honey flow we experienced this summer with the refreshing monsoon rains that had been sluggish the past few years. Third was the invite to volunteer for USAID Partners of the Americas Farmer to Farmer program in Jamaica and fourth is the completion of the 9th year of service of my small bee farm in the southern Rocky Mountains. And fifth is the first year anniversay of my editorship for Kelley Beekeeping newsletter.

Each of these events has impacted me positively and given me a heightened sense of gratitude. My intern reminded me of my initial enthusiasm when I decided that beekeeping was going to be my profession. That enthusiasm has lasted me 18 years and then some. I recognize that I may only have a couple more decades to really put towards this industry in an active capacity and I want to make every season count by encouraging the next generation of beekeepers.

The sweet honey flow we experienced this year in our area was a gift from heaven. Wildfires devastated the landscape a few years ago so finally having a good dose of moisture mid summer- was truly quenching. We moved our hives from the valleys to the mountains in time for the bees to capture the divine nectars of the alpine meadows.

The invitation to serve as a volunteer for the USAID Partners of the Americas Farmer to Farmer program was truly enlightening as both my husband and our two small children got to participate. My husband and I conducted 13 workshops in a month all around the

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Queen's Court *continued*

island of Jamaica—visiting local bee associations and teaching about value-added beekeeping products. Our children had their first international experience and got to meet many other beekeepers—all under age 10. The beekeepers of tomorrow look bright!

The tenth anniversary of my small farm pales in comparison to Kelley's 90th...but if there's something for me to be proud about, it is the fact that we have built it from scratch and are inspiring others to do the same. The moral support to beekeepers these days is much more than a decade ago...and with the camaraderie of fellow beekeepers, scientists and service and product suppliers such as KelleyBees, then another decade of service will soon be on the horizon.

Hives overwintering in the Sangre de Cristo Mountains.

My first anniversay as the editor of this newsletter has been delightful...I am indeed learning much and am looking forward to another year of working with Kelley staff and with the wonderful contributors that share their insight with you, our valued readers. We do encourage story submissions and if you have a suggestion or idea for a column, we welcome pitches. We also welcome photos and other funsies that you might want to share with the greater public. Did you know that there are over 30,000 subscribers to Kelley Beekeeping online newsletter?

Next month I'll share some of my New Year resolutions as they pertain to my five sincerest gratitudes for this year. And though my ambitions can exceed my abilities at times, it is the striving, and the motivation from inspiration from beekeepers all over the world, that will help mold these endeavors. I hope that each and every reader has a most joyous holiday season. There's a lot to reflect upon. Like just how thankful I am to have the bees and their keepers in my life.

Season's Greetings!
Melanie Kirby

Melanie has been keeping bees professionally for 17 years. She breeds survivor stock queenbees in the southern Rocky Mountains of northern New Mexico and promotes living laboratory applied research while savoring and sharing enchanted bee products. Email: Editor@KelleyBees.com.

If you have a question you would like to share, email it to Editor@KelleyBees.com

A•Bee•Cs

Beginning Beekeeping

by Stephen J. Repasky, EAS Master Beekeeper

The North American Beekeeping Conference For all skill levels of beekeepers: Bee Our Guest!

Come, bee our guest, and let the American Beekeeping Federation (ABF) do the rest! The annual North American Beekeeping Conference and Tradeshow organized by the ABF is being held at the Disneyland Hotel in Anaheim California, January 6-10, 2015. This conference is one that every beekeeper should attend at least once in their lifetime and hopefully even more! Over 600 beekeepers regularly attend this conference and tradeshow to hear the latest news in the beekeeping industry and see the greatest in innovations from industry leaders in new equipment, tools, gadgets, protective wear, treatments treatments, and more! Not to mention the camaraderie and social aspects unique to this event.

The conference and tradeshow moves around the country every year allowing for many to minimize travel or attend as a family vacation. Previous years locations included Baton Rouge (LA), Hershey (PA), Las Vegas (NV), Galveston (TX), Orlando (FL) and many more!

Don't let the location, number attending or the name intimidate you! The ABF conference has something for everybody. For starters, there are special interest groups (SIGs) for every part of the industry you may be interested in. Have you ever wanted to know what it takes to move from a hobbyist to a little bit bigger operation? Then the small scale/sideliner SIG speakers may interest you (also good for the hobbyist!).

Perhaps you are curious as to how the BIG guys produce and package so much honey and what challenges they face. Then the Honey Producer/Packer SIG has some fabulous speakers! Have you been reading all of the advertisments about packages queens for sale and really want to understand the how and why about their production, then the Package Bee and Queen Breeder SIG may be interesting to you! Finally, if you are interested in trying to wrap your head around how someone can keep 10,000 to 80,000 hives – then sit in on the Commercial SIG and hear what they have to say about their industry.

So how much can you really fit into four days? A lot actually! Tuesday is basically an arrival day for many beekeepers coming in from out of town. There are ABF board meetings an various committee meetings that go on so that business can be attended to prior to the first full day on Wednesday. Wednesday the fun begins! Opening ceremonies and remarks by ABF President Tim Tucker are followed by the presentation of the 2014 American Honey Queen and Princess as well as the 2015 Contestants. Various SIG meetings will keep you busy until the welcome reception in the Tradeshow where you can check out the numerous vendors, bid on some live auction items or be entertained by the Beekeeping Brain Buster event!

If Wednesday didn't get your excitement up, Thursday is a full day of great information and topics! Some of the topics include: Bee Informed Partnership: Drivers and Solutions to Poor Bee Health; Healthy Bees, Healthy Environment, Healthy People: The Honey Bee Health Coalition; 2014 American Honey Queen & American Honey Princess Year-in- Review Presentations; and Mite Treatments, Queen Failures, and the Post Office. Evening entertainment is a Medieval Times dinner with entertainment!

Friday gets real interesting for the beekeeper attending. This is the day where there are hard decisions to be made as to which session to attend! So many great topics and speakers it is really hard to see them all! Four concurrent sessions will be running. Some of the beginning tract topics include The Truth About Treatment Free for the Small Scale Beekeeper - Greg Hannaford, Feeding Bees with Integrity- Understanding the Purpose of Feeding Bees - Chappie McChesney and Bee Time: Lessons From the Hive - Mark Winston, just to name a few. For the Serious Sideliner, topics include: Beginning a Business for Small Scale Beekeepers – Debbie Seib, Swarm Management – What's Really Happening in Your Hive? – Steve Repasky, Survivor Stock Breeding: Defining Longevity as the Umbrella Trait for a Whole- Approach to Management – Melanie Kirby and Hive Management Programs, Hive Products, Bee Removals, School Presentations & Media – KEYS to Making it as a Sideliner" – Emily Brown. For those interested in Commercial beekeeping, a great lineup includes: The Fall and Rise of the Honey Bee - Peter Loring Borst, Varroa Treatments: Efficacy and Economic Impact - Fabiana Ahumada and Queens, Princesses and Drones! Oh, My! – Dr. Elina Niño. If current research in the industry is of interest to you then you may want to check out the Research tract and hear from the researchers at the USDA-ARS Labs in Tucson, Beltsville and Baton Rouge! Of course throughout the day there is plenty of time to visit the tradeshow and the vendors, lunch in and around Disney or the hotel and take the evening to check out the Honey Show and Live auction in the Tradeshow where you can have an opportunity to purchase award winning honey and wax and many other beekeeping related items!

Saturday is filled with breakout sessions where again there is something for everybody. Some of the Break outs include: Beginning Beekeeping the Right Way, Beekeeping in Greece, Queen Rearing using Jenter System, Growing an Apiary Business, Honey Show Judging, Honey Bee Biology and Behavior and many more!

The Conference and Tradeshow concludes Saturday evening with a lovely banquet and auction as well as the crowning of the 2015 American Honey Queen and Princess. This is just a very small glimpse into what all is available and what will be happening! There is still time to register by going to this website: http://nabeekeepingconference.com/schedule. Here you can find information on hotels in the area, travel, registration and the full conference schedule. Come, Bee Our Guest at the 2015 North American Conference and Tradeshow at the Disneyland Hotel in Anaheim, CA!

Submitted by: Stephen Repasky, Board Member for the ABF representing Small Scale/Sideliner Beekeepers

Stephen J. Repasky is a second-generation beekeeper and author of Swarm Essentials. He is the owner of Meadow Sweet Apiaries and is very active in the beekeeping community at the local, state and national levels. He can be reached via his website at www.meadowsweetbees.com

Just the FAQs

by Dennis Brown

Hi Dennis,
We are second year beekeepers, and after splits and swarms are finding ourselves with four hives now. The books seem to indicate a long line of hives is not good due to "drifting." What do you think of a U formation? Is it OK to have hives with entrances facing each other? Do you have any suggestions?
Karen

Hello Karen,
It is absolutely true. You will create a drifting problem if you line your hives up in a row right next to one another and their boxes are all the same color. I have always placed my hives in two's. I place two hives in line next to each other a foot or so apart facing the same direction. Then I will place two more in line about five feet apart from the first set of two in the same direction. You could add another set of two in line five feet from the last set in the same direction. At this time I would change direction. You could begin to create a "U" shape if you like. You can add three sets of hives to create the right arm of the "U" and then three sets of hives to create the left arm of the "U". All the hives can face the inside of the "U" or turn them 180 degrees. It doesn't matter. Personally, I like my hives to face the inside of the "U" because I can observe all the entrances at the same time. The important thing to remember is that your hives on the arms will be ten to fifteen feet away from each other when you create your "U". The base of the "U" has a clear path in front of it.

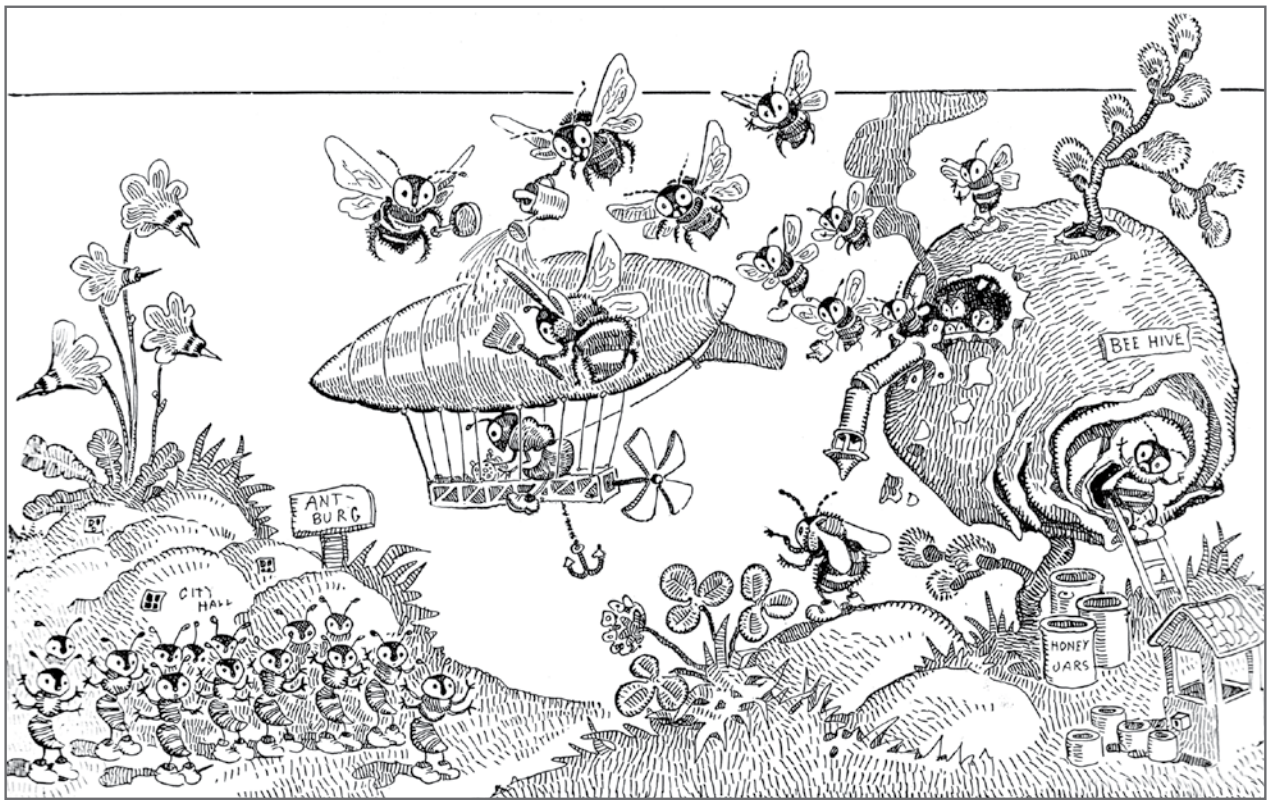
My hives are much easier to work when placed in two's. I can work one hive from one side and the other hive from the other side. If you have more than two together, you will have to bend around and work the middle hive from the back. Your back can wear out pretty quickly like that and you will notice a lot of population drifting to the hives on the end.

Review: You can line your hives up but, keep two together and then two more at least five feet away from the first set. Entrance direction has been recommended to facing south easterly but it all depends on how the wind blows and where the sun rises in relation to the apiary. Add a third set then start changing hive direction. Don't place more than three sets in a row. If you want a "U" shape, move up in front of the last hive in the first row five feet and place three sets of two hives five feet apart for the left arm and three sets of two hives for the right arm. Now you have a perfect "U".

With this configuration, drifting is never an issue.

Enjoy your bees.
Dennis

Dennis Brown is the author of "Beekeeping: A Personal Journey" and "Beekeeping: Questions and Answers," both of which are sold here at Walter T. Kelley Bee Supply. Contact Dennis at www.lonestarfarms.net.



X•Y•Zs by Phill Remick

Advanced Beekeeping

Crucial Overwintering Concepts

Res-puh-ray-shuh-n: *"The sum total of the physical and chemical processes in an organism by which oxygen is conveyed to tissues and cells, and the oxidation products, carbon dioxide and water, are given off."* Dictionary.com

All living beings must breathe to survive, including the honey bee. We are told that for almost every 10 pounds of honey a colony consumes, close to one gallon of water is expelled.

Hive moisture has to go somewhere as a mist. If the respiration is not removed it will build up during cold weather, frequently condensing on the underside of the lid—dripping on and freezing the cluster. To prevent this, I prefer to get my hives down to two stories, complete with more than ample stores of honey and pollen for the winter. Here's some of my prep:

I drill a ½" to ¾" hole in the top super, dead center, below the cleat or hand hold to provide greater air circulation, providing an option for bees to easily take cleansing flights or go for a cruise when weather permits. Any hive bodies that have holes in them are plugged for winter and all entrances are seriously reduced - keeping unwanted visitors like mice at bay and robber bees at a distance.

Those of you residing in deep snow country may find this top drilled entrance/exit just the ticket if a heavy snow blankets the front hive body entrance. If you have a wind buffeted site, protect your hives with some sort of major barrier; cold winter wind is no friend to the fragile honey bee.

Hives under a blanket of snow.

Some beekeepers insert a segment of ½ to 1" foam between the inner cover and telescoping lid to prevent frigid weather

from taking more of a toll. You can try using organic burlap in between the inner cover and telescoping lid to redistribute gathered moisture. Cut it so that it hangs about two inches outside the perimeter of the hive, that way accumulated moisture can be 'wicked' away.

On some hives we use quilt boxes. These are two inch frames around the perimeter of the super, with thin canvas stapled on the bottom, a few good size holes drilled for ventilation with screen over them on the inside, plus wood chips/shavings inside. Works great collecting upward bound vapors, so, think of a Mountain Camp style rim feeder with canvas on the bottom.

Screened bottom boards

The temperature inside the often unoccupied hive body (because bees naturally move up) gets just as cold as the outside. This brings me to another crucial point: People are concerned about wrapping their hives. The wrap obviously hinders temperature change inside the colony; honey bees only heat their core/cluster, not the entire super. The other negative to a wrapped hive can be the accumulated respiration/condensation being unable to escape.

Here's the thing: If warm weather happens to roll in, the wrapped hive may not perceive the change and miss an opportunity for a cleansing flight, or worse, they may misjudge the outside temperature thinking it warmer than it is and perish in flight. To avoid mold or accumulated rain water, elevate the back of each hive slightly, tipping it forward. I place a one inch thick block of wood the width of the hive under the back of it; this is adequate to facilitate draining.

Food Supply

Honey should be centered in the super - lots of honey, at least 60-80 pounds. Don't forget a good pollen source. Wintering is difficult at best; miss a step and you can lose the whole shooting match. If you furnish adequate ventilation, keep your bee friends strong and dry, with plenty of food while protecting them from direct wind, your chances for a success over winter increase dramatically.

Send your bees into winter strong, if you have done due diligence, with a bit of luck, you will reap the rewards of robust and vital colonies in spring.

Phill Remick has kept bees professionally since the 70's. He offers sage advice and instruction to those in need in the Albuquerque metro area. Visit Phill's site at www.newbeerescue.com

Gift Guide to Beekeeping

While the bees are nestled in for their long winter naps, give the beekeeper in your life something to open besides their hives for the holidays!

Wondering what to get the Beekeeper in your life, even if that is you? Buying gifts for a beekeeper can be daunting. We here at Kelley's are happy to help you with gift ideas!

- **Protective clothing** is always a must while tending to your hive! We carry a selection of jackets & coveralls that available in Cotton, Nylon and Ventilated material.
- **Literature and DVDs** are a great gift for a beginner or long time beekeeper!
- **3 lb. Package Bees** are also available to purchase now for spring delivery. *While supply lasts.*

If you are feeling overwhelmed, Gift Certificates are available for any occasion!

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Deep hive body, new style frames, top cover, inner cover, screened bottom board, entrance reducer, feeder, hive tool, smoker, and protective clothing (goat skin gloves, round veil and helmet) and *How to Keep Bees and Sell Honey* book by Walter T. Kelley.

Kelley Beekeeping

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Bee Health

Native Bee House at the Randall Davey Audubon Center

by Kate Whealen, Bob Zimmerman, Joy Mandelbaum & Betty Sperlich

A couple of months ago, in the foothills of Santa Fe, New Mexico- some lucky Master Gardeners, in a collaborative project with the Audubon Center on upper Canyon Road, built a house for native bees at the new pollinator garden. First, Steve Cary, naturalist, author of Butterfly Landscapes of New Mexico and Operations Manager at Audubon, treated us to a talk. His presentation featured fabulous photos of native bees. Then we wandered out to the center's garden, where Gail Haggard, naturalist and owner of Plants of the Southwest, discussed native plants and we identified some of the native pollinators and butterflies on them.

Native bees have been "unsung heroes" deserving of recognition. There are over 1,000 varieties of native bees, with more than 500 varieties identified in New Mexico. Most native bees are solitary (instead of living in a hive), and are very efficient pollinators, especially for fruit trees, tomatoes and squash. These gentle, non-aggressive bees often work earlier in the day and under cooler or wetter conditions than honeybees (which are not native to the Americas).

Next followed a session in the Pollinator Garden on building your own bee house. Master Gardeners and Santa Fe Bee Keepers Kate Whealen, Betty Sperlich, Bob Zimmerman, and Master Gardener and Audubon Project Leader Joy Mandelbaum, researched designing and building the house along with Bee Keeper and contractor Charles Brunn.

The house is constructed of a frame of non-treated lumber and is 8 inches off the ground to keep out unwanted visitors. It faces southeast so bees can benefit from the warmth of the morning sun. It has a roof of latillas and metal to protect the bees from rain.

Kate Whealen, Joy Mandelbaum & Bob Zimmerman with the new bee house. photo by B. Sperlich.

Master Gardeners helped place logs of aspen, cottonwood, fir, ponderosa, Russian olive, and fruit trees into the frame. The logs, varying in diameter from 3 to 8 inches, had been cut into 11-inch lengths, the width of the

frame. Joy's accommodating husband, Ron, had drilled holes of different sizes and depths to meet the needs of the various sized bees. Generally, 3/4 inch and smaller holes were drilled to a depth of 3-4 inches. Holes larger than 1/4 inch were drilled 5-6 inches.

The house is an experiment. We're curious to see which of the more than 500 varieties of native bees of New Mexico might find a home in it next spring. We're especially curious to see who moves into the old hollow log that forms the centerpiece of the home. Check it out next time you are in The City Different. You might be inspired to build a smaller version in your backyard.

To learn more about native pollinators, look at:

Pollinator Paradise http://www.pollinatorparadise.com/nm.htm
Attracting Native Pollinators, Xerces Society Guide
Pocket Guide to the Native Bees of New Mexico on the web
NMSU: Pollinator Project. aces.nmsu.edu/iipm/pollinator-project.html
Selecting Plants for Pollinators in the Ecological Region of Arizona-New Mexico

Kate Whealen, has been an avid gardener for many years & a beekeeper for almost a decade. For the past 5 yrs, she has been sharing information about honeybees at the SF Master Gardener's Fair & 3 yrs ago she became a MG. She is also the founder & coordinator of the Sangre de Cristo Beekeepers Club in Santa Fe. Email: beto1234@earthlink.net

Joy Mandelbaum, has long been interested in native plants/wildflowers. SFMGA since 2003. Interest in native pollinator plants/insects is outgrowth of my being SFMGA Project Leader for the Audubon Project. Email - joyfulnm@gmail.com

Bob Zimmerman, has been a Master Gardener and a beekeeper for 6 years and served as the President of SFMGA for 2 years. Email: rzim@q.com

Betty Sperlich, has been a backyard beekeeper for 7 years, & a Master Gardener for 3 years. Email: bsperlich@cybermesa.com

A close-up of the native bee house. photo by B. Sperlich.

Bee Science

The Consilience, Part II Honey Bee Nutrition

by Dr. Zachary Huang, Michigan State University

This article on Honeybee Nutrition by Dr. Zachary Huang is being republished as Part II of The Consilience. Part I was published in the September 2014 issue of Kelley Beekeeping. Part III will be published in the upcoming January 2015 issue.

Managed Pollinator CAP
(Coordinated Agricultural Project)
A National Research and Extension Initiative to Reverse Pollinator Decline

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

Honey Bee Nutrition

Honey bees, like any other animal, require essential ingredients for survival and reproduction. What we know about honey bee nutrition now was learned mostly during the 50s-70s, and recent studies specifically on honey bee nutrition are very few. Honey bees require carbohydrates (sugars in nectar or honey), amino acids (protein from pollen), lipids (fatty acids, sterols), vitamins, minerals (salts), and water. Additionally, these nutrients must be present in the right ratio for honey bees to survive and thrive.

1. Carbohydrates

Like other animals, honey bees need carbohydrates as an energy source. All carbohydrates are first converted to glucose, which enters the Krebs cycle and produces ATP, the fuel in nearly all cells, and carbon dioxide and water as by-products. Aside from being used as an energy source, glucose can also be converted to body fats and stored. A worker bee needs 11 mg of dry sugar each day (Huang et al., 1998). This translates to about 22 ul of 50% sugar syrup per worker per day. A colony with 50,000 bees therefore needs 1.1 liter (about 2 pounds) of 50% sugar syrup per day (about half a gallon of nectar at 25% sugar concentration), which does not include brood rearing and other activities. A colony of this size, therefore will consume almost 700 pounds of nectar per year, assuming the nectars having a 50% sugar concentration,! Of course, consumption is lower during winter times when temperature is not regulated at 35C, but perhaps that cancels out the brood rearing and flight activities.

1.1. Collection of Nectar

Nectar is the main source of carbohydrates in the natural diet of honey bees. Sugar concentration in nectar can vary widely, from 5% to 75%, although most nectars are in the range of 25% to 40%. A honey

bee uses her proboscis to suck up nectar from flowers and stores the liquid in her honey crop. The crop is a specialized part of the digestive system, and has a structure between it and the mid-gut, where digestion takes place. This structure, the proventriculus, can let some nectar in when the forager needs energy on its way home, remove pollen inside the nectar, and serve as a one-way valve to prevent back-flow from the mid-gut. This ensures that no contamination of nectar or honey can take place. For this reason I tell people that honey is definitely not "bee vomit." The honey crop is also the site of synthesis of ethyl oleate, a pheromone from foragers that tells young bees that they do not need to develop into foragers. The average weight of the nectar inside the crop is 25.5+15 mg (Calderone and Page, 1992), quite a feat considering that an average worker bee weighs 120 mg.

1.2. Conversion of Nectar into Honey

Foragers add enzymes (invertase, glucose oxidase) to nectar during foraging, so some digestion is already occurring before nectar is brought back to the hive. Invertase converts sucrose into two six-carbon sugars, glucose and fructose. A small amount of the glucose is attacked by the second enzyme, glucose oxidase, and gets converted into gluconic acid and hydrogen peroxide. Gluconic acid makes honey acidic, and hydrogen peroxide has germ-killing properties, both contributing to honey's unfriendly disposition to bacteria, mold, and fungi. Foragers then pass the nectar to special "receiver" bees, which are middle-aged bees that have finished nursing, but have not started foraging yet. Receiver bees deposit nectar into cells and dry the nectar either on their mouth parts, by forming a large drop between the proboscis and the mandibles, or by fanning over the cells. The moisture has to be reduced to 17%-18% before bees consider the honey "ripe" and then seal the cells. Honey with high glucose levels (such as canola honey), will crystallize very quickly and should be extracted as soon as possible.

1.3. Toxic Substances in Nectar and Sugar Supplement

Adult bees can utilize glucose, fructose, sucrose, trehalose, maltose, and melezitose, but bees are unable to digest rhaminose, xylose, arabinose, galactose, mannose, lactose, raffinose, melibiose or stachyose. Most of these sugars are also toxic to honey bees. About 40% of sugars found in soybeans are toxic to bees, and therefore care should be taken when using soybeans as a pollen substitute.

Other plants are toxic to bees due to the presence of alkanoids in nectar. These include: azalea (Rhododendron molle), azure (Aconitum carmichaeli), black hellebore (Veratrum nigrum), California buckeye (Aesculus californica), Chinese alangium (Alangium chinense), Chinese bittersweet (Celastrus angulatus), jimson weed (Datura stramonium), plume poppy (Macleaya cordata), happy tree (Camptotheca acuminate), Summer Titi (Cyrilla racemiflora), tea (Camella sinensis) and oil-tea (C. olelfera). Nectar from these plants is usually toxic to both adult bees and brood, and the majority of them also toxic to humans.

Honey dews are sugary secretions produced by homopteran insects (aphids, leafhoppers, and woolly aphids). Honey dews are produced because the low protein diet (plant sap) that these insects rely on force them to drink excess fluids to obtain enough amino acids, and thus need to secrete the excess sugary water. Honey bees will collect honey dews to make honey dew honey. This type of honey is praised by some people due to its strong and unique flavor, but can cause dysentery in overwintering bees due

Multifloral pollen.

to indigestible sugars or high levels of minerals. Adult bee paralysis in bees in Germany was also attributed to high Potassium and/or Phosphorus and low Sodium concentrations.

HMF (hydroxymethylfurfural) is formed in honey and high fructose corn syrup (HFCS) at high temperatures due to acid-catalyzed dehydration of hexose sugars, with fructose more prone to its formation. HMF above 30 ppm (parts per million) is considered toxic to honey bees. HFCS with such levels of HMF has been found to cause high mortality in cage studies (LeBlanc et al., 2010), as well as higher mortality than bees infected with Nosema ceranae (Z.Y. Huang, unpublished data). Beekeepers using HFCS for bee feeding should pay special attention to storage conditions, although many times, the batch from the supplier might have already become "bad" due to high temperatures either during transportation or storage.
Some honeys are not toxic to bees, but to humans. A good example is honey from tutu (Coriaria arborea), which has caused fatalities in New Zealand.

2. Protein

2.1. Importance of Pollen

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).

2.2. 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 cubicula, 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.

2.3. 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.

2.4 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.

2.5. 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.

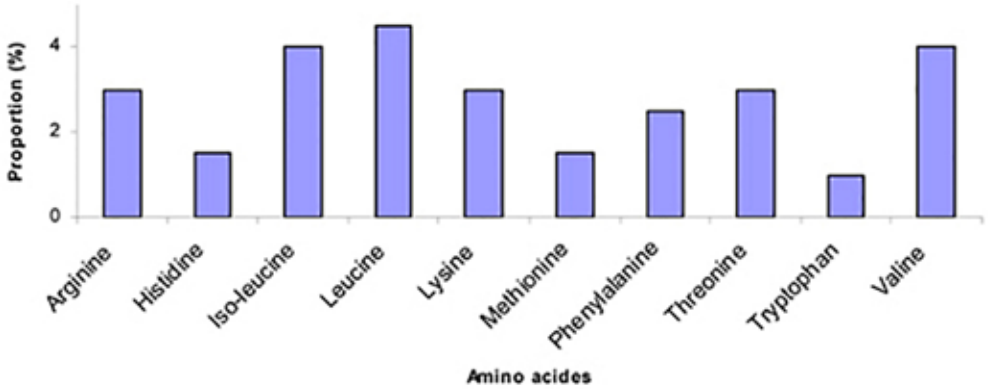

Fig. 1 Proportion (%) of the 10 essential amino acids needed by honey bees (deGroot, 1953).

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.

2.6. 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).

2.7. 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.

2.8. 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.

2.9. 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.

3. Other Nutrition

3.1. Sterols and Lipids

A sterol, 24-methylene cholesterol, is common in pollen and is the major sterol source for honey bees. Nearly all insects need to obtain sterol from their diet because of their inability to synthesize them directly. Sterol is the precursor for important hormones such as molting hormone, which regulates growth because it is required at the time of each molt. It is not clear what other lipids are required by honey bees, but most likely normal consumption of pollen provides for all the lipid requirements. Pollen with low fat content is less likely to be consumed by honey bees, but can be made more attractive to bees with the addition of lipids. The total lipid concentration within a pollen supplement is recommended to be 5%–8%.

3.2. Vitamins

Nurse bees are thought to need the following vitamin B complex for brood rearing: thiamine, riboflavin, nicotinamide, pyridoxine, pantothenic acid, folic acid, and biotin. Ascorbic acid (vitamin C) also seems essential for brood rearing. Like sterol and lipids, the vitamin needs of a honey bee colony are satisfied if pollen stores are abundant in the hive or fresh pollen is being brought into the colony. It is not known whether micro-organisms naturally present in the alimentary canal of bees may play a role in providing vitamins and other essential substances.

3.3. Minerals

The mineral requirements of honey bees are poorly understood. High amounts of potassium, phosphate, and magnesium are required by all other insects, and so presumably are by honey bees as well. Excessive levels of sodium, sodium chloride, and calcium have been shown to be toxic to honey bees. Again, all the required minerals can be obtained from pollen, although nectar also contains minerals. Dark honey contains higher levels of minerals. The optimal ash concentration for maximum brood rearing seems to be at 0.5%–1%. Pollen with more than 2% ash inhibits brood production.

3.4. Water

Honey bees forage for water for two purposes. One is to use it to dilute honey so that honey can be added to brood food. The second is to use water to cause evaporative cooling by fanning over a thin layer of water when the ambient temperature is over 35° C. During winter time, bees have enough water from condensation over the inner cover, so the issue is usually too much water, which can drip on the cluster and kill bees if there is not adequate ventilation. When bees have a choice, they usually prefer water with some salts (e.g. a swimming pool over a lake). Other species of honey bees (e.g. Apis dorsata, A. cerana) have been observed to forage on urinals or open restrooms in Asia. This is probably because bees are not obtaining adequate sodium from their nectar or pollen.

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.

Acknowledgements

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Further Reading

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Bee Thinking About

Tailoring rural advisory services to family farms: An FAO e-mail conference (1-18 December 2014)

The UN General Assembly declared 2014 to be the International Year of Family Farming and invited the UN Food and Agriculture Organization (FAO) to facilitate implementation of the International Year, in collaboration with its partners.

Among its other initiatives for the International Year, FAO has worked with the Global Forum on Rural Advisory Services (GFRAS) in setting the spotlight on rural advisory services for family farms. This has been done by jointly organizing two recent side events on the topic – in Buenos Aires on 26 September 2014 during the 5th GFRAS Annual Meeting and in Rome on 27 October 2014 during the Global Dialogue on Family Farming. To continue and expand the dialogue to a global audience, the FAO Research and Extension Unit is now hosting an e-mail conference on "Tailoring rural advisory services to family farms" which will allow participants to share their knowledge, ideas and experiences on this topic. The conference takes place 1-18 December 2014. Results of the two side events and the e-mail conference will feed into preparations of a document on policies to enhance rural advisory services for family farms that FAO and GFRAS are planning to publish in 2015.

The conference is open to everyone, is free and will be moderated. To subscribe to the conference, send an e-mail to listserv@listserv.fao.org with the following one line in the body of the message (leave the subject line blank):
subscribe RAS-L firstname lastname

Where firstname and lastname refer to the person's first and last name. For example, if the subscriber's name is John Smith, then the line should be:
subscribe RAS-L John Smith

A short background document was published on 22 November and sent to subscribers before the conference began.

All messages posted during the conference are available from the searchable website https://listserv.fao.org/cgi-bin/wa?A0=RAS-L

For more information, please contact AIS@fao.org

The International Year of the Farming Family

BEE HEALTHY ROADMAP

IMPROVING HONEY BEE HEALTH

HEALTHY BEES · HEALTHY ENVIRONMENT · HEALTHY PEOPLE

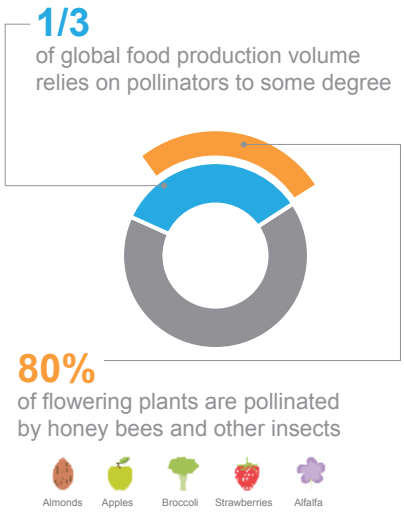
HONEY BEE HEALTH COALITION

Global food production and North American agriculture depend on honey bees. More than 30 organizations and agencies from across food, agriculture, government and conservation have formed the Honey Bee Health Coalition with the goal of reversing recent declines in honey bee health and ensuring the long-term health of honey bees and other pollinators. The Coalition has issued a ***Bee Healthy Roadmap*** outlining shared priorities for improving honey bee health through collective action that will accomplish more than any one group can achieve on its own.

What's at Stake:

ONE-THIRD OF GLOBAL FOOD PRODUCTION AND BILLIONS IN AMERICAN AND CANADIAN AGRICULTURE

One-third of global food production volume relies on pollinators to some degree as does $18 billion in American agriculture. Honey bees and other insects pollinate 80% of flowering plants worldwide. In 2009 alone, honey bees directly supported $11.7 billion of crops in the U.S. In Canada, the value of honey bee pollination for crop production is estimated at $1.3 to $1.7 billion annually. On average, 30% of America's honey bees die each winter. Reduction in this 'overwintering loss' is one benchmark by which to track overall progress in improving honey bee health.



What we're working toward:

HEALTHY BEES, HEALTHY ENVIRONMENT, HEALTHY PEOPLE.

> **"The future security of America's food supply depends on healthy honey bees"**
>
> Tom Vilsack
> U.S. Agriculture Secretary

What needs to be done:

COLLECTIVE, SCIENCE-BASED ACTION IN FOUR PRIORITY AREAS

The Honey Bee Health Coalition has set four priority areas that need immediate action where it and its members can have direct impact:

» Put the best available tools, techniques, and technologies in the hands of beekeepers so they can best manage their hives

» Ensure honey bees – especially in and around production agriculture – have access to a varied and nutritious diet throughout their lives

» Control crop pests while safeguarding pollinator health

» Work together to improve honey bee health

By collaboratively implementing solutions among food, agriculture, government, and conservation partners, the Coalition can help to achieve a healthy population of honey bees and healthy populations of native and managed pollinators, ensure productive agriculture, and promote thriving ecosystems. Knowing that the Coalition can't improve honey bee health on its own, this Roadmap lays out specific priorities and actions the Coalition, its members, and other stakeholders can take to improve honey bee health.

COALITION MISSION AND STRATEGIC GOALS

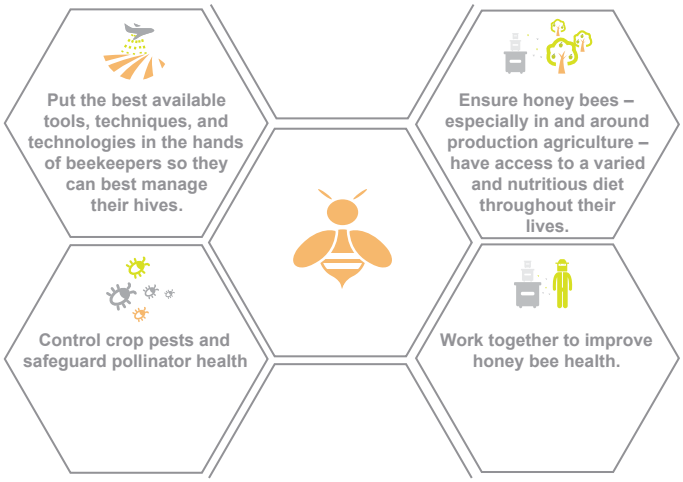
A platform for cross-industry coordination on four priority areas

ROLE OF THE COALITION:

The Coalition provides a vehicle for collaboration, implementation of new partner initiatives, and developing coordinated and holistic strategies to improve honey bee health. The Coalition is committed to developing explicit goals, milestones and metrics to measure improvements in honey bee health.

THE MISSION of the Honey Bee Health Coalition is to collaboratively implement solutions that will help achieve a healthy population of honey bees while also supporting healthy populations of native and managed pollinators in the context of productive agricultural systems and thriving ecosystems.

STRATEGIC PRIORITIES



STRATEGIC GOALS (across all priorities):

» Improve and sustain honey bee health at all levels of beekeeping

» Identify and implement novel and proven solutions to major honey bee health challenges

» Enhance effective communications and collaboration among private sector, public sector, academic, and NGO stakeholders with vested interests in beekeeping, pollination, and agriculture production

» Institute sound science and evidence for making decisions

HIVE MANAGEMENT

GOAL: Put the best available tools, techniques, and technologies in the hands of beekeepers so they can best manage their hives.

Coalition Actions:

Promote investment in "technology transfer" – teams of in-field experts that gather data, provide expertise in hive monitoring, and provide information to beekeepers to better control varroa mites and others pests and pathogens. Identify and address research gaps and promote research and innovation related to hive management, including development and registration of new products, varroacide resistance, efficacy and thresholds. Promote identification and dissemination of best management practices for beekeepers including for control of varroa.

Programs underway include:

» ***Endorse and increase support for tech transfer teams.***

- Raise awareness among Coalition members and outside stakeholders and funders regarding the value and positive impacts of tech transfer teams and the need to scale and fund them. Provide Coalition endorsement for tech transfer and leverage Coalition membership and networks to increase funding.

» ***Best practices guide for beekeepers.***

- **Convene** experts to review existing literature and knowledge on hive best management practices and provide guidance and recommendations on regionally-relevant best practices for varroa mite control; disseminate results to beekeepers.

» ***Varroacide product registration***.

- Foster partner initiatives to promote the registration of new varroacide products.

FORAGE AND NUTRITION

GOAL: Ensure honey bees – especially in and around production agriculture – have access to a varied and nutritious diet throughout their lives.

Coalition Actions:

Promote improved nutrition for honey bees and other pollinators by developing bee-friendly, high-quality, spatially- and temporally-relevant landscapes as well as supplemental honey bee nutrition.

Programs underway include:

» ***Honey bee forage and agricultural lands strategy.***

- Identify, communicate, and promote strategies for meeting honey bee forage needs on agricultural lands in the Upper Midwest of the United States and other regions. Identify priority areas for forage on agricultural lands: where it is, where it's needed, what plants are needed, and when.

» ***Transportation corridors and rights of way strategy.***

- Promote development of honey bee forage along transportation corridors and rights-of-way.

» ***Partner initiatives to explore incentives and innovations for providing forage and nutrition.***

- Foster and incubate partner initiatives to understand, incentivize, and innovate for honey bee forage and nutrition solutions. These include areas such as:
  - Gaining a better understanding of the yield benefits honey bees have on crops that have not traditionally utilized pollinators;
  - Gaining a better understanding of how cover crops that are planted between other crop plantings can have benefits for healthy soils and pollinators; and
  - Developing nutritional supplements for bees in transit or otherwise without access to forage.

CROP PEST MANAGEMENT

GOAL: Control crop pests and safeguard pollinator health

Coalition Actions:

Work to develop crop- and product-specific Integrated Pest Management (IPM) practices and messaging to improve bee and pollinator safety. Promote communication and understanding among stakeholders to raise awareness of crop pest management issues for bee health, disseminate existing information, create a network to address emerging issues in a collaborative environment; and support region- and crop-specific best management practices (BMPs).

Programs underway include:

» ***Promote BMP programs for crop pest management and pollinator health.***

- Understand current crop pest management best management programs for pollinators; identify and implement opportunities for the Coalition to support, promote, and improve BMP programs for pollinators.

» ***Promote and improve incident reporting.***

- Identify and implement Coalition actions to promote and improve beekeeper incident reporting regarding crop pest management-related bee health incidents.

OUTREACH, EDUCATION AND COMMUNICATION

GOAL: Work together to improve honey bee health.

Coalition Actions:

Create tools, resources, and hands-on experiences that accelerate understanding and the adoption of proven practices and new innovations that directly improve honey bee health. Develop a website, briefings, and other supporting communications materials. Develop and execute an outreach strategy to raise awareness and increase cooperation among critical players in the food chain and the public at large. Design programs that accelerate understanding and collaboration among the critical players in the food chain to create positive impacts on honey bees and other pollinators and improve their health.

Programs underway include:

» ***Outreach tools.***

- Create the tools for effective Coalition outreach and communications.

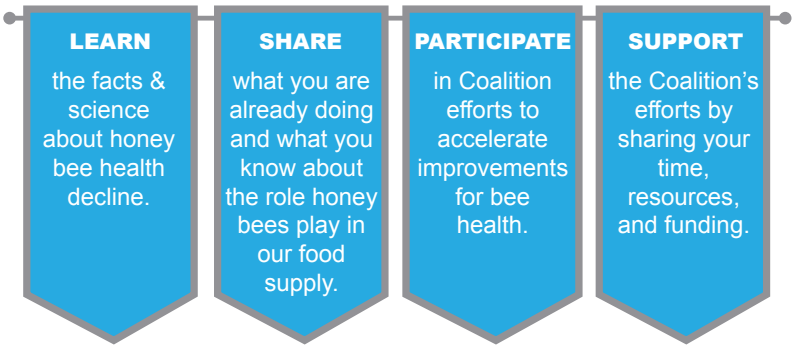
» ***Outreach messages.***

- Create the messages for outreach and communications, including messaging related to the Coalition as a whole and to specific strategic priorities and initiatives.

» ***Outreach implementation.***

- Implement outreach and communications objectives to reach key audiences and stakeholders with information about honey bee health, the Coalition, and actions that can be taken to improve honey bee health.

Join us *as we work to achieve a healthy population of honey bees to support productive agricultural systems and thriving ecosystems.*



To find out more about the Coalition and how you can help improve honey bee health, please contact Julie Shapiro at jshapiro@keystone.org.

Sweet As Honey

In homage to flavor and one that we savor…HONEY!

by Beetrix Royale

Honey-Nut Christmas Cookies

photo by Taste of Home

TOTAL TIME
Prep: 30 min. Bake: 20 min./batch
MAKES: 42 servings

INGREDIENTS
2 cups all purpose flour
1 cup cold butter, cubed
1 package (8 ounces) cream cheese, softened
¼ cup sugar
1 ½ cups chopped pecans, divided
1/3 cup plus ¼ cup honey divided
1 teaspoon butter, melted
½ teaspoon ground cinnamon

DIRECTIONS
1. Place flour in a large bowl. Cut in cold butter and cream cheese until mixture resembles coarse crumbs. Shape into two disks; wrap in plastic wrap. Refrigerate for 2 hours or until easy to handle.

2. Preheat oven to 325°. Place sugar and 1 cup pecans in a food processor; cover and process until pecans are finely chopped. Transfer to a small bowl; stir in 1/3 cup honey, butter and cinnamon.

3. On a lightly floured surface, roll one portion of dough to 1/8-in. thickness. Cut with a floured 2-in. round cookie cutter. Place a teaspoonful of filling on the center of half of the circles; top with remaining circles. Press edges with a fork to seal. Repeat with remaining dough.

4. Transfer to greased baking sheets. Brush with remaining honey and sprinkle with remaining pecans. Bake 18-22 minutes or until golden brown. Remove to wire racks to cool. Yield: about 3-1/2 dozen.

To Make Ahead: Baked cookies can be frozen for up to 1 month.

Read more: http://www.tasteofhome.com/recipes/honey-nut-christmas-cookies#ixzz3LMvUvnmw

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The Walter T. Kelley Company is looking for Resale Partners!

Ask yourself these questions:

Are you a beekeeper?

Is your local beekeeping community strong and active?

Do you teach beekeeping classes?

Do you find yourself recommending beekeeping supply companies to your beekeeping class because you don't have the product to sell?

Have you ever dreamed about operating your own business?

Would you like to operate a business that aligns with your favorite hobby, part-time job, full-time job or passion?

If you answered YES to some of the above questions, we may have an opportunity for you!

Walter T. Kelley has the best dealer program in the U.S. with two programs available:

TIER 2

- 10-14% off Kelley products
- 5-10% off non-Kelley products
- Additional Product Promotional Sheet
- Quantity price breaks

TIER 1

- 8% off Kelley product
- 5% off non-Kelley product
- Quantity price breaks

If you would like to be contacted by the Walter T. Kelley Company regarding our Resale Partner Program you can:

1) Complete the following questionnaire and mail it to:
Attn: Kevin Harrub, Walter T. Kelley Company
807 W. Main St, Clarkson, KY 42726

2) Go to https://www.surveymonkey.com/s/KY8YSW3 to complete an online survey

3) Call Kevin Harrub at 800-233-2899 ex. 236

Name _____

Address _____

City _____ State _____ Zip Code _____

Email _____

Phone _____ Cell _____

1. How many years have you been a beekeeper? _____

2. Are you teaching or mentoring beekeepers? YES / NO
If yes, please provide details: _____
_____
_____

3. Have you ever operated or owned your own business? YES / NO
If yes, please provide details: _____
_____
_____

4. Are you an active member of your local or state beekeeping association? YES / NO
If yes, please provide details: _____
_____
_____

5. I would run this business out of my:
☐ Home ☐ Barn ☐ Out building ☐ Store front
Please provide details: _____
_____
_____

UPCOMING EVENTS

December 2014

Idaho: Idaho Honey Industry Association Annual Meeting featuring Randy Oliver
December 4-5, 2014
Contact: Nick Noyes
Tel: 208.739.3962
For Fri. workshop Visit http://www.idabees.org/education.html

Lousiana: 53rd Annual Louisiana Beekeepers Association Convention
December 5-6, 2014
Alexandria Best Western Inn & Convention Center
2720 North MacArthur Drive
Alexandria, LA 71303
Info: http://www.labeekeepers.org/2014Convention.htm

January 2015

California: North American Beekeeping Conference- Disneyland Resort
Anaheim, CA
December 6-10, 2014
For Info visit: www.abf.org

California: American Honey Producers Association 46th Annual Convention
January 6-10, 2015
Manhattan Beach, CA
Info: https://ahpanet.site-ym.com/?2015ConventionReg

Georgia: Metro-Atlanta Beekeepers Association featuring Jennifer Berry & Dr. Jamie Ellis
Saturday, January 17, 2015
7:45 AM- 5:00 PM
Info: http://www.metroatlantabeekeepers.org/beekeeping_short_course.php

Texas: Austin Area Beekeepers Association
January 17, 2015 - 9:00 am- 4:30pm
Austin, Texas
Info: https://www.eventbrite.com/e/austin-area-beekeeping-seminar-registration-13207823957

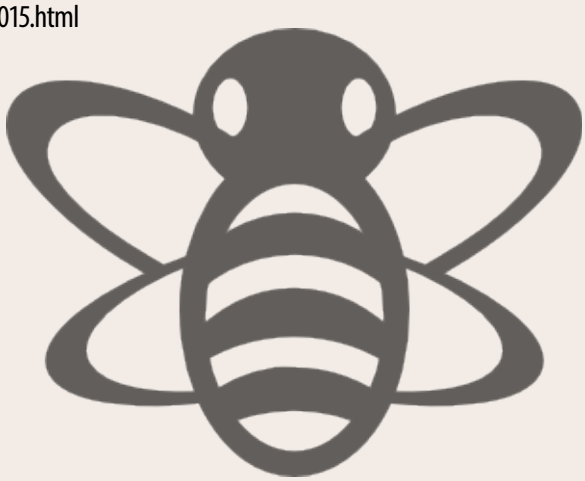
Arizona: American Association of Professional Apiculturists – American Bee Research Conference in conjunction with the Apiary Inspectors of America annual meeting.
January 22-23, 2015 - Tucson, AZ
Info: http://aapa.cyberbee.net/

West Virginia: Mid Ohio Valley Beekeepers Expo 2015
January 31, 2015
West Virgina University - Parkersburg, WV
Info: http://www.movba.org/expo2015.html

February 2015

New Mexico: NM Beekeepers Association Annual Meeting featuring Dr. Marla Spivak
February 6-7, 2015
Kosmos Performance Space
1715 5th Street
Albuquerque, NM 87102
Info: www.nmbeekeepers.org

Georgia: Georgia Beekeepers Association Spring Meeting
February 14, 2015
Lake Blackshear Resort & Golf Club
Lake Blackshear, GA
Contact: GinaG@mindspring.com
Tel: 404.467.7932 or 888.467.7932
Info: www.gabeekeeping.com/events.html



We'd love to share news of your upcoming events. Please send the event name, date, website and/or contact information to me by the 10th of each month for inclusion in the following month's issue. Editor@KelleyBees.com

You can save shipping costs and sales tax by placing a pre-order before any meetings that we attend (excluding events in KY). We note on our website which meetings we are attending, and we'd love to meet you there to deliver your equipment.