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AMERICAN BEE JOURNAL

The Beekeeper's Companion Since 1861

VOLUME 155 NO. 2

FEBRUARY 2015

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AMERICAN BEE JOURNAL

Volume 155 No. 2

February 2015

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Editor-Joe M. Graham

Advertising Manager-Marta Menn

Publishing Department- Dianne Behnke & Susan Nichols

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info@americanbeejournal.com
Web
www.americanbeejournal.com

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February Cover Picture

Winter in the Beeyard—Wisconsin beekeeping artist Marie App has done another excellent painting for our cover. To contact the artist about print ordering information, email her at marieapp@hotmail.com. More details on page 121.

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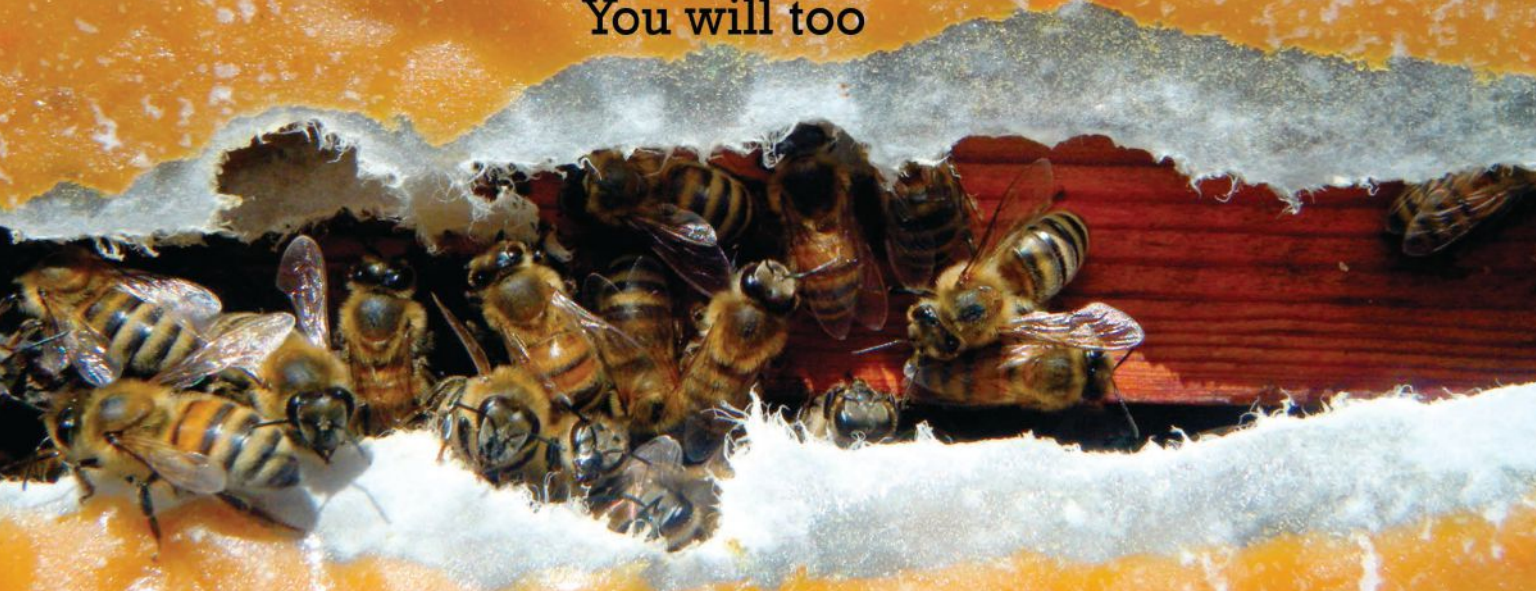
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Letters to the Editor

Send your letters to the editor, Attn: Joe Graham, Dadant, 51 S. 2nd Street, Hamilton, IL 62341, Fax: 1-217-847-3660, or email: abj@dadant.com.

Due to size and content, we may be unable to publish all information received. Thank You!

FEBRUARY COVER PICTURE

Most Wisconsin farmers, especially those who grow corn, will probably tell you that Wisconsin is over-populated with White Tail deer. They are inquisitive animals and will find every corn field in the State. They will also check out beekeepers' beehives in the winter, but unlike some other animals, will not try to get at the honey.

Wisconsin painter Marie App has had seven of her paintings reproduced on covers of beekeepers' national magazine covers. She exhibits watercolor and oil paintings in several Wisconsin galleries. To contact the artist for commissions or beekeeping prints and cards, email her at marieapp@hotmail.com.



HIVE HEATING

For those who would consider heating their hive in the winter, there is a better and possibly safer way to do it, if a person has some electrical know how. Instead of using a light bulb, I would suggest using a power resistor as the heat source. The bees don't need the light, and a power resistor produces heat only. If a 120 volt source of power is used, a 500 ohm power resistor would produce 28.8 watts of heat. However, I think wiring 120 volts into a humid beehive is not something I would recommend. A safer method would be to use a 12 volt source of power, from a battery charger, where a 5 ohm resistor would produce 28.8 watts of heat, or more, depending on the charger.

Each resistor would draw about 2.5 amps, so a 10 amp charger could heat four hives. It is important to note that a power resistor rated for up to 100 watts or more should be used, to dissipate the heat over a larger area. The 100 watt resistor is 6.5 inches long by 3/4 inch in diameter, making it easier to fit in a hive than a light bulb would be.

Dewey Hassig
hassig@hotmail.com

QUEENS KILLED BY BEEKEEPERS?

The title of Larry Connor's column in the December issue (Many Queens Are Killed By Beekeepers) and his first sentence relating a quote from a queen producer "that 50 percent of his queens are killed by beekeepers" in the context of new beekeepers and newbie instructors implies that there are bad practices other than the usual rough handling, dropping on the ground etc. that beginners engage in that kill queens and that those of us who are beekeepers and mentors or instructors need to warn newbies about these dangers. Instead he told us of the ways in which newbies (or any of us for that matter) might kill colonies by not recognizing the integrated biology of queen and colony thus killing or removing cells of needed replacement queens. Dr. Connor makes a number of good points, but never really addresses the concern brought up by the first paragraph's queen producer. Beekeepers kill many queens by destroying supersedure cells, but how do beekeepers kill queens provided by queen producers? This would be useful to know and to pass along to newbies.

Brent Weisman
Tampa, FL

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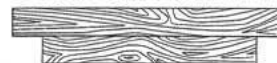
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News Notes

CONNECTICUT

BACKYARD BEEKEEPERS ASSOCIATION

Tuesday February 24, Meghan Milbrath, of the University of Michigan, will speak on Keeping a Healthy Hive. Each month we have timely weekend hands on inspection workshops, bee school, mentor program and more. Please check our web site for the dates and locations or more information at www.backyardbeekeepers.com

2015 Speaker Schedule

March 31, Izzy Hill on Bugonia

April 28, Dr. Diana Sammartaro subject TBD

May 26, Wyatt Mangum subject TBD

June 30: Dinner Meeting

September 29, Sam Comfort subject TBD

October 27, Juliana Rangel Posada on Reproductive biology of honey bee queens and drones

November 17, Michael Fairbrother of Moon Light Meadery on Mead

NEW HAMPSHIRE

Charles Andros, former NH/VT Apiary Inspector, will hold a beekeeping workshop from 1-1:30 PM on Saturday, April 18, at 18 MacLean Road, Alstead, NH 03602. Look for the "BEE" sign on the south side of Walpole Valley Road. Topics of discussion will be early spring management: locating apiaries, equipment, handling bees, feeding syrup and supplements, making nuclei, reversing, and requeening. Bring a veil, if you have one, as we shall be opening some colonies. We'll be inside if it is a rainy day. Registration required. email: lind enap@gmail.com or call 603-756-9056.

NEW YORK

HoneybeeLives Organic Beekeeping Classes introduce students to Organic/Natural Beekeeping with a Biodynamic influence. This two-day winter weekend class has dates available in the Hudson Valley and Brooklyn. Honey bees are an inspiring addition to the experience of life. A philosophy of care is imparted, as well as practical

knowledge in preparation for starting hives in the spring. Learn a gentle way to tend them while respecting their instincts and understanding their complex and beautiful lives. This class is also helpful for current beekeepers who are looking for a culture of nurturing to advance their skills.

The Brooklyn location offered February 21 & 22. The Hudson Valley location offered January 24 & 25, February 7 & 8 or March 7 & 8. Please visit www.HoneybeeLives.org for more info on class and registration, or call 845-255-6113.

NEW YORK

Malta, NY on March 21: Southern Adirondack Beekeepers Association presents their annual all-day seminar. Speakers will be Allen Dick of Alberta Canada, Meghan Milbrath of Munith, Michigan, and Wyatt Mangum of Fredricksburg, Virginia. Details: www.adirondackbees.org or call Anne Frey 518-258-7503.

PENNSYLVANIA

PHILADELPHIA BEEKEEPERS GUILD 5TH ANNUAL NATURAL BEEKEEPING SYMPOSIUM

Philadelphia Beekeepers Guild Sunday, February 8, 2015 from 10:00 AM to 4:00 PM (EST) Philadelphia, PA

Details: Ross Conrad will present on natural beekeeping topics and Katy Ciola Evans will talk about her IPM study results and conclusions while working graduate student at the University of Delaware. The event will be at Temple University (exact location TBD), 1801 N Broad St, Philadelphia, PA 19122. Looking forward to seeing you there!

Don Shump

Philadelphia Bee Co.

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PENNSYLVANIA

The Western PA Beekeeping Seminar will be February 13-14 at Four Points Sheraton, Mars, PA.

Speakers include Jerry Hayes author of, "Classroom" Q&A column for the *American Bee Journal* and Diana Sammartaro, one of the authors of *The Beekeeper's Handbook*.

Along with break-out sessions on value-added products, bee biology, cooking and disease and pest control, a special Beginning Beekeeping workshop will be offered on Saturday. Registration is \$50 and opens December 1, 2014 at Penn State Extension, Beaver website: <http://extension.psu.edu/beaver> or call 724-774-3003.

VIRGINIA

MID-ATLANTIC ORGANIC HONEY BEE CONVENTION

March 28, 2015 at 4500 Kensington Ave., Richmond

Speakers Sam Comfort, Wyatt Mangum, PhD, Virginia State Apiarist Keith Tignor, and John Adams. \$50 person, \$90/family. For information, visit www.maohbc.com.

NORTH CAROLINA

The Center for Honeybee Research, in partnership with the Park Service and area Bee Associations, will offer a two-day course in Beginning Beekeeping, March 14 & 15, 2015 at the Folk Art Center on the Blue Ridge Parkway in Asheville, NC. The Western North Carolina Regional Bee School has grown into one of the largest in the U.S., last year attracting attendees from six states as well as throughout North Carolina, and offers a cohesive curriculum meant to introduce first-time beekeepers to the considerations and challenges likely to confront them in their first year. Classes begin at 9:00 AM Saturday March 14 til 5:00 PM and resume 12:30 PM til 4:30 PM on Sunday March 15, 2015.

Cost is \$45 per person in advance, \$60 at the door, if available. Details and online registration at www.chbr.org.

NORTH CAROLINA

The North Carolina State Beekeepers Association is hosting the joint North Carolina and South Carolina Beekeepers Spring Conference in Monroe, NC at the Union County Cooperative Extension Center February 5-7, 2015. The theme for this conference is "Protecting Our Bees." Guest speakers and workshop presenters will include Kim Flottum, editor, Bee Culture Magazine; Dr. Keith Delaplane, Professor of Entomology, University of Georgia; Jennifer Berry, Research Professional III, University of Georgia; and Rev. Charles Butler, author of "The Feminine Monarchie," from London, England. Workshop topics will include hive management, hive products, wax processing and more. Details and registration at www.ncbeekeepers.org or (704) 358-8075.

FLORIDA

2015 UNIVERSITY OF FLORIDA BEE COLLEGE

University of Florida Bee College is one of the nation's leading beekeeping education events. There are over 50 courses taught by Dr. Jamie Ellis and the HBREL staff, David Westervelt and the Apiary inspection team, Dr. Deborah Delaney of the

University of Delaware, and Dr. Thomas Seeley of Cornell University.

Whether you are interested in honey bees, have a hive or two, or are a professional, Bee College is for you. There is always something new to learn about our beloved honey bee.

Please consider joining us for this truly one-of-a-kind event.

When: Friday, March 6th-Saturday, March 7th, 2015

Where: The Whitney Laboratory for Marine Bioscience, 9600 North Oceanshore Boulevard, St. Augustine, FL 32080

Classes include:

Honey Bee Biology
Making Beekeeping into a Business
Beekeeping Equipment
Beginners Overview
Live Bee Removal
Candle Making
Setting Up Your Apiary
Pests and Diseases for Beginners
Africanized Honey Bees
Assembling Supers and Frames

And many many more!!

ALABAMA

The Alabama Master Beekeepers will hold classes and Testing for the Certification of the Alabama Apprentice, Journeyman, Master, and Master Craftsman Beekeeper at the Performing Arts Center in Clanton Alabama. The classes and testing will be held February 4-5-6, 2015 with Dr. Jim Tew's Symposium following on Saturday, February 7. We are also offering classes to beginning beekeepers without any experience. To register for Master Beekeeper program classes go to AlabamaMasterBeekeepers.com or David Kelton 256-523-4767

ALABAMA

**ALABAMA COOPERATIVE EXTENSION SYSTEM
114 DUNCAN HALL AUBURN UNIVERSITY, AL 36849**

20TH ANNUAL BEEKEEPING SYMPOSIUM

New Location...New Location...The Alabama Cooperative Extension System's 20th Annual Beekeeping Symposium is being held at the Clanton Conference and Performing Arts Center, 1850 Lay Dam Road, Clanton, AL 35045. It will be held on Saturday, February 7, 2015.

Dr. Greg Hunt, Professor, Department of Entomology, Purdue University and Dr. Larry Connor, Wicwas Press, will present discussions on queen types, breeding and selecting. Roy Smith, Master Beekeeper and Welch Honey Judge will present a review on producing and selecting different

honey varieties. Practical information for beginning beekeepers will be presented by members of the Alabama Beekeepers Association. Specifically, Mr. Lonnie Funderburg will present on the Life Cycle of the Honey Bee and Mr. Bill Evans will discuss proper techniques for inspecting and evaluating the typical hive of bees.

An ambitious effort to use live-interactive video with speakers at the combined North Carolina/South Carolina meeting to be held in Monroe, North Carolina is being explored. If this cooperative event can be implemented, off-site speakers such as Mr. Kim Flottum, Editor, *Bee Culture* magazine and other nationally known speakers will be presenting at this meeting. A more complete list of presentations will be available in early January 2015. Though complicated to arrange, if all present plans can be implemented, this ACES/Alabama Beekeepers Association spring meeting will be a significant Alabama beekeeping event.

Although honey is the best know product from the bee hive, Elizabeth Whitaker will address other hive products. Sherry Ferrell will also be conducting a "Cooking with Honey" Workshop.

Registration is from 8:00 a.m.-8:30 a.m. and the program is from 8:30 a.m. until 4:00 p.m. For those **who pre-register**, lunch will be provided by the Alabama Beekeepers Association. There will be an open hive demonstration (weather permitting) during the lunch.

If prepaid by January 23, 2015, the registration fee for the day is \$25. After January 23 and at the door, the registration fee is \$35. For more information contact Dr. Paul L. Mask at 334-844-4450 or you can visit www.onetewbee.com to view all registration material. For **online registration** visit: <https://mell-base.uce.auburn.edu/wconnect/CourseStatus.awp?&course=C150207>

ARKANSAS

The Arkansas Beekeepers Association welcomes all to join us in Little Rock, Arkansas for our Spring Conference and Beekeeping Trade Show March 6 and 7, 2015. Featured speakers include Jerry Hayes and Landi Simone. Please visit www.arbeekeepers.org for details.

KENTUCKY

BEGINNER BEE SCHOOL

**Sponsored by the Lake Cumberland
Beekeeper Association**

This 6 session program will get you started in beekeeping:

February 10, 2015 - Honey bee biology
— Dr. Tom Webster

February 24, 2015 - Pests & diseases,

medications & treatments — Laura Rogers

March 10, 2015 - Hive management, feeding & nutrition, early pest detection, apiary location — Tammy Horn

March 24, 2015 - Hive components & choices, clothing, tools — Lake Cumberland Beekeepers

April 14, 2015 - What to look for during hive inspection, installing package bees, wintering your colony, swarm capture — Matt Wilson

TBA - Hive inspection, queen marking — Dorothy Morgan

Registration: \$25

Limited to 50 participants

Time: 6 to 8:30pm

Place: Pulaski Co Extension Service office

606-679-6361

Beth.Wilson@uky.edu

KENTUCKY

The annual Northeastern Kentucky Beekeeping School will be held on Saturday, Feb. 28, 2015 in Maysville, Kentucky. This location is 2 hours south of Cincinnati and 1 hour north of Lexington. The school will be held at the Maysville Community and Technical College Campus (1755 US 68, Maysville, Ky 41056). Registration 8-9am. Classes and vendor displays 9-3:30pm. Lunch included with registration. Door prizes awarded. Early bird registration \$20. Registration at the door is \$25. For more information please call 606-356-1081.

INDIANA

INDIANA BEE SCHOOL XIII

The Indiana Beekeepers' Association will hold its Indiana Bee School XIII on Saturday, February 28, 2015 at Decatur Central High School, 5251 Kentucky Avenue, Indianapolis, Indiana. Folder Pickup starts at 7:00 a.m. (EST) with program starting promptly at 9:00 a.m.

The guest speakers are Jennifer Berry and Dr. Joe Latshaw. There will be sessions for beginner to advanced beekeepers.

Registration Fees: Pre-registration fees are \$30.00 per individual or \$50.00 per family. Registration received/post dated February 10, 2015, will be \$40.00 per individual or \$65.00 per family. Lunch is included.

For more information or to register online: <http://indianabeekeeper.com>. You may contact Mike Seib at: 317-432-5342 or mike@seibshoosierhoney.com.

MICHIGAN

The Southeastern Michigan Beekeepers Association (SEMBA) will hold its 77th Annual Beekeeping Conference on Satur-

day, March 21, 2015 from 8:00 a.m. to 5:00 p.m. in the VisTaTech Center at Schoolcraft College, 18600 Haggerty Road, Livonia, MI. Keynote speaker will be Dr. Lawrence J. Connor. Dr. Connor received his Ph.D. in entomology from Michigan State University. He has had a long academic career in bee research. Dr. Connor is a publisher of over a dozen books on bees, beekeeping, queen rearing and pollination, author of three books on bee essentials, and a regular contributor of articles to *Bee Culture* and *American Bee Journal*. Visit the Education link at the SEMBA website at sembabees.org for more information.

WISCONSIN

BEEKEEPING CLASSES 2015, MADISON, WI

You are invited to attend one of our day-long **'Beekeeping Classes'** to be held at the Dane Co. Extension Building, 5201 Fen Oak Dr, Madison, WI 53718. Beginners Classes will repeat on Jan 31, Feb. 28, March 28, April 11 and May 2, 2015. **Second Step Class** is on March 21, 2015. All classes run from 9am - 4pm. The fee of \$50 covers coffee, handouts, free sample journals and catalogues, and props galore for you to handle. To register, contact Jeanne Hansen at 608-244-5094 or jeannieala@yahoo.com.

WISCONSIN

Date: March 21, 2015

What: The Prairie Enthusiasts 2015 Annual Conference

Where: UW Stevens Point, Drefus Center 1015 Reserve Street, Stevens Point, WI 54481

Conference theme: "Connections" Speakers, authors, and workshops, many paying special attention to pollinators. Some of the guest speakers are: Heather Holms, author of "Pollinators of Native Plants", Marcie O'Connor "Measuring Diversity Moth by Moth", and Dan Young "Insect Pollinator Habitat Considerations" and more.

Time: 8:00AM doors open for registration

For more information and conference registration: <http://www.theprairieenthusiasts.org/>

MISSOURI

ST. LOUIS BEEKEEPERS TO HOST EIGHTH ANNUAL BEEKEEPING WORKSHOP

PROMINENT HONEY BEE SCIENTISTS AND BEEKEEPING EDUCATORS TO PRESENT COURSES FOR BEGINNERS AND EXPERIENCED BEEKEEPERS

The Eastern Missouri Beekeepers Association (EMBA) will offer courses of

beekeeping instruction for beginners and experienced beekeepers on Saturday, February 7, 2015, at Maritz in Fenton, Missouri. Space is limited and will be filled on a first-come-first-served basis.

Prominent university entomologists and educators, Dr. Deborah Delaney, Assistant Professor of Entomology, University of Delaware, Dr. Jeffrey Harris, Assistant Professor of Entomology, Mississippi State University, Dr. Megan Milbrath, Michigan honey bee researcher, farmer and beekeeping instructor, and Sarah Red-Laird, Oregon beekeeper and beekeeping educator, will be among the instructors leading the workshop.

The Experienced Beekeepers' course will be tailored towards intermediate and expert level beekeepers and will place special emphasis on colony health and behavior.

The Beginners Beekeeping course is intended for novice beekeepers and persons with no prior beekeeping experience. The class will cover all aspects of basic beekeeping to prepare students to start beekeeping in 2015.

Tuition for the workshop is \$80 per person if registered before January 18, 2015. Tuition is \$95 per person for those registering on or after Jan. 18th. Registration closes Jan. 31st, unless filled sooner. There will be a waiting list, if needed.

Lunch and refreshments are included in the cost. Registration packets include course materials, an authoritative reference book, beekeeping periodicals, and equipment catalogs.

Vendors include representatives of Dadant & Sons, The Walter T. Kelley Company, and others.

EMBA supports beginner beekeepers with a broad program of cooperative procurement and educational and social events including purchasing complete beginners equipment kits, nucleus colonies, and queens for delivery in the spring, and open hive instructional workshops during the season at the Club's teaching apiary in Creve Coeur, Missouri.

Registration is available online at www.easternmobeekkeepers.com.

More information is available by emailing info@easternmobeekkeepers.com or calling 314-669-1828.

KANSAS

Spring 2015 Kansas Honey Producers Meeting

Friday and Saturday March 13 & 14, 2015
Holiday Inn at KSU Campus
1641 Anderson Avenue, Manhattan KS 66502

Our main guest speaker will be Dr. Clarence Collison, Beekeeping Specialist, Emeritus Professor/Dept. Head, Dept. of Entomology and plant Pathology, Mississippi State University. For more infor-

mation, see our website: www.kansas-honeyproducers.org.

NEBRASKA

A Beginning Beekeeping Short Course will be offered by the University of Nebraska Cooperative Extension Service on Saturday, March 7, 2015 from 9:00 AM to 5:00 PM at the Christenson Agricultural Research Education Building near Mead, Nebraska. Directions to the meeting site can be found at <http://ardc.unl.edu/direct.shtml>. Registration is \$40 and includes lunch, breaks and a workbook. To register send a check and your contact information to:

Jeri Cunningham
Department of Entomology
University of Nebraska
103 Entomology Hall
Lincoln, NE 68583-0816
402-472-2123
jcunningham1@unl.edu

Registrations must be received by Feb. 25, 2015. Instructors will include Marion Ellis, Erin Ingram, Natalia Bjorkland, Hershel Staats and Warren Nelson.

ARIZONA

8TH ANNUAL CHEMICAL FREE ORGANIC BEEKEEPERS CONFERENCE 27-28 FEB - 1 MAR 2015 IN ORACLE, ARIZONA

As the Organic Beekeepers yahoo.com discussion group has now grown in numbers to over 5700 + members, we have now put together our 8th annual meeting for an American Beekeepers Association, for beekeepers into clean Organic Beekeeping, to come together to associate for clean sustainable beekeeping with ZERO treatments, and getting off the artificial feeds, and off artificial breeding parameters, not in tandem with Nature.

Meeting to be held in Oracle, Arizona at the YMCA Triangle Y Ranch Camp and Retreat Center 27-28 Feb - 1 Mar 2015. Meeting will start Friday early afternoon with signing in, with Friday Night Hello's/ Dinner, ...run all day Saturday into eve, and through late Sunday afternoon, with keynote presentations, general sessions, break-out sessions, hands-on workshops, with 6 catered meals. Dinner for Friday night Hello's will also have speakers/movie. Vendors welcomed with those attending (NO treatments/artificial feeds allowed sold for bees).

Speakers so far confirmed: Don Downs (Apitherapy), Sam Comfort (TBHs/singing/dancing), Ramona Herboldsheimer (microbe Update, bkpg over the centuries), Bruce Brown (CC Pollen/politics update), Michael Bush (breeding/field mgt), James Fearnley (UK Pollen/propolis), Jacqueline

Freeman (Relational Bkpg: How to be best friends with your bees.), Laura Ferguson (Dir College Melissae/International Natural Bkpg Fed), Gerald Golgul (mead making), Krassimire Entchev (Ger/Bulg Around the yr with Dee Lusby, my experiences regressing bees in S./N. Europe and its importance for localizing), Amalia Haas (Utilizing Culturally-Specific lenses to support chem-free beekeeping: The Case Study of Jewish & Honeybee Calendars), Dean Deknow/Stigletz (hive mgt/basic queen rearing), Gregg Tivnan (Reflections of a first-year beekeeper).

The fee for meeting includes: accommodations in Lodges (with up to 6 per room dorm style, each with own bath.....with bring-your-own sheets/bedding/blankets, w/men separate from women) for \$200 per person, plus six catered meals, access to all meetings/talks/workshops, snacks/break refreshments, and also a camp liability coverage (form required to be filled out). Overflow for accommodations will be usage of cabin units on site, with same fee. Also no fee for vendors other than normal lodging costs for meeting/catered meals/camp liability needs. For those not bringing own sheets/bedding/blankets due to plane travel/other, rental is available at camp office for approx \$10 per person needing.

For more information see: <http://www.tucsonymca.org> or visit OrganicBeekeepers at <http://groups.yahoo.com/group/organicbeekeepers/> or contact Dee Lusby for information/registration at: 520-398-2474 late eve. For payment of registration per person of \$200, due in advance of attending with check or moneyorder, send to Organic Beekeepers c/o Dee Lusby, HC 65, Box 7450, Amado, Arizona 85645, WITH stamped self addressed envelope, for returning receipt and more information on YMCA to sender, plus liability/medical form to be filled out. Note: \$200 fee is a straight fee whether sleeping/eating at camp or not for covering cost of lodged rented, meeting halls, vending/catering, hiring workers, liability insurance, etc during conference. For general information concerning the meeting contacts are Keith Malone (Alaska) 907-688-0588, and Ramona/Dean at 978-407-3934.

WYOMING

Wyoming Bee College, March 21-22, 2015, Cheyenne, WY. \$65 registration fee, www.eventbrite.com to register www.wyomingbeecollege.org for more information.

CALIFORNIA

Delta Bee Club of central California will hold its annual Almond Season meeting on February 6th at Harvest Hall, Stanislaus County Ag Center, 3800 Cornucopia Way, Modesto. We are pleased to announce that Dr. Elina Nino, Extension Apiculturist at UC Davis, will speak to the group. A catered



Pennsylvania Honey Queen - Jessica Onstead and Pennsylvania Honey Princess - Blair Hetherington.

dinner and door prizes donated by Dadant, and others, will round out the evening.

For more details, visit www.deltabeeclub.org

HEARTLAND APICULTURAL SOCIETY CONFERENCE ANNOUNCED

The 14th Annual Heartland Apicultural Society's summer conference will be held in Albion, Michigan July 9 through 11, 2015. Please join us for this three-day Celebration of bees and beekeepers. Confirmed speakers include Dennis VanEnglesdorp, Susan Cobey, and Roger Hopingarnier to name but a few. Queen rearing, drone catching, microscope techniques, mead making, beginners to advanced, something for everyone!

2015 PENNSYLVANIA HONEY QUEEN AND PRINCESS SELECTED

The Pennsylvania Honey Queen Program is pleased to announce that Jessica Onstead was recently selected as the 2015 Pennsylvania Honey Queen and Blair Hetherington as the 2015 Pennsylvania Honey Princess.

Jessica, 21, is the daughter of Stephen Onstead and Fritz Onstead of Somerset, Pa. She is a graduate of Somerset Area High School, where she was a varsity member of the Lady Eagles tennis team, a member of the National Honor Society, a student of the month for the Somerset Kiwanis Club and a Somerset Welfare League cotillion honoree. Jessica is currently attending The University of Pittsburgh at Johnstown for a degree in Business Economics and hopes to one day own her own business. In her free time, Jessica enjoys reading, baking and collecting stamps.

Blair, 20, is the daughter of Barron and Robin Hetherington of Ringtown, Pa. She is a graduate of North Schuylkill High School, where she was a member of the homecoming court and was the marching band's featured baton twirler for three years. Blair is currently attending the Pennsylvania State University (Penn State) for a degree in Food Science and a minor in Horticulture. She is a member of the Food Science Club, EARTH House and Ag Advocates. In her free time, Blair is a Crew Manager on her family's 500 acre strawberry and vegetable farm.

As the 2015 Pennsylvania Honey Queen and Princess, Jessica and Blair will educate the public on the importance of honey bees and the benefits of honey by attending schools, fairs, festivals and participating in media interviews.

For more information on the Pennsylvania Honey Queen Program, visit <http://pastatebeekeepers.org/queen.htm> and follow us on Facebook at PA Honey Queen Program. To schedule a presentation from the 2015 Pennsylvania Honey Queen or Princess, contact Rachel Bryson at honeyqueen@pastatebeekeepers.org.

The Pennsylvania Honey Queen Program is an affiliate of the Pennsylvania State Beekeepers Association.

SECRETARY VILSACK NAMES MEMBERS TO THE NATIONAL HONEY BOARD

WASHINGTON, Nov. 24, 2014 -- Agriculture Secretary Tom Vilsack has appointed three members and three alternates to serve on the National Honey Board. They will serve 3-year terms beginning Jan. 1, 2015, and ending on Dec. 31, 2017.

The producer member appointed is Mark A. Jensen of Power, Mont., incumbent, and the producer alternate member is Randy Verhoek of Baldwin, N.D.



Arnia's user interface allows beekeepers to check the status of their hives from any internet enabled device.

The first handler member appointed is Eric S. Wenger of Peabody, Kan., and the first handler alternate member is Michelle Poulk of Corpus Christi, Texas.

Additionally, the appointed importer handler member is Mathias Leitner of Gilbert, Ariz., incumbent, and first handler alternate member is Jeffrey Z. Dong of Eastvale, Calif.

USDA's Agricultural Marketing Service (AMS) provides oversight of the Board in accordance with the Commodity Promotion, Research, and Information Act of 1996 and the Honey Packers and Importers Research, Promotion, Consumer Education and Industry Information Order. Under the Order, the program is financed by an assessment of \$0.01 per pound on first handlers and importers of 250,000 pounds or more of honey or honey products annually. The program is administered by board members who are selected by the U.S. Secretary of Agriculture.

HIVE MINDS AND THE INTERNET OF BEES

ARNIA REMOTE HIVE MONITORING NOW LISTENING TO BEES ACROSS THE ATLANTIC WITH PODSYSTEM "BEST SIGNAL" M2M SIMS AND FLAT-RATE DATA

PodsystemM2M, the expert in multi-network data SIMs for the M2M industry, has today announced that its Best Signal USA & Europe Multi Network SIM cards have been selected by Arnia for expansion of its remote bee hive monitoring system into the USA. Arnia provides state of the art remote bee hive monitoring systems for beekeepers, bee farmers and bee researchers, combining hive acoustics with other parameters. The monitoring data is interpreted to assess bee colony behavior and health. PodsystemM2M Best Signal USA & Europe SIMs roam on multiple networks throughout the USA and Europe at a competitive flat rate, enabling

Arnia to expand across the Atlantic without the worry of increased data costs.

For Arnia, a key advantage of the PodsystemM2M Best Signal Multi Network SIM is that it automatically switches between networks if coverage is patchy or if a network is not available, so that the device remains connected. This enables Arnia to confidently offer its remote hive monitoring system to customers in remote or rural areas - where bee hives are often located. When the integrity of research studies and the health of the hives are at stake, bee researchers and bee farmers cannot afford to lose data packets as a result of weak or patchy cellular network signals. Arnia Operations Manager, Peter Sogorski says, "Some of the apiary sites that our beekeepers have can very often be on the peripheral edge of network signals. Sites are sometimes obscured by buildings or trees and this does affect signals locally. Having the multi network SIMs means the connection will automatically switch to another network, should it be required."

In addition to reliable connectivity, PodsystemM2M's Best Signal Multi Network SIMs carry the advantage of flat rate data in the USA (on both AT&T and T-Mobile) and on networks across Europe. This makes it easy for M2M companies to expand their operations across the Atlantic without the worry of increased data costs. Sogorski says, "We find this competitively priced multi network SIM invaluable in both the USA and Europe. Our system requires that we have reliability and continuity in our data transfer, as this is a critical part of our electronic bee monitoring system. The Best Signal SIMs provide controllable costs and reliable connectivity."

Podsystem Inc. CEO Sam Colley adds, "We are really excited to be working with Arnia and their innovative bee monitoring application. Given the global environmental and economic value of honey bees, it's vital that Arnia have developed this unique M2M monitoring application especially for bee

hives. We are very pleased to be able to provide the reliable M2M connectivity needed to ensure Arnia's monitors continue to provide a unique insight into hive conditions to help maintain strong, healthy and productive colonies around the world."

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Formic acid gel strips for the treatment and control of Varroaosis caused by *Varroa destructor* in honeybees



HOW MITES MULTIPLY



Under the brood cap, doubling the population every 22 days



1 mite becomes 15 in 4 months Just takes 1 female



In 12 weeks, the number of mites in a western honey bee hive can multiply by (roughly) 12

Mite Away Quick Strips® should be used as part of an integrated Pest Management Program (IPM). The strip's innovation is that the treatment successfully penetrates the brood cap, targeting mites where they reproduce, arresting the transmission of viruses. High mite loads throughout the beekeeping season can result in higher winter losses.

Typically treatments are needed in the spring, to protect the summer bees, and again in the autumn, to protect the bees that will make up the winter cluster.

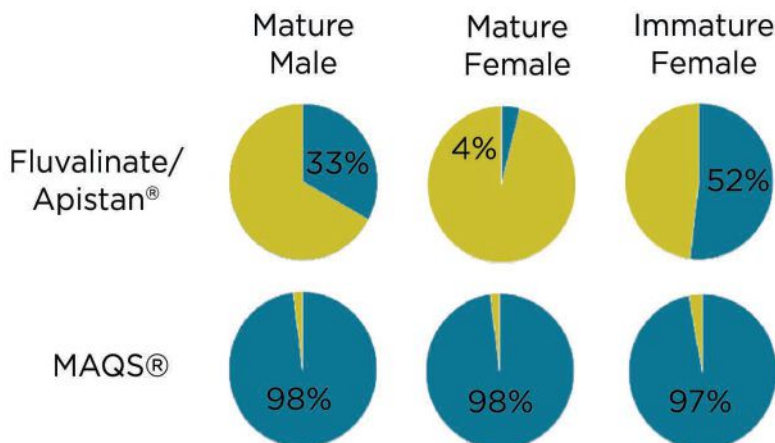
MAQS® can be applied on single or double brood-chamber standard Langstroth equipment or equivalent. The colony cluster should cover a minimum of 6 frames. Having entrances fully open during the 7 day treatment is essential.

Mite Away Quick Strips® can be purchased through most bee supply outlets across the USA. A full distributor list can be found on our website.



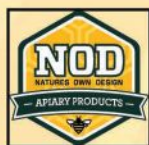
LABEL CHANGES: As of April 2014, our label no longer requires use of respirators for application and the 1/2 Dose treatment is legally approved.

EFFECTIVENESS MAQS vs. FLUVALINATE ON MITES PRESENT IN THE BROOD (% OF MITES KILLED)



This result is incredibly promising for an effective Varroa treatment. Impressively, the treatment was effective at killing 97% to 98% of the Varroa in the capped brood within the first three days of treatment.²

1. S. Wendling, Varroa destructor (Anderson et Trueman, 2000), a ectoparasite mites de l'Abeille TAME Apis mellifera Linnaeus, 1758 REVUE bibliographique ET CONTRIBUTION TO L'Etude SA Reproduction. THESE Pour le Doctorat Veterinaire, 2012
2. Winter Colony Health Assessment After Using Mite Away® Quick Strip (MAQS®) as a Control for Varroa Mites in the Fall of 2009 Alison Van Alten, Janet Tam and Melanie Kempers -



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U.S. Honey Crops and Markets

subs in preparation for making early spring splits or transporting colonies to almond pollination in California. Demand for bees for almond pollination remains excellent, and reduced fuel prices have cut transportation costs significantly. Honey demand also remains very strong in this area, but most stocks of unsold honey are long gone. Beekeepers reported very good holiday sales via shops and the Internet.

EAST CENTRAL—After a cold, sometimes snowy or rainy November, December weather was milder. Migratory beekeepers had long since moved their bees to the South or California, but other beekeepers were still trying to feed colonies on warmer days with sugar patties or candy boards. Although it was too early for winter colony loss reports, many beekeepers had already sent in their orders for early package bees, nucs and queens. By late January or early February, beekeepers should have a better idea on how their apiaries are overwintering. Honey supplies remain low with prices at both the wholesale and retail levels reaching record levels in some locations. Some packers have been scrambling to find sufficient supplies of honey to last until the new crops start coming in 2015.

WEST CENTRAL—The Dakotas did better than most of the other states as far as honey production was concerned. Honey production in Minnesota was generally down, as was production in Iowa, Missouri, Kansas and Nebraska. Honey reports from Minnesota seem to have been the worst, but beekeepers elsewhere had very poor crops in some cases due to the cool, wet spring and summer. Meanwhile, wholesale and retail demand for honey continues to skyrocket due to shortages around the globe. Those beekeepers lucky enough to produce a crop have enjoyed record prices at both the wholesale and retail levels.

November was colder than normal, which at times caught beekeepers by surprise who were still preparing colonies for winter or had still not moved their bees to the South or California. Snowfall has been heavy at times in the northern states, but generally has been light elsewhere in the area. Instead, a number of states reported average to heavy rains in December at a time when this precipitation could have very well been snow or ice. Some beekeepers are feeding dry sugar, sugar patties or candy boards in West Central locations. Meanwhile, migratory beekeepers in the South or California are feeding large amounts of syrup and pollen subs to their colonies to build them up for almond pollination or in order to make splits this spring. Almond pollination rental prices are varying from \$170 to \$180 per 8-frames of brood, while colonies with 10 or more frames are receiving a bonus of \$10 to \$30 more per colony.

INTERMOUNTAIN—Cold weather, but light precipitation characterized much of this area during November and December. Not only would beekeepers like to have the snow cover for next spring's

UNITED STATES
Colonies continued to stream into California from all over the country for the big almond pollination season starting at the end of this month. Most reporters quoted \$170 to \$180 for colonies with eight frames of brood, with bonuses for stronger hives. Heavy rains in December helped soil moisture in this drought-stricken state, which in turn should also help spring honey flows. The large reduction in fuel prices has been a real god-send to migratory beekeepers.

Early winter storms caught beekeepers on the Eastern Seaboard by surprise. Where stores are adequate, no harm was done, but in many cases beekeepers were still feeding colonies that were light on winter stores. This could lead to higher winter losses. The Upper Midwest also received an early taste of winter, but elsewhere in the country snow has not been as heavy as last season. In some cases rainfall came instead where temperatures were milder than normal.

Beekeepers were beginning to gear up for the season in the South. Demand for package bees, nucs and queens is expected to be very heavy again this spring. Colonies are generally in good condition and beekeepers are hoping that extreme cold weather will stay away. This is especially important as the first maples and wildflowers begin blooming and colonies begin to brood up.

As we have indicated in the past, honey inventories remain low. This has continued to keep both the wholesale and retail markets for honey strong.

NORTHEAST—Beekeepers continue to report harsh winter weather. Cold weather has often been accompanied by snow or rain. Many reporters have not been able to check their colonies, but some hope to start winter feeding with sugar fondants or winter sugar patties. This will be switched to syrup and pollen subs later in the winter or early spring. Orders are starting to be made for package bees, nucs or queens, although many beekeepers do not know how many colonies they will lose until spring. A number of states are planning beekeeping short courses for this late winter or early spring.

Holiday sales of remaining stocks of honey were excellent, but little honey remains unsold at this point.

MIDEAST—Similar reports of extreme

cold weather accompanied by snow or rain also have been coming from our reporters in this area. Unfortunately, a number of colonies also went into winter low on stores, so will need additional feed before spring. Beekeepers are hoping for an early spring, so their losses will not be extremely high. Some reporters were already suggesting that package bees and queens would be in short supply this spring. Most stocks of locally produced honey have been sold out for quite some time.

SOUTHEAST—November weather was colder than normal, but December temps were about normal for the month. Some rain has helped moisture conditions. Beekeepers have continued to feed colonies during warmer periods. Stormy weather in late December produced some heavy rains, winds and even a tornado or two. Mississippi was especially hard hit. Believe it or not, spring bee work is beginning in some locations as package bee and queen producers gear up for production and commercial beekeepers start preparing for making splits or moving colonies out of state for pollination rentals.

Honey demand and prices have continued to be quite good in this area, but little honey remains for sale at this late date. Brazilian pepper in Florida was the last significant honey flow reported and most of that honey sold quickly, even though it is generally regarded as a less desirable honey than those honeys produced earlier in the year.

SOUTHWEST—Colonies are wintering well, although at times cold or stormy weather has been reported. The rain and snow are welcome to replenish ground moisture in preparation for spring wildflower growth. Beekeepers are continuing to feed colonies both sugar and pollen



U.S. HONEY, BEESWAX AND POLLEN PRICES FROM OUR REPORTERS

	North-east	Mid-east	South-east	South-west	East Central	West-Central	Inter-Mountain	West
Wholesale								
White lb. Blk	\$2.00-\$3.00	\$2.00-\$2.90	\$2.00-\$2.50	\$2.00-\$2.50	\$2.00-\$2.50	\$2.00-\$2.60	\$2.00-\$2.75	\$2.00-\$2.60
Amber lb. Blk	\$1.80-\$2.50	\$1.90-\$2.25	\$1.60-\$2.25	\$1.80-\$2.25	\$1.80-\$2.35	\$1.90-\$2.30	\$1.90-\$2.50	\$1.80-\$2.35
1 lb. CS 24	\$60.00-\$115.00	\$55.00-\$100.00	\$50.00-\$110.00	\$51.00-\$120.00	\$53.00-\$115.00	\$58.00-\$110.00	\$60.00-\$150.00	\$58.00-\$115.00
2 lb. CS 12	\$59.00-\$85.00	\$58.00-\$80.00	\$60.00-\$90.00	\$58.00-\$77.00	\$59.00-\$82.00	\$55.00-\$85.00	\$57.00-\$110.00	\$60.00-\$84.00
5 lb. CS 6	\$72.00-\$105.00	\$59.00-\$102.00	\$60.00-\$98.00	\$57.00-\$95.00	\$60.00-\$104.00	\$60.00-\$105.00	\$59.00-\$101.00	\$59.00-\$103.00
Retail								
Jars 8 oz.	\$2.50-\$4.00	\$2.40-\$4.00	\$2.25-\$3.95	\$2.20-\$3.90	\$2.50-\$4.50	\$2.40-\$4.00	\$2.00-\$4.00	\$2.25-\$3.90
Squeeze Bear 12 oz.	\$3.50-\$4.90	\$3.00-\$4.85	\$2.75-\$4.85	\$2.80-\$4.75	\$2.95-\$4.95	\$3.25-\$4.75	\$3.50-\$4.85	\$3.25-\$4.95
Jars 1 lb.	\$3.95-\$11.00	\$3.55-\$8.25	\$3.40-\$7.00	\$3.50-\$8.00	\$3.45-\$8.25	\$3.95-\$8.25	\$3.75-\$8.00	\$4.00-\$9.00
Jars 1 1/2 lb. (Pint)	\$5.50-\$13.00	\$5.25-\$10.00	\$5.50-\$9.70	\$5.45-\$10.00	\$4.25-\$9.50	\$5.50-\$9.50	\$4.75-\$10.00	\$4.75-\$10.25
Jars 2 lb.	\$7.99-\$14.00	\$6.95-\$10.50	\$5.99-\$10.49	\$6.00-\$11.25	\$6.25-\$11.00	\$6.95-\$10.50	\$6.25-\$11.25	\$6.50-\$11.50
Jars 3 lb. (Quart)	\$9.50-\$25.00	\$8.95-\$22.00	\$8.79-\$18.00	\$8.25-\$21.00	\$8.00-\$21.00	\$8.50-\$22.00	\$8.10-\$23.00	\$8.00-\$25.00
Jars 4 lb.	\$10.00-\$35.00	\$10.00-\$30.00	\$11.00-\$29.75	\$12.00-\$29.70	\$10.00-\$30.00	\$10.00-\$30.50	\$11.00-\$28.50	\$10.00-\$32.00
Jars 5 lb.	\$16.99-\$40.00	\$15.00-\$39.50	\$15.50-\$35.50	\$16.25-\$32.00	\$16.00-\$31.00	\$15.75-\$35.00	\$16.00-\$33.25	\$16.50-\$35.00
Creamed 12 oz.	\$5.50-\$7.50	\$5.50-\$7.00	\$5.49-\$6.95	\$5.25-\$6.99	\$5.50-\$6.25	\$5.40-\$7.25	\$4.75-\$7.00	\$5.25-\$7.25
Comb 12 oz.	\$6.00-\$14.00	\$5.50-\$13.00	\$5.25-\$13.25	\$5.50-\$13.50	\$5.50-\$14.75	\$5.50-\$14.50	\$5.50-\$13.75	\$5.75-\$13.50
Round Plas. Comb	\$5.00-\$8.50	\$4.50-\$8.50	\$4.50-\$7.50	\$4.00-\$8.25	\$4.25-\$8.99	\$4.00-\$7.50	\$4.25-\$7.00	\$4.50-\$8.50
1 Gallon	\$24.00-\$50.00	\$23.00-\$46.00	\$24.50-\$45.00	\$24.00-\$50.00	\$25.00-\$45.00	\$23.00-\$45.00	\$24.00-\$50.00	\$25.00-\$50.00
60 lb.	\$185.00-\$225.00	\$130.00-\$200.00	\$130.00-\$200.00	\$140.00-\$200.00	\$130.00-\$225.00	\$140.00-\$220.00	\$140.00-\$225.00	\$140.00-\$230.00
Beeswax								
Light per lb.	\$3.20-\$6.50	\$3.20-\$5.75	\$3.20-\$6.00	\$3.20-\$5.50	\$3.20-\$6.00	\$3.20-\$5.50	\$3.20-\$5.50	\$3.20-\$6.00
Dark per lb.	\$3.20-\$6.00	\$3.20-\$5.35	\$3.20-\$5.25	\$3.20-\$5.25	\$3.20-\$6.00	\$3.20-\$5.75	\$3.20-\$5.50	\$3.20-\$5.75
Pollen								
Wholesale per lb.	\$3.50-\$6.50	\$3.50-\$8.00	\$3.00-\$6.00	\$3.00-\$5.00	\$3.25-\$6.00	\$3.25-\$6.00	\$2.50-\$6.00	\$2.50-\$5.50
Retail per lb.	\$5.50-\$15.00	\$7.00-\$15.00	\$6.00-\$15.00	\$6.00-\$10.00	\$7.00-\$15.00	\$7.50-\$15.50	\$7.00-\$12.00	\$7.00-\$15.00

The above prices are not meant to provide a realistic picture of prices in all states of the particular area. They are intended merely to show what a few beekeepers are receiving for their honey, beeswax and pollen and we realize prices may vary tremendously, even within individual states. The bulk prices for honey are stated per pound, delivered buyer's warehouse, containers exchanged or furnished by buyer, unless otherwise noted. Where prices are not shown, insufficient data were available.

honey plant growth, but ski resorts would also like to have a good snow cover for optimal skiing conditions during this important tourist season. Some beekeepers had been feeding their colonies that were short on stores, but this has been difficult during colder weather. Beekeepers reported only fair to poor honey crops in 2014 in Nevada, Colorado and Utah. However, honey production was some better this year in parts of Idaho and Montana. Honey production figures in Montana have become especially important now that this state has become one of the leading honey-producing states in the country. Demand for honey continues to be strong at both the wholesale and retail levels.

Migratory beekeepers have been busy moving colonies mostly to California for almond pollination, but some are also still

going to southern states for buildup and later splitting.

WEST—Colonies have been streaming into California in preparation for the almond pollination season beginning later this month. Contract prices are ranging from \$170 to \$180 per colony for 8-frames of brood with bonuses awarded for stronger colonies. Beekeepers are doing everything possible to build up colonies now and bring them through the January and February cold weather with strong populations and lots of brood. This is quite a feat considering the rough weather that can sometimes hit the state during this period. Beekeepers have been feeding lots of syrup and pollen sub to colonies, as well as medicating them where necessary.

The rain that came earlier was very helpful over much of California in beginning to

HONEY MARKET FOR THE MONTH OF NOVEMBER 2014

In volumes of 10,000 pounds or greater unless otherwise stated

(From December 2014
USDA National Honey Report)

Prices paid to beekeepers for extracted, unprocessed honey in major producing states by packers, handlers & other large users, cents per pound, f.o.b. or delivered nearby, containers exchanged or returned, prompt delivery & payment unless otherwise stated.

-Report includes both new and old crop honey-

(# Some in Small Lot — +Some delayed payments or previous commitment)

Arkansas

Soybean Extra Light Amber \$1.96

California

Alfalfa Light Amber \$1.75

Clover White \$2.00 - \$2.15

Clover Light Amber \$1.70

Colorado

Alfalfa Extra Light Amber \$2.05

Dakota

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break the long drought. More rain is needed, as well as snow in the mountains for irrigation purposes. The added moisture will be very welcome to beekeepers as spring flows begin later this spring. Last season's honey production was very poor and, in addition, pollinators had to feed more because few natural nectar sources were available to help build-up. Oregon and Washington reporters also indicate receiving rains this

fall which should help ground moisture and early spring buildup.

As we indicated earlier, honey crops were down again in this area, so beekeeper and packer inventories are also low. Honey prices and demand are up at both the wholesale and retail levels.

ARGENTINA

Argentine honey exports between January-November of 2014 were 51,938 MT at an average FOB price of USD 3,741 per MT. In terms of volume, exports suffered a 16% sharp decline of 9,822 MT compared to the same period of 2013. During the first eleven months of 2013, Argentina had ex-

ported 61,300 MT at an average FOB price of USD 3,250 per MT. During 2014, exported honey experienced a price increase of 15%, which almost offset the lower volume. Interestingly, during both 2014 and 2013 the USA kept a 65/66 % share of Argentine shipments, while Germany also kept between a 10/11% share.

The outlook for the new 2014/2015 honey crop does not look encouraging. The honey harvest in northern subtropical Argentina was a failure and so far in the prairie region of Buenos Aires, Santa Fe and Entre Rios temperatures were lower than ideal to fos-

ter good nectar production. However, black thistles will be in full bloom until the middle of January, so weather permitting, beekeepers may still succeed in their expectations because ground moisture is exceptional for this time of the year.

The disparity between the US dollar at the black market and the government controlled market is 46%. Thus, exporters are forced to subsidize the inefficiency of non-competitive industries. Inflation during 2014 was over 42%. Argentina is one of the top six countries all over the world with the highest inflation rate.



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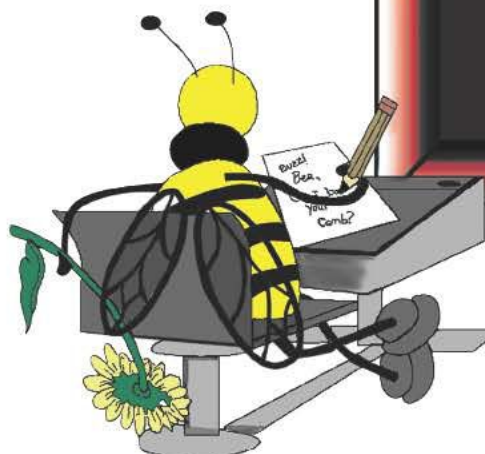
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The Classroom

by Jerry Hayes

Please send your questions to Jerry Hayes
Email: gwhayes54@yahoo.com



Q COLLOIDAL SILVER FOR BEE HEALTH?

Being a beginner beekeeper with 3 years to my credit, I always look forward to reading "The Classroom" upon receiving the ABJ. Many thanks for your answers and insight.

I have a friend who constructs colloidal silver generators. He gives them away to people of interest who have various ailments, and tells me often about people who have received a new lease on life due to the taking of silver suspended in water, at very minimal cost to them. His generators, once advertised on E-bay, were removed by request of the EPA, I was told. He recommended I propose this question to you... Have you ever heard of beekeepers treating their water sources with silver to promote bee colony health? It has been proven that viruses do not grow in the presence of silver...nor does bacteria or fungi. Bob tells me it costs pennies for him to prepare his daily glass of water.

Looking forward to the next issue of ABJ, and your Classroom :)

*With the love of bees in common,
Richard Ogden
Warner Springs, CA*

A

Good Morning Richard and thank you for the Classroom vote. The first thing I think of is that silver is a metal like steel, copper or aluminum and in high doses I don't think I want to consume a metal above my biological need for it like the iron we need for red blood cells. There is lots of anecdotal information about colloidal silver and how it helps or hinders or does nothing in

a variety of biological systems available. Remember, in the world of science correlation is not causation, meaning just because something happens in parallel with another event doesn't mean one was the cause or result of the other. As an example, many things are said to contribute to the rise of the diagnosis of autism in the US. The rise of autism can be directly "correlated" to the growth in sales of organic produce almost exactly. And for that matter, so does the rise in the sales of HD TV's and the number of Americans who ride their bikes to work every day. Do I personally believe any of these correlations....no, but some people do who like emotional correlations more than science and they are not causation. The European Union banned the use of colloidal silver for treatment of human disease in 2010, if memory serves me correctly. That tells you something right there.

No one has done a peer-reviewed study on the use of colloidal silver with honey bees. So, we just don't know. Would I use it personally on my honey bees? The answer is no simply because we have approved, researched and proven products, systems and processes that have been shown to work successfully on honey bee parasites, pests and pathogens. Why fill up a honey bee with metal silver particles and not know how it affects queens, drones, larval food, foraging behavior and all the things that a honey bee colony has to do in concert to be able to prepare to survive the next winter. Might be an interesting experiment to see if you kill them or not, but that is not why we are beekeepers, I don't think.

Q

OPEN FEEDING?

As we look at all the feeder boxes we pulled off our hives, my husband asked, "Why don't people put out community feeders in their yards instead of having to fill a feeder on each hive. It would be less disruptive to the bees also." I am referring to helping the hives build up for winter. Thank you for any insight you can give us.

*Laura Faust
Eastern Missouri Beekeepers Association*



A

"Community feeding" of apiaries can promote serious robbing and robbing can lead to loss of the weaker colonies in your apiary. Robbing does not always occur, but taking a chance on it starting is not something most beekeepers would want to risk. However, since you did not know this, your question is a perfectly logical and one that makes a lot of sense seeing how much time and labor it takes to feed each colony individually.

If your colonies are like mine, they are all separate and individual units — the sum of their bee parts, sometimes communally called a super organism. I have a small number of colonies, but enough to see that 30% are boomers, 30% are mediocre in the middle and 30% are junk. Managing each colony based on its own needs and your needs as the beekeeper is logical. Feeding is labor and resource intensive if you are looking to maximize whatever beekeeping goals you have set for this season. There are few

things that are consistent among honey bee colonies, cows, chickens, the fruit trees in your yard or kids you have or have raised. They all should be treated individually because they are different and they need those slight management/attention nuances so they can achieve their genetic best.

I think you can visualize those 6 o'clock news stories where people are hungry and they have no roads and the helicopters swoop in laden with food and water and blankets. Notice they never land. That is because the biggest, strongest, toughest individuals will engulf the helicopter and not only take the food but destroy the helicopter and its crew. So, the helicopter hovers and pushes the food out where the biggest, strongest, toughest take control of this resource. Hopefully they are also empathetic and the smallest, hungriest and weakest get some too.

The same thing happens if you open-feed your honey bees. The 30% that are boomers will dominate and take as much as they can. They are not empathetic. The 30% in the middle will get less and the 30% that are weak get very little if any. Instead of the 30% of boomers deciding who gets what, you the beekeeper need to manage the 30% in the middle and the 30% that are weak and make those decisions with certain management techniques that can make them also become boomers. That means feeding, treating and doing all the other stuff individually.

To get the best results from your colonies, you, the Beekeeper Manager, have to make decisions for each colony as a separate unit based on what you see when you open each colony. You need to assess things like: What season is it? What your Varroa sampling shows? Is the queen laying? And, the dozens of other inputs you get from the colony. It isn't easy and the more colonies you get, the harder this gets, but it is the best way to manage for success.

Q HONEY CRYSTALLIZATION

I run a pumpkin patch in central Minnesota and I sell most of my honey in my serve-yourself pumpkin stand. I am having some trouble with honey starting to crystallize. I presume from the outdoor temperatures? Any ideas? Is there a temperature that I need to stay above or below to keep my honey from looking bad?

*Thanks much, love your articles,
Dick Hanson*

A

Here is a slightly longish Jerry answer. Honey is a super-saturated sugar solution. All honey sugar profiles are slightly different because each flower produces nectar



with different sugar ratios. So, when you have a naturally blended product as honey bee foragers visit and collect a variety of nectars, there is large variability. The ratios of the sugars fructose and glucose determine how fast the honey granulates or crystallizes. Some honeys do not granulate at all because these ratios are already balanced. Honey crystallization is a normal, natural process and is actually encouraged in many parts of the world since it makes eating and using honey easier when it is a semi-solid.

To balance itself in this super-saturated solution (honey), the glucose will precipitate out and form sugar crystals. Fructose is more water soluble, so it stays in solution. Temperature also influences how fast this sugar balancing/crystallization takes place. A temperature between 52 and 59 degrees F encourages crystallization. Below 52F, even to freezing, crystallization slows. Above 77 degrees F crystallization slows as well. Above about 100 degrees F the honey degrades and produces off flavor and color chemicals.

Sorry the honey looks bad, but this might be a consumer education process as this indicates a pure natural process. And, if you wanted to take advantage of this natural process, you could produce your own wonderful crystallized honey spread. Search up "Dyce Process" on the internet. In the meantime, if you want to reliquify this honey, a hot water bath in a large pot with the honey still in jars will be needed. Not boiling, but about 100 F to 125 F with a quick heat up and fast cool down so the honey does not degrade, darken and taste poorly.

Q ROBOBEES

Jerry—have you seen this you-tube film? www.robobees.info

Did the AgChem companies actually partner with Greenpeace to produce this or is it a blatant poke at the companies? Maybe you can help me out with wrapping my head around the politics here—hope all is well with you.



A

It was produced by Greenpeace. There is an actual lab at Harvard working on 'robo bees', but I think it's more of a robotics/engineering goal than a 'replace pollinators' goal. Activists seized on this and have used it to claim big ag is behind it all. Everybody has an agenda. Agendas are great, but truthful agendas are better. And then, there are agendas designed for fund raising.

Just an FYI. Back in the 1960s, a French Marxist-turned-devout-Catholic theologian named Jacques Ellul wrote a book entitled "Propaganda." One of the many points he made from his research was that the more educated you are, the more susceptible you are to propaganda. It flies in the face of what we might normally believe – that the less educated are more susceptible.

His point was that the more educated you are, the more you depend upon what you read and the more you are shaped by your worldview. The less educated you are, the more you depend upon your own direct experiences. So, I guess fund raising is better through educated people, regardless of truth being sacrificed.

Q WHY DON'T ALMOND GROWERS OWN THEIR OWN COLONIES FOR POLLINATION?

I believe we met at SXSW Eco this year. I help run a local nonprofit that helps bees by rescuing them from situations where they normally would have been exterminated (house infestations, etc).

I had a curiosity, and I hope you might be able to shed light on it. Why is it that almond growers pay exorbitant prices for renting out these hives and not just purchase them and pay a beekeeper 50k a year to look after them?

Maybe the math is not adding up right for me, but it seems that for the price some pay yearly for basically a month of pollination, they could buy their own as an investment and pay someone to tend to them throughout the year.

Am I missing something?

Cameron Barnette



A

Cameron, this is an often-asked question from nonbeekeepers who do not realize how much work, time and money go into keeping colonies alive and productive throughout the year. You must also realize that the costs for a hired beekeeper/manager would only be part of the cost of keeping an almond grower's colonies alive and productive. There would also be the initial cost of setting up or buying the colonies, as well as all the yearly moving and fuel costs, equipment replacement, feed and medication costs, even if you never planned to extract any of the honey.

I would argue with you that the rental fees for productive honey bee colonies are not exorbitant. Yield per acre for almonds hovers around 3,000 lbs per acre with a huge dollar value. There are production costs associated with this, but without a honey bee taking pollen from point A to point B, yield drops precipitously. I would say honey bees are deserving of a higher rental fee considering how hard it is to keep colonies alive, let alone meet colony strength standards for pollination.

Some of the largest almond growers have been purchasing colonies the last several years to test this model. The challenge has been what happens to the bees the other 11 months of the year; who manages them and who is liable for what happens when a certain percentage of them die or are weak? Lots of management questions to work out. No simple answers.

Q MOVING COLONIES

Not sure if it is a sign of climate warming or not, but something strange happened this year with my garlic crop. Normally I don't see any shoots up until January or February. But this year it was all up by the end of October, and was 6" tall by early November. I guess it was because of the warm weather. But winter has finally arrived in the Pacific Northwest, and we have had a week of cold weather. I think it is time for me to start moving my bees. We have a lot of black bear in our area, and so when I started with honey bees 4 years ago, I placed my hives on my roof. This has worked out well for me, but it is time to start thinking about a new roof. That means moving the bees. The normal recommendation is to move honey bees 3 feet or 3 miles. But in the winter, the bees are inside most of the time. Here in the foothills of the Cascades, we can have cold rainy weather for a few weeks at a time. Would it be possible for me to move them a shorter distance during a cold spell like that? Say 300 feet or so? It would make it so much easier than having to move them miles away and then back.

Thanks so much,
Roger



A

Yes, if you can gauge the front end and the back end of a cold rainy spell so that the bees are confined for 10-14 days, then you can carefully move them and have some but not a lot of the original imprinted foragers return to the original location. If you can wait for February, then most of the old foragers will be dead anyway. If not, expect a few to show back up at the original colony location from a short move.

Be careful that in cold below 57 F that you are as gentle as possible in moving, so clusters are not totally dislodged and bees and queens exposed to an unregulated cold and can't reorganize into a safe, warm cluster.

Q

VARROA ATTRACTANT?

What efforts have been put into finding out what attracts the varroa to enter the cell of a pupa at the proper time. That "lure" would seem to be the holy grail in that a comb trap could be used to fight our little enemy.

Greg Cooke
Conn.



A

There have been some significant efforts along this path. The original host of *Varroa* is the Asian species of honey bee, *Apis cerana*. On *Apis cerana* the *Varroa* is a "good parasite" as it only reproduces on

drone brood. Drone brood produces its own pheromone odor signature that alerts and directs *Varroa* to them. Drone brood is used by *Varroa* to reproduce because it takes a few extra days for drones to develop and mature before emerging and it gives *Varroa* enough time for them to reproduce as well.

When the first female *Varroa* had that natural genetic mutation that allowed her to reproduce on the western honey bee, *Apis mellifera*, that we use, she figured out how to reproduce not only on drone brood, but worker brood as well. That is why we have a problem.

Several years ago the USDA, CMAVE (Center for Medical, Agricultural and Veterinary Entomology) Lab in Gainesville, Florida, under the direction of Dr. Baldwin Torto, worked on developing a *Varroa* 'lure' based of drone pheromones. They got close, but because *Varroa* now can detect and look for worker brood to reproduce on, it wasn't effective enough to commercialize it.

The balance of worker, drone and queen pheromones is so delicate in a colony that coming up with the right 'lure' is possible, but will take more work. If you introduce the wrong combinations of pheromones or the wrong ratios, colony health is also disrupted. It is that darn balance thing again.

Good thinking Greg.

Q "BEES" ATTRACTED TO LIGHT

I live in Pass Christian, MS and for the last 4 weeks, every time it gets dark and I turn on my porch light, it is swarmed with honey bees and at 5 in the morning you can find me sweeping up dead or crawling around, erratic bees. I am trying to find out if I should be concerned. I have never seen bees act like this before. Any information or help would be much appreciated.

Mindy
Mississippi

A

Honey Bees are attracted to light just like many other insects. My first question is: Are you sure they are honey bees? There are many other insects that might be confused with honey bees at times. Sometimes there may be a feral honey bee colony close to a light source that may be attracted to it. I



spent many years as the Chief of the Apiary Section in Florida and there is a sub-strain of more defensive honey bees called African Bees that are more attracted to artificial light sources. These particular honey bees have been found moving across Louisiana and perhaps Mississippi.

This is an unusual circumstance and not one that indicates any particular honey bee health issue. If you could locate the hive and beekeeper, if these are hive-kept bees, then you could reason with the beekeeper about possibly moving them elsewhere.

GLUTEN COMMENT

I enjoy reading your answers in the *Bee Journal*, but was very dismayed at your answer, the "Readers Digest" version, to the gluten-free honey question (October 2014). I happen to be one of the 1/133 people who has a gluten intolerance. I will agree with you that there are lots of companies making huge profits from gluten-sensitive people who refuse to change their habitual gluten-laden junk food diets and from those crash dieters who are willing to jump on the latest fad for "health." However, you would be amazed at the products companies have added gluten to for no reason. These products include shampoos, soaps, sunscreens, etc.

I have yet to see it labeled on honey, but would not be surprised if the cheaper honey products do contain traces of gluten or wheat. There are many products you would never suspect as containing gluten until a gluten-sensitive person like me uses a product and breaks out in hives or suffers from days of nausea and migraines. So, I am asking, please reconsider your answer. I am not expecting a reply in print, but "gluten-free" is not hype when you are actually the person suffering and living day-to-day, wondering when you will be adversely affected by the next hidden gluten source. Thank you for your time,

Jennifer Stanford

GLUTEN

A

I am sorry that you are one of those who are sensitive to gluten. I have an Aunt who developed the sensitivity as she got older—certainly no fun. However, I do get very tired of those who work the ignorance of the general public and plant fear and confusion just to make a dollar when there are real people who are suffering.

I guess my thought was to make people aware of this strategy by business to manipulate by emotion. But, be knowledgeable that this is a very real condition in a small minority of our friends and neighbors and

have the respect and caring for these real sufferers.

Q

HONEY BEE NUTRITION

Hello my name is Kaleb and I am doing a management project in a class on honey bees. I read the journal every month and enjoy your Classroom. I was wondering if you could help me. I have to do a paper on honey bee nutrition, but am having a hard time coming up with ideas. I know there is better bee food, but how do I describe this to someone else? Thank you for your help.

Kaleb Woody



A

The short story on honey bee supplemental or substitute diets is that there are no nutritionally complete artificial diets on the market. Cost is an issue, so off-the-shelf raw ingredients such as soy flour, or dried egg yolks or brewer's yeast have been traditionally used to formulate a honey bee food. The honey bee's protein, vitamins, fats, minerals, etc. come from flower pollen collected by forager honey bees and then prepared for fermentation to release nutrients and preserve them for storage as bee bread. Honey bees do not eat soy flour, dried egg yolks or brewer's yeast very well, if at all.

Then, we have the situation where a patty of something is placed inside of a colony on the top bars of frames. Honey bees do not always recognize this as a place to find food. Sure, they can be attracted to it if you put enough sugar in it, but that doesn't mean they are eating it. Mostly they are sucking the sugar off of it and dragging the rest of the patty out as trash because honey bees do not find food in their colony in a lump on the top bars.

If someone could invent a cost-competitive artificial honey bee diet that was actually eaten and digested and it brought health value to the colony, that would be a game changer in so many ways.



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MISSOURI HEALTH INSPECTOR GETS COOL RECEPTION AT FALL CONFERENCE

by EUGENE MAKOVEC*



Enforcement of obscure honey sales regulation is at issue

The Missouri State Beekeepers Association drew 180 attendees to Jefferson City in October for its annual Fall Conference. One of the breakout sessions was billed as “Keeping Bees and Selling Honey in Missouri: An Open Forum Discussion on the Rules and Regulations.” Moderated by MSBA Vice President Valerie Duever, it featured Virginia Phillips, Missouri environmental public health specialist, and representatives of three other departments – each of whom would presumably tell a little of what they were about before the forum was opened up to questions.

Things did not go quite according to plan.

Ms. Phillips was up first, to discuss state regulations on food processing as they relate to honey. At issue was the state’s requirement that any honey sold through a third party must be “processed” in an “inspected kitchen”, while honey sold directly to the consumer is exempt. Many small beekeepers sell honey through corner markets, gift shops and other retailers, and have been doing so without incident for years, but regulators have recently stepped up enforcement of a little-known rule that apparently has been on the books for decades.

Virginia had a PowerPoint presentation ready to go, but did not get past her introduction before the questions began. The resulting dialogue took on the feel of a lawyer presenting oral arguments in front of an unsympathetic Supreme Court.

First came a spirited discussion about the definition of “food processing”, which a couple of questioners defined, in the conventional way, as the making of a food product by mixing or modifying ingredients

- leading them to wonder what it has to do with the bottling of pure honey. Virginia, however, defined the term much more broadly to include virtually any handling of a food product. As such, she said, “honey processing” is subject to state regulations requiring an “inspected kitchen” - except in cases where the product is to be sold directly, and in person, to the end user.

What difference does it make, someone asked, whether it’s sold directly or indirectly, when it’s the same honey, in the same bottle, with the same label? Virginia responded that if you sell directly to the consumer, he or she can ask you questions about the product. But even then, she added, the law requires the product to contain a label stating that it was not inspected by the state.

Beekeepers in other states have dealt with similar issues over the years.

“Where do we get those labels?” asked a woman toward the back of the room.

Virginia smiled. “You get to provide those labels yourself.” In fact, it should be noted that if one is selling honey at a farmers’ market, craft show or other such display, a prominent placard is also required, stating the same warning to the public.

As for honey processing, it isn’t just bottling, said Virginia; it begins at the point when a frame is uncapped. “So it doesn’t apply to comb honey?” one man asked. Actually it does, she clarified, as you are cutting the combs out of the frame for packaging.

“So Ross Rounds are okay?” someone else asked, noting that these are self-contained and would thus fall outside that definition. Nope, came the reply - just removing it from the hive counts as processing, as that exposes it to an environment where it could become contaminated. All stages of the operation, therefore, need to be conducted in an inspected kitchen.

She was then asked about picking apples from a tree; isn’t that food processing too? No, she said, as the apple is still the same as when it was on the tree. Packaging of uncut fruits and vegetables does not fall under guidelines on food processing; only once they are cut do they become subject to regulation.

We then moved on to the topic of food-borne illness, with the question being, just what is the government trying to protect us from with these rules? Virginia cited botulism, which this writer described as “really a non-issue”.

“It’s an issue to the babies who die from it,” she retorted.

“Yes,” I said, “but it’s very rare, and has nothing to do with how I bottle my honey.”

“That’s true,” she conceded, but added that honey can be contaminated or even adulterated during “processing”. She offered no other examples of food-borne illnesses related to honey contamination, nor an explanation of how an inspected kitchen would prevent someone from adulterating honey.

Regarding the criteria for such an “inspected kitchen”, Virginia did say that it was not the same as the “certified kitchen” required in a restaurant or bakery. Through a series of questions, we established the following stipulations: The kitchen can be located in one’s home, but must be separate from the primary home kitchen, and must include a separate hand-washing sink, washable walls and ceiling, and a floor

*Eugene Makovec is editor of the Missouri State Beekeepers Association Newsletter



Virginia Phillips, Missouri environmental public health specialist, speaking and the others looking on. They are (left to right): Cindy Thompson, Department of Agriculture, Ag Business Development; Anastasia Becker, Integrated Pest Management Program; and Ian Brown, Missouri State Bee Inspector.

drain. If a separate building is used, it must include its own bathroom, and all sink and floor drains must be connected to a proper sewer or septic system.

Several attendees cited the impracticality of having to rent such a facility for all stages of production, necessitating numerous trips to bottle different sizes as needed. Others complained of the impossibly high cost for small-time beekeepers of building such facilities for themselves.

Virginia's suggestion was that local bee clubs host extracting days at approved sites where members can all extract honey together. So, someone asked, can members extract their honey into food grade buckets that day and bottle at home as needed? No, she said, all bottling needs to be done in an inspected kitchen as well.

As for the others on the dais, Valerie, our moderator, finally intervened to give them each a chance to plug their own roles in state government. But even an explanation of the state's Agri-Missouri program, which promotes members' products at the State Fair and other events, led back to a discussion of regulations that beekeepers need to follow in order to qualify.

At one point, Virginia clicked through part of her slide show, which included a photo of her own beehive in St. Louis. "I'm a beekeeper too," she said. "I know how proud you are of your product." But she had long since lost the crowd, and this attempt to present the state's regulatory face

as "one of us" did not appear to mitigate the widespread feeling that the rules she is tasked with enforcing are both unrealistic and unnecessary.

ILLINOIS BEEKEEPERS CHANGED THE LAW

On July 13, 2010, the Illinois General Assembly passed legislation that amends the Illinois Food, Drug and Cosmetic Act (FDCA) to define raw, unadulterated honey (whether in the comb or extracted) as a raw agricultural commodity. As a result, The Illinois Department of Public Health (IDPH) does not have authority to regulate comb honey or unadulterated honey extracted from the comb (410 ILCS 620/27). Further, the legislation amends the Sanitary Food Preparation Act to prohibit IDPH from inspecting honey houses of producers who sell less than 500 gallons of honey per year (410 ILCS 650/7(b)). The Act defines a honey house as "any stationary or portable building or any room or place with a building that is used for the purpose of extracting, processing, or other handling of honey" (410 ILCS 650/7(a)). The effect of the amended legislation is to make it easier for beekeepers to sell their products to retailers and farmers' markets. The Illinois State Beekeepers Association (ISBA) website has additional information about the changes to the law.



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Missouri Honey Regulation Has Little to Do With Public Safety

by Eugene Makovec

Even before she signed on for the Missouri State Beekeepers Association's Fall Conference, I had arranged for Virginia Phillips to speak in November to Three Rivers Beekeepers, a local club based in St. Charles County. Virginia is a Food Processor Inspector with the Missouri Department of Health and Senior Services, and the person to whom I was referred the day my honey was pulled from the shelves of a small grocery in adjacent Lincoln County.

Unfortunately, Ms. Phillips did not show up at Three Rivers, explaining days later that she'd forgotten due to a sick child. But we were fortunate to have a former state inspector in the audience, who got up and offered a semi-official explanation of the regulations. He began by citing the 1980s Tylenol tampering scare and the 9-11 terrorist attacks as justification for these types of regulations, but admitted upon questioning that neither tampering nor terrorism would be prevented by an inspected kitchen. And like Virginia, he could offer no examples of food-borne illnesses prevented by the state's "honey processing" rules. He did, however, candidly advise us that there is no point in seeking regulatory relief from the regulators themselves; that needs to come from the legislature.

By way of background, I first received a call in late August from a Lincoln County health inspector, who informed me that she'd removed my product from the aforementioned store shelves, and asked if I had an "inspected kitchen". I said I did not, and that I was unaware of any such requirement by Lincoln County. "It's not Lincoln County," she replied, explaining that her department is also tasked with enforcement of state regulations.

"So what's changed?" I asked her. I argued that I'd had honey in that store for over a year, and in other markets previously for over 15 years. I asked her if this action was in response to a complaint, or if all local beekeepers could now expect such treatment. "The state has been training us" on enforcement of rules pertaining to honey, she explained.

I then asked if she could cite the law in question so I could look it up. "No," she said, "but I can give you a phone number for someone who can." That someone was Virginia Phillips.

It took Virginia a week to return my calls, but when she did she was very nice. "My husband and I used to be beekeepers," she said, explaining that she understood how I felt. She graciously offered to speak to our local club to explain the rules, so I scheduled her for November. I also brought the issue to the attention of some fellow MSBA board members, who scheduled her to speak at the state meeting in October.

I would like to think that Virginia's failure to make her scheduled appearance at Three Rivers had nothing to do with the cool reception she'd received in Jeff City. But the truth is, while most of the questioners at the state meeting were polite, it quickly became clear that we had little respect for the message she was delivering.

Virginia was a good sport throughout, exercising patience and a sense of humor. But from her department's expansive definition of "food processing", to the regulations' arbitrary exemptions, to her inability to cite past health hazards from unregulated honey, Virginia failed to in any way justify the state's newfound desire to inconvenience the hundreds of small-time Missouri beekeepers who currently sell honey through third-party vendors.

Someone in the audience asked the same question I had asked during my first phone conversation with Virginia: Why the distinction between the product I sell direct and what I sell through a third party, when it's the same honey? She gave him the same response she'd given me - that the direct buyer can ask the seller questions about that honey. I didn't get it then, and I don't get it now.

I have sold thousands of bottles of honey through third-party vendors since the late '90s. During that time I've had the occasional customer question referred back to me, but none have had anything to do with product safety. They have, in fact, been the same kinds of questions I am asked by direct customers, such as:

- Where are your bees located (i.e., how "local" is this honey)?
- Why is this honey a different color than what I bought last fall?
- Why does this honey taste so much better than what I buy in the supermarket?
- Can I buy this in a larger size?

Frankly, the law's distinction between direct and indirect sales makes no sense in terms of safety, as the product and the package are exactly the same. And what of the same law's distinction between sales of under \$30,000 per year and those over that threshold? (The larger-scale seller is stuck with these kitchen regs for both direct and indirect sales.) Does the company that

grosses \$30,000 in sales care less about its product than someone who sells only \$29,000? These kinds of rules are always presented as being about safety, but when they start writing meaningless exemptions, they disprove their own premise.

Further, Virginia's suggestion that the local club simply host an extracting day for everyone at an approved kitchen displays a curious lack of understanding of the process. The fact is, some local clubs host extraction days now, for the benefit of members who do not have their own extractors, but this is not normally done in an inspected kitchen.

Furthermore, club extraction events are geared to those with small amounts of honey, and attendees are in fact limited to small amounts in order to give everyone a chance. If we're talking about people who actually produce enough honey to want to sell through a third party, it would be all but impossible to find an approved facility large enough to accommodate even a dozen such folks with all their supers and containers, and with adequate counter space for all of them to bottle all of their honey in a very limited time frame.

Not to mention, you'd be hard put to find such a beekeeper who bottles every bit of that honey on the day of extraction. Not only is honey for sale typically bottled as needed in whatever sizes are currently in demand, but care is usually taken to avoid bottling so much that it ends up crystallizing in the bottle.

Now, to the subject of "contamination", which our speaker said becomes possible as soon as we pull honey off the hive. At the risk of giving the regulators ideas, what about contamination between the hive and the inspected kitchen? What about every time I open the hive and pull frames out for inspection? How about when I open the hive a few days before extraction, to move frames around, consolidate the full ones into one super and the empty or uncapped ones into another? By Virginia's definition, that is food processing, and should take place in a sanitized environment.

Perhaps the state should mandate that the hive itself be permanently located in an inspected kitchen, with a food-grade plastic tube connecting to the outside environment. But then, how would we regulate the bees' whereabouts when they are outside the hive? Bees have been seen collecting water from mud puddles and stagnant ponds; should I spray the tube with disinfectant spray once a day to ensure that all colony members "wipe their feet" upon entrance?

I know, I'm being ridiculous now. So I will simply ask once again: Just *what* is the state protecting us *from*? What food-borne illnesses were commonly associated with honey consumption before the state stepped in to make work for its inspectors?

To define one of nature's purest and most perfect products as a "processed food" is to besmirch our reputation as beekeepers and insult the intelligence of our customers. To further force us to clutter our packaging with a "WARNING: UNINSPECTED!" label implies an inherent danger for which there is no supporting evidence.

The consumer who seeks out local honey at his local market has a favorable, and accurate, understanding of it as a wholesome and healthy food product. He does not need the state to protect him by making that product more expensive and harder to find.

Preventing small-scale beekeepers from selling honey in local shops denies choice to consumers. It causes marginal harm to the many small grocers, quick shops, gas stations, feed stores and similar venues who currently supply sought-after local honey. But it significantly impacts the ability of beekeepers to support their hobbies or sideline businesses - which, by the way, provide valuable pollination services to their local farmers and gardeners, mostly at no charge.

It's no secret that this is personal for me. Some have suggested that it would be best not to make a big deal of this. Perhaps the state is just making a point with a handful of "busts", and if we keep a low profile, they will again lose interest and go after real problems.

But I believe there is a larger issue here. This is a regulation with no logic or justification to support it. Even if they back off for awhile, why should we forever live in fear of the next crackdown? We need to change the law.

Since the advent of CCD and subsequent wall-to-wall media coverage, honey bees and beekeepers are appreciated like never before. If the storyline becomes a struggle between small-time beekeepers, struggling to keep afloat, and an overbearing regulatory state preventing them from selling their wares, we'll win the PR battle hands down.

Our Missouri governor and his wife are proven friends of beekeeping. Our legislature, like that of many states, is dominated by Republicans who profess a desire for limited government. The time to act is now.



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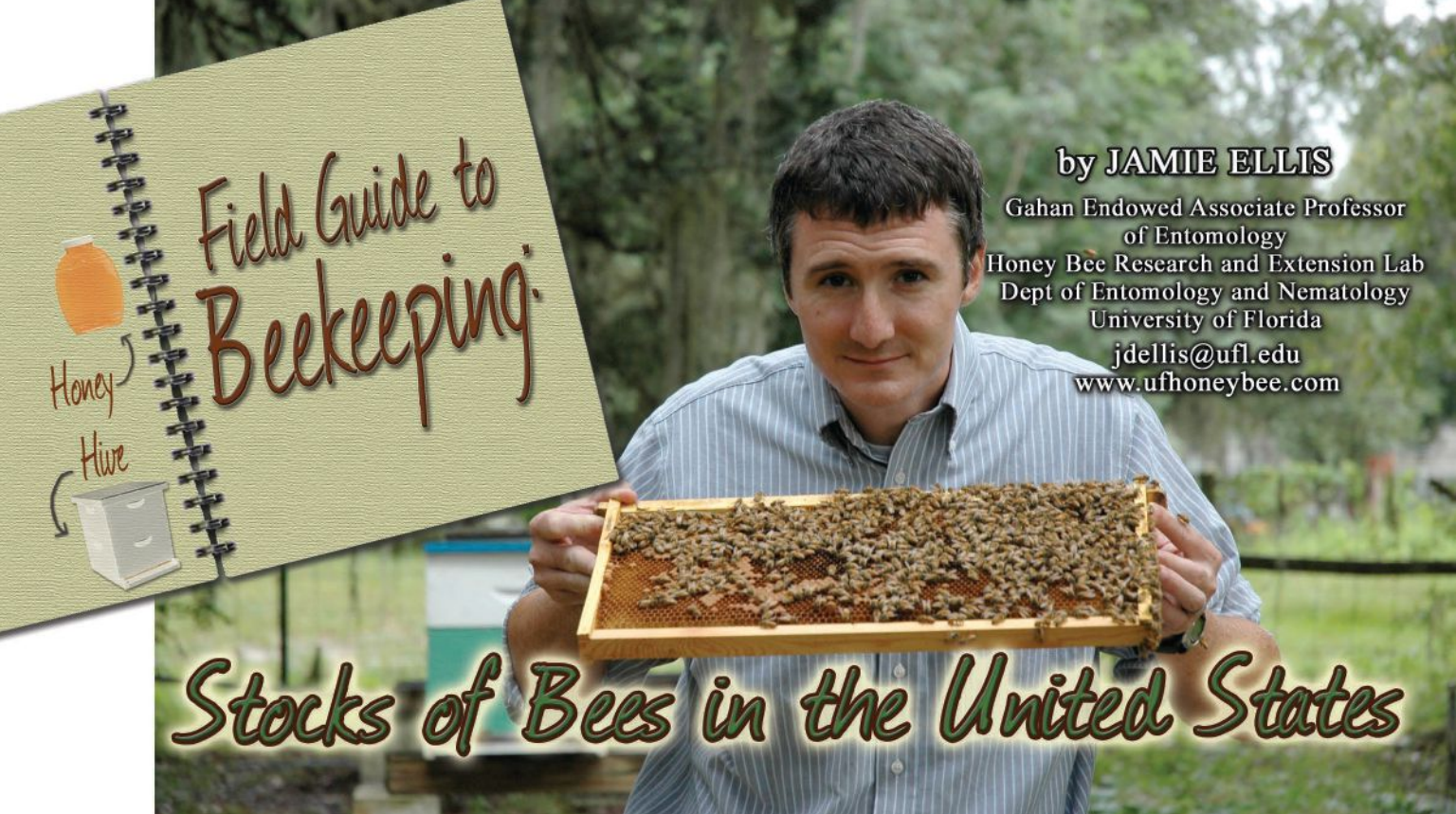


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by JAMIE ELLIS

Gahan Endowed Associate Professor
of Entomology
Honey Bee Research and Extension Lab
Dept of Entomology and Nematology
University of Florida
jdellis@ufl.edu
www.ufhoneybee.com

Stocks of Bees in the United States

All beekeepers must choose the type of bee that will be the workhorse of their beekeeping operations. Which bee to use can be the subject of intense debate among beekeepers. Should you use Russian bees or Minnesota hygienic bees? Which is better: Italian or New World Carniolan bees? The answers to these questions are not easy. There are, in fact, no right answers to these questions. The average beekeeper will use multiple types of bees during his or her journey through beekeeping. Part of the joy of beekeeping is figuring out which bee(s) is best for you.

What is a honey bee “stock”?

There are a number of terms associated with types of a given organism. These include breed, line, stock, pedigree, etc. Some use these terms interchangeably with the terms subspecies or race. However, each term has its own definition and it is important to use the right one when discussing the types of honey bees available in the U.S.

To understand “type terminology” best, it is important to appreciate a little about honey bee biogeography. There are multiple species of honey bees in the world, perhaps 7-9 depending on who you ask. We use the one species whose natural distribution is exclusively outside of Asia: *Apis mellifera*, the western honey bee. Western honey bees are distributed naturally in Europe, Africa, and parts of the Middle East.

Apis mellifera, as a species, can be divided further into subspecies, or races. The race name would be the third name in the Latin designation. For example, *Apis mellifera ligustica* is the Italian honey bee, with the race or subspecies name being *ligustica*.

Races of honey bees each have unique physical and behavioral attributes and typically a limited geographic distribution, all of which allow them to be distinguished from other races of western honey bees. These differing attributes, or “phenotypes” as scientists would say, confer varying characteristics to the bees, meaning that no two races of honey bees are exactly alike. It is this diversity that is celebrated among beekeepers as it produces bees with varying characteristics that are more/less desirable, depending on the view and management practices of the beekeeper. For example, some bee races swarm more than do others. Some bee races can be quite defensive while others tend not to sting as much. Some bee races overwinter better than do other bee races. Thus, beekeepers are free to choose a race that works best for them, in their particular management system.

Europeans brought honey bees to North America hundreds of years ago. Consequently, the honey bees that we use mostly descend from European races of honey bees. I say “mostly” because we do have one African race of honey bee in the Americas. This is the “killer” bee of lore – *Apis mellifera scutellata*. The various races of western honey bees can hybridize with one another. To be fair and accurate, we no longer have European races of honey bees in the U.S. Instead, the bees we use are derived from purposeful and/or natural breeding between the various European races that were introduced into the U.S. I like to use the designations “European-derived” or “African-derived” honey bees when discussing the bees we have in the U.S. After all, they are no longer European or African! The lines maintained

from the original or subsequent introductions of honey bees into the U.S. can be considered “stocks.”

I provide two good quotes that will help explain what I mean when using the term “stock.” First, Dr. Al Dietz explained the concept of bee races, and how we use them in breeding. He noted:

“The geographic races of bees are the results of natural selection in their homeland. That is, the bees became adjusted to their original environment, but not always to the economic requirements of beekeepers. Therefore, they are not the result, but the raw material for breeding.” – Dietz, A. 1992. Honey bees of the world. *The Hive and the Honey Bee* (J. Graham, ed.), Dadant and Sons, Hamilton, IL, USA. 1324 pp.

I really like Dr. Dietz’s description of a race and how he noted that bee races provide the raw material for breeding, ultimately producing the stocks that we have in the U.S. today.

Second, Dr. David Tarpy wrote a North Carolina State University Extension Bulletin and made the following statement on bee stocks:

“The term “stock” is defined as a loose combination of traits that characterize a particular group of bees. Such groups can be divided by species, race, region, population, or breeding line in a commercial operation. Many of the current “stocks” in the United States can be grouped at one or more of these levels...” – David Tarpy, 2005. The Different Types of Honey Bees. AG-645, NC State University, Cooperative Extension Service, <http://www.cals.ncsu.edu/entomology/apiculture/pdfs/1.12%20copy.pdf>.

It technically is incorrect to claim that we use one race or another in our beekeeping operations. We have *stocks* of honey bees that originated from multiple European races and one African race, or crosses between the races. Granted, some of the bees available for purchase may exhibit characteristics principally associated with a given race, but they almost certainly are not pure, unadulterated descendants of the original bees of that race. For example, you might purchase Italian-derived honey bees that are yellow in color, produce large colonies, are relatively gentle, and are prolific honey producers. However, they almost certainly are not “pure” Italian honey bees, descended from the original stocks imported into the U.S. Genetic analyses of honey bees across the U.S. support this assertion.

Points to consider when deciding which bee stock to use

There are five key considerations one must remember when searching for and purchasing one’s bee of choice. First, many bee breeders claim to raise a given bee race. However, I hope you now appreciate that there are no “pure” races of European honey bees in the U.S. Most of the race designations are assigned based on a given queen’s color, the color of the queen’s offspring, and sometimes on the colony’s behavioral attributes. Color can vary tremendously within a given bee stock (see Figure 1 as a great example). Thus, a bee’s color cannot be the sole indicator of its race. Furthermore, even a queen that is true-to-race (i.e. “pure”) supplies only ½ of the genes carried by her female offspring. Given that queens mate in the air, away from the nest, usually with multiple, unrelated drones, I suspect that most bees available for purchase in the U.S. are mixtures of multiple stocks. I have known beekeepers who breed multiple stocks of honey bees in the same apiary, selling the queen offspring based solely on the color of the queen. Hmmmmmm.....

Second, not all members of a bee stock exhibit the same characteristics. Biology is messy, necessarily so. Yet, beekeepers have been working with the various stocks long enough to note the general characteristics of each bee stock. Italian bees illustrate this point well. Italian honey bees generally are docile compared to African honey bees. Of course, some colonies of Italian honey bees can be very defensive (very, *very*, defensive). So, as a stock, they have average defensive tendencies. However, this tendency toward gentleness can vary over the stock. There are outliers for each attribute in each stock. Colonies of all bee races have the ability to break the mold, so-to-speak. Again, the extension bulletin developed by Dr. David Tarpy at North Carolina State University summarizes this well:

“Wide variation exists within the stocks as well as among them. Any generalities about a particular stock should be treated with caution, since there are always exceptions to the rule. Nonethe-

less, the long and vast experience of beekeepers allows some oversimplifications to be made in order to better understand the different types of bees available.” David Tarpy, 2005. The Different Types of Honey Bees. AG-645, NC State University, Cooperative Extension Service, <http://www.cals.ncsu.edu/entomology/apiculture/pdfs/1.12%20copy.pdf>.

Third, I believe bee management is a greater determinant of the success of a given bee stock than even the bee’s typical characteristics. I note this because it is common for beekeepers to spend money on a stock of bee that they feel best meets all of their needs. They, then, have a bad experience with the stock and feel that it fails to live up to its billing, ultimately abandoning the stock in disappointment. I especially see this a lot when people purchase and use resistant stocks of bees. They purchase a bee reportedly resistant to something and then do not give it a fair chance, or they misuse it and

abandon the stock forever. In practice, a bee stock must be used longer than a year, or maybe even two, before one can know if it will work for them. Regardless, a good bee in the hands of a bad beekeeper becomes a bad bee.

Fourth, be selective when choosing where to purchase your queens. Just because a breeder says a queen is a given race or stock does not make the queen the given race or stock. I always tell people to go straight to the source with questions about a given stock. For example, it often is a university, federal research group, or queen breeder association that is trying to produce a given stock. Therefore, I tell seekers to go to these sources when wanting to find the bee that most typifies the stock. When in doubt, (1) ask other beekeepers, (2) search the web, or (3) look in the beekeeping literature for sources of queens of a given stock. You can find a good list of bee suppliers in the U.S. at <http://www.beesource.com/bees-supplies/united-states/>. More state-specific information on sources of bees typically can be found on each state’s beekeepers’ association website. Finally, you are reading this article in the *American Bee Journal*. Just flip through the pages of the magazine and you will see advertisements for a number of bee breeders/stock providers.

Fifth, you can lose the traits of a given bee the moment the queen dies, swarms, or is superseded. This is very important to remember. You can go through a lot of effort and expense to purchase and use a queen of a given stock. However, the characteristics of that stock can be lost the moment the queen is lost and resulting daughter mates with drones from other colonies in the area. If you plan to use a given stock exclusively, you will have to either (1) ensure that your apiary is located 3+ miles from feral or managed honey bees or (2) make plans to requeen the colonies yearly with queens from a breeder specializing in the stock. You should know that the F₁ (or daughter) crosses of your stock can produce significantly less desirable bees. For example, Buckfast and Russian queens produce workers with average defensive tendencies but daughter queens crossing with drones from other stocks can produce bees with a significantly higher defensive tendency.

The bee stocks

In Table 1, I summarize the major attributes of each of the main bee stocks in the U.S. I do this in a manner that allows you to compare the bee stocks directly. I chose the characteristics I discuss in the table because they are the ones most mentioned in the literature. However, there are a few additional points I would like to make about each stock.

1) *Apis mellifera ligustica* (the Italian honey bee – Figure 2) - Arguably, this is the most popular stock of European honey bee on the planet. It is the most used bee in the U.S. It is known most for its yellow-to-brown color, prolific honey production, and large colonies. Italian-descent queens are

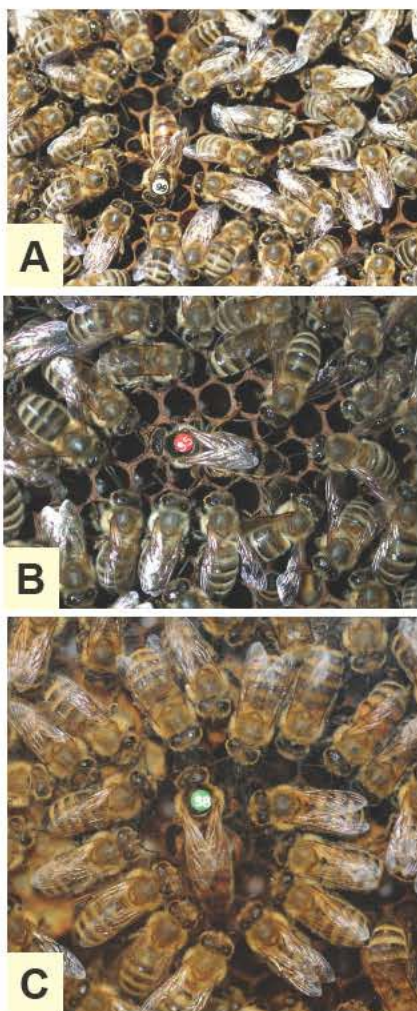


Figure 1: The extreme color variation within bee stocks is represented in this image of three Carniolan queens. Sue Cobey, world expert on Carniolan bees, considers the queen in figure A to be most representative of the stock. Photographs provided by Sue Cobey.

easy to purchase because they are common and typically readily available. A quick internet search or discussion with other beekeepers will help you identify breeders from whom you can purchase Italian-descent bees.

2) *Apis mellifera carnica* (the Carniolan honey bee – Figure 3) - Carniolan bees are the second most popular honey bee in the U.S. They originate from east-central Europe. Sue Cobey, bee breeder extraordi-

naire, developed a line of improved Carniolan bees called New World Carniolans. Sue notes that she continues to work to improve this stock, having recently incorporated carnica stock from Germany and Slovenia into her Carniolan lines.

3) *Apis mellifera caucasica* (the Caucasian honey bee – Figure 4) – Caucasian honey bees once were more popular and easier to purchase than they are today.

However, Sue Cobey notes that she and her team are beginning to work with Caucasian bees, having reestablished them with stocks from Turkey and the Republic of Georgia. I was able to find breeders of this bee using a quick Google search for “Caucasian honey bees for sale.”

4) **Buckfast honey bee** – The Buckfast bee is not a descendant of any one race of honey bee. It is a stock of bee produced by



Figure 2: An Italian honey bee queen (A) and workers (B). The workers were photographed from a colony in Italy. Photograph A was provided by Liana Teigen (University of Florida) and B was provided by Sue Cobey.

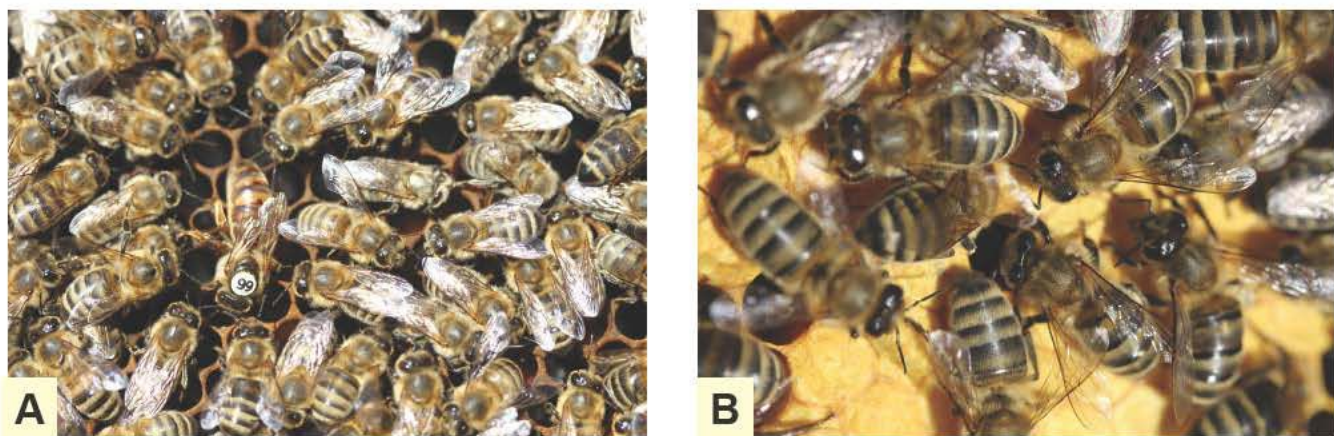


Figure 3: A Carniolan honey bee queen (A) and workers (B). Both photographs were provided by Sue Cobey.

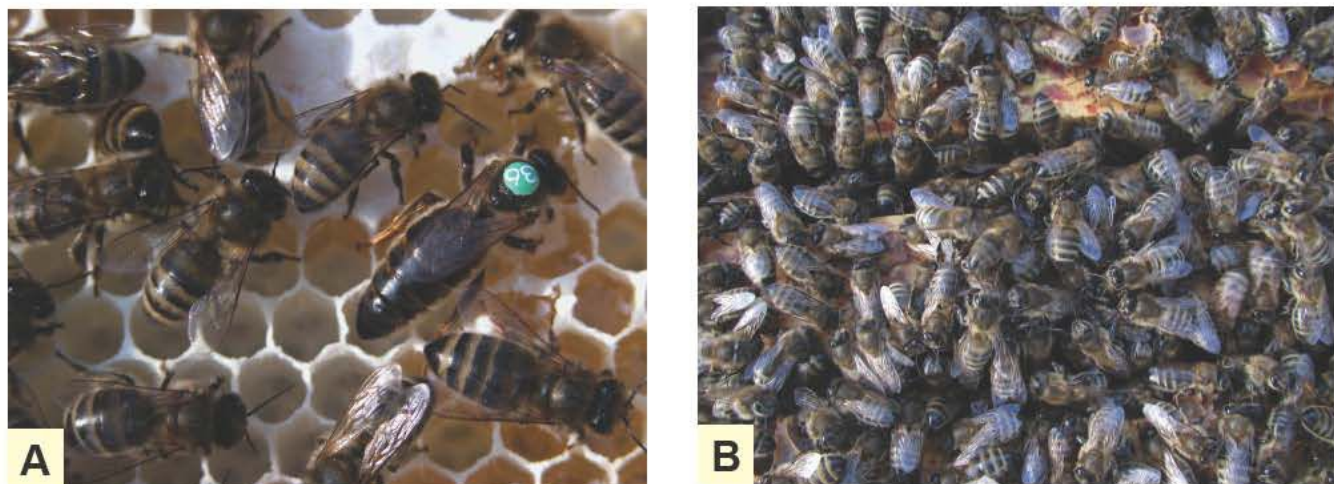


Figure 4: A Caucasian honey bee queen (A) and workers (B). Photograph A was taken of a queen in Turkey by Dr. Irfan Kandemir and B was provided by Sue Cobey.

Brother Adam, a monk at Buckfast Abbey in England. Brother Adam wanted to breed a bee that would have a number of good production and disease tolerance characteristics. He did this originally in an effort to develop a bee that would be resistant to tracheal mites. The story of this bee is fascinating. Basically, Brother Adam traveled Europe and parts of northern Africa to find bees that he considered to have desirable traits. These bees were brought back to his breeding apiary in England and crossed to produce Buckfast bees. The result was a productive bee that many beekeepers around the world like to use. The catch is that Brother Adam is deceased and the program no longer exists at the Abbey. I know because I have been there twice. Thus, the Buckfast bees available today are not necessarily descendants of the original bees, but rather stocks that have been maintained by breeders interested in perpetuating the bee. The original Buckfast bee was an ever-evolving bee as Brother

Adam continued to breed the bee to improve upon its many attributes. Because the Buckfast bee is a hybrid bee, the expression of its notable characteristics can vary greatly within the stock.

5) **Russian honey bees** (Figure 5) - Russian honey bees are an interesting lesson in the ability of populations to adapt to various stressors. The original lineage of Russian bees is not known, but it is suspected to be derived from *Apis mellifera macedonica* (the Greek bee) or possibly Carniolan honey bees. Russian bees display many of the same characteristics as those exhibited by Carniolan bees, with the added benefit of elevated *Varroa* tolerance. How did the *Varroa* tolerance develop? In the early 20th century, beekeepers transported bees from western Russia, where *Apis mellifera* is native, to eastern Russia, where *Apis mellifera* is not native but where *Varroa* is native. Thus, Russian bees adapted over time to develop a

level of tolerance to *Varroa*. Scientists at the U.S. Department of Agriculture, Honey Bee Breeding, Genetics, and Physiology Laboratory in Baton Rouge, Louisiana imported Russian bees and began selecting lines that had a high tolerance of *Varroa*. This bee has been shown by multiple research groups to be quite tolerant of *Varroa*. For more information on Russian bees and for a list of Russian Honey Bee Breeder members, see: <http://www.russianbreeder.org/>. The USDA-ARS, Baton Rouge Bee Lab posted a series of documents related to their work with Russian honey bees. This can be found at <http://www.ars.usda.gov/Research/docs.htm?docid=2744> and includes a chronology of the Russian bee project found at <http://www.ars.usda.gov/Services/docs.htm?docid=6444>.

6) *Apis mellifera scutellata* (the African or Africanized honey bee) – There are many races of honey bees in Africa. Thus, one could argue that assigning *Apis mellifera*



Figure 5: Three color variations of Russian honey bee queens (A – C) and a group of workers (D). Photographs A-C were provided by Bob Ketch and photograph D by the USDA-ARS.

scutellata the name “the African honey bee” is an injustice to the numerous races of African honey bees present in Africa. Some call the bee the “Africanized” honey bee to note its hybridization with European honey bees. I think it is most accurate to call it the African-derived honey bee. Regardless, this one race of honey bee was taken to Brazil in the 1950s in an effort to improve honey production on the continent. In short, African honey bees work better in warmer climates than do European races of honey bees. The idea was that this bee would perform better in South America than would European honey bees. This turned out to be true, but at a cost. The African honey bee typically is very defensive. The bee spread from its point of introduction in Brazil, throughout South and Central America, and into the U.S. I do not include this bee in a discussion of bee stocks available in the U.S. in an attempt to suggest that you consider incorporating the stock into your operations. Instead, I wanted to make you aware of its existence so that you can recognize the bees’ traits should they begin to appear in your operation. Many of the major queen breeders in the U.S. produce queens in areas where African bees are present. Consequently, it is possible, though not likely if breeders take steps to minimize this, to purchase queens that have mated with African bee drones. It is illegal to keep African bees in many states.

7) *Apis mellifera mellifera* (the German or black honey bee) – Like many events in history, the exact race of honey bee first brought to the U.S. from Europe is debated. It is possible that the Spanish were first to bring honey bees to the New World, then bringing a Spanish race of honey bee to Florida. On the other hand, many authors who have written about bee introductions into the U.S. state that the German black bee was the first honey bee introduced to the Americas. Regardless of which bee was introduced first, the German bee was the one most used by beekeepers in the U.S., and this continued for quite some time. This particular bee is known for its heightened defensiveness, its susceptibility to disease, and its general inclination toward the temperate climate in North America. This was the honey bee of our American ancestors; this was our great grandfathers’ bee.

In the 19th century, more races of honey bees were introduced from Europe into the U.S. Beekeepers began gravitating toward these bees and away from the German black bee. Thus, the German bee was minimized and likely has disappeared altogether. I often hear rumors of populations of German bees living in forests or other places having minimal human traffic. Though these tales may be true, I suspect that this bee is all-but-gone from the U.S., thanks largely to pathogens, *Varroa*, and beekeeper gravitation toward other bee races. The German bee purists need not worry. The German bee has left its legacy in beekeeping and it, no doubt, left its genes in our current bee population. I include a description of German bees in Table

1 for comparative and historic reasons. To my knowledge, it cannot be purchased in the U.S.

Other stocks of note

The following list includes stocks of honey bees that (A) typically are bred for amplification of one specific trait, though the breeder may be selecting for other favorable traits secondarily (1-3 below), (B) are no longer available (4 below), (C) are derived from “survivor bees” (5 below), or (D) are hybrid crosses between multiple stocks. Regarding the former, many, maybe most, of these traits are present in subpopulations of the bee stocks listed in Table 1. Consequently, they can be selected for in any of the major stocks listed in Table 1.

1) **Minnesota Hygienic bees** (Figure 6) – Dr. Marla Spivak and her team at the University of Minnesota selected for hygienic behavior in the Italian honey bee stock formerly available as Starline bees. Hygienic behavior is the behavior by which worker bees detect sick/diseased/parasitized pupae, uncapped the cells in which the pupae reside, and remove the pupae from the cell and, ultimately, the hive. This behavior appears present in all of the major bee stocks listed in Table 1, though to varying degrees. Though Minnesota Hygienic bees were from Italian stocks originally, this trait can be selected for in any bee that one wants to use. For more information on Dr. Spivak’s Minnesota Hygienic bees, see: http://www.beelab.umn.edu/prod/groups/cfans/@pub/@cfans/@bees/documents/asset/cfans_asset_317501.pdf and http://www.beelab.umn.edu/prod/groups/cfans/@pub/@cfans/@bees/documents/asset/cfans_asset_317498.pdf.

2) **Suppressed Mite Reproduction (SMR) honey bees** – Members of the USDA Honey Bee Breeding, Genetics, and Physiology Laboratory in Baton Rouge,

Louisiana discovered this trait. This trait may be an enhanced variation of ordinary hygienic behavior. Bees with the SMR trait seem to be able to detect capped brood cells that contain reproducing *Varroa* and selectively remove the bee pupae only from those cells, leaving the pupae developing in cells that contain non-reproducing *Varroa*. You can find more information about SMR bees at <http://www.ars.usda.gov/Research/docs.htm?docid=2744&page=13>.

3) **Cordovan honey bees** – This is an often misunderstood trait of honey bees. In essence, the cordovan trait is a recessive trait in honey bees in which the black cuticular coloration of the bee’s body is replaced by brown. The fact that it is recessive means that both parents, the queen and the drone, must carry the trait in order for the offspring to present the characteristic. The amount of black coloration in each bee stocks’ cuticle differs naturally. This means that the lighter bees, such as Italian honey bees, look more golden when they are cordovan, while the darker honey bees, such as Carniolans, look brown. The cordovan phenotype presents itself in the bees’ antennae, head, thorax, legs, and abdomen, anywhere a black cuticle would otherwise be present. It is worth noting that the cordovan trait does not confer any enhanced level of productivity to bees that possess it. It is simply a color marker that some beekeepers like to have in their bees.

4) **Starline, Midnite, and Double Hybrid honey bees** – Starline bees were developed by the late Dr. G.H. Cale, Jr. of Dadant & Sons, Inc., by crossing several stocks of Italian honey bees. Midnite bees were derived from crossing Carniolan and Caucasian bees. As the name implies, Double Hybrid bees resulted from a cross between Starline and Midnite queens. These bees were available when I was young, but



Figure 6: Minnesota Hygienic queen and workers. Photograph provided by Dr. Marla Spivak, University of Minnesota.

Table 1 - Principal Stocks of Honey Bees Present in the United States

Characteristic*	Italian-derived honey bees (<i>Apis mellifera ligustica</i>)	Carniolan-derived honey bees (<i>Apis mellifera carnica</i>)	Caucasian-derived honey bees (<i>A.m. caucasica</i>)	Buckfast honey bees	Russian honey bees	African-derived honey bees (<i>Apis mellifera scutellata</i>)	German or black honey bee (<i>Apis mellifera mellifera</i>)
¹ Origin	Italy	Alps of east-central Europe	Caucasus mountains in Eurasia, near the Black Sea	Mixed	Primorsky region of eastern Russia	Central and eastern Africa, to South Africa	Northern regions of central Europe, from UK to Germany
Morphological Characteristics							
² Queen color	Golden yellow to leather brown	Generally dark with lighter regions in areas	Very dark, can be jet black	Variable as a hybrid	Variable, but generally brown to black	Variable	Black with some brown coloration
³ Drone color	Somewhat variable, but generally yellow to dark brown	Dark body with gray and brown thoracic hairs	Black body with black thoracic hairs	Variable as a hybrid	Can be variable, but generally black	Variable, often brownish abdomen	Dark brown to black
⁴ Worker color	Golden yellow to brown with yellowish bands on abdomen	Gray to almost black, with gray or brown stripes on abdomen, high color variation	Black body with gray bands on abdomen, black thoracic hairs	Variable as a hybrid, but often brown with black stripes on abdomen	Variable, but generally brown to black	Variable	Dark brown to black
⁵ Tongue length	Short-to-medium	Medium-to-Long	Long	Average	Average	**	Short

Key to the stock characteristics discussed in Table 1.

The numbers below correspond to the numbers assigned each characteristic in Table 1.

1. Origin – The natural range of the bee stock. A “mixed” origin means that the bee derives from a mixture of one or more stocks.

2. Queen color – The color pattern associated with a typical queen bee of a given stock.

3. Drone color – The color pattern associated with a typical drone bee of a given stock.

4. Worker color – The color pattern associated with a typical worker bee of a given stock.

5. Tongue length – The relative length of a typical worker’s tongue, representative of the stock. This is relative to tongue lengths of workers from other races of *Apis mellifera*. This is important because longer tongued bees access nectaries in deeper corollas. This partly contributed to beekeepers’ general migration away from German bees as German bees have short tongues and could not work certain nectar-producing plants well.

6. Defensiveness – All stocks of honey bees exhibit some level of defensiveness, some more so than others. This is rated from low (a colony that is hard to provoke) to very high (a colony that attacks with little provocation). The term “defensiveness” is preferred to “aggression” because the latter implies that the bees seek out and preemptively strike potential threats. Honey bees are defensive, not aggressive.

7. Worker behavior on the combs – This is a description of how workers move on the combs when colonies are opened and worked. “Calm” workers go about their jobs while the combs are inspected. “Nervous” workers scurry about the combs rapidly, often migrating to the comb perimeter or vacating the combs altogether. Nervous bees sometimes form masses of bees at the bottom of frames being inspected. This can lead to “flighty” bees which fly from the combs to initiate a defensive response against the beekeeper.

8. Robbing tendency – The propensity of a colony to rob other colonies during times of nectar dearth or when the colonies are being inspected by beekeepers. “Low” means colonies are less likely to rob other colonies while “high” means they are highly likely to rob other colonies.

9. Propolis use – The pattern of propolis use among the stocks ranges from low (little propolis used) to high (considerable propolis used).

10. Swarming tendencies – The propensity of

colonies of a given stock to swarm. This ranges from a low propensity (the colony does not swarm a lot or takes some time to reach the swarm threshold) to a very high one (the colony swarms multiple times per year or is quick to reach the swarm threshold).

11. Tendency to abscond – Absconding is a colony behavior whereby all of the bees in the nest, including queens, workers, and drones, leave the nest in response to a colony stress. Some bee stocks rarely abscond (low) while others abscond frequently (high).

12. Overwintering ability – The likelihood that a colony will overwinter successfully. Some colonies do not overwinter well, or even at all, in temperate climates. This ranges from none (colonies from the stock likely will not overwinter in temperate climates) to very good (colonies from the stock possess traits that make them highly likely to overwinter successfully).

13. Honey consumption during winter – Some bee stocks go into winter with high adult populations, thus making them very likely to consume large amounts of their honey stores during the winter (high). This can lead to problems, such as starvation, in prolonged winters. Other colonies overwinter with smaller clusters and have a lower tendency to consume honey (low). These bee stocks are more likely to survive winter than are bee stocks that consume a lot of their winter stores.

14. Colony growth in spring – This refers to how early a colony initiates growth in spring and the rate at which it grows. Slow growing colonies come out of winter with small clusters and are slow to expand. Rapid growth is exhibited in colonies that have nearly explosive growth after winter. These tend to produce more honey during the spring season.

15. Brood production – This relates to a colony’s likelihood of producing copious amount of brood during the spring expansion period. “High” indicates that a bee stock produces lots of brood while “low” indicates that the colony produces comparatively little brood.

16. Colony population in summer – This refers to the relative number of adult worker bees in a colony during summer. Some bee stocks produce colonies that have high summer popula-

tions while others produce colonies with low populations. This affects a colony’s use of resources, vulnerability to pests and pathogens, and use under varying management paradigms.

17. General disease tolerance – The general ability of a given bee stock to tolerate the various bee pests/pathogens that typically affect colonies, Varroa excluded. “Low” indicates a stock generally is vulnerable to many pests/pathogens. “High” indicates that the stock is tolerant of many pests/pathogens.

18. Tolerance of Varroa – Some bee stocks are very tolerant of Varroa infestations (high) while others are not (low). Given that Varroa are considered the number one threat to honey bees, it benefits beekeepers to use stocks that display some level of tolerance toward Varroa.

19. Tolerance of tracheal mites – Some bee stocks are very tolerant of tracheal mite infestations (high) while others are not (low).

20. Tolerance of American Foulbrood – Some bee stocks are very tolerant of American Foulbrood infections (high) while others are not (low).

21. Tolerance of European Foulbrood – Some bee stocks are very tolerant of European Foulbrood infections (high) while others are not (low).

22. Notes on wax production – This characteristic is important to beekeepers who specialize in wax production or wax products. Some bee stocks are quick to build wax in response to nectar flows while others are slower to do this. Some stocks also are known for producing “wet” cappings. This simply means that the cappings constructed over the top of cells of honey contact the honey stored underneath, making them appear “wet.” This, typically, is undesirable if the comb is going to be used in comb or cut-comb honey. “Clean” or “dry” cappings do not touch the honey stored within the cell, consequently producing a comb with a more desirable appearance.

23. Honey production – Under average management conditions, this characteristic refers to a colony’s typical honey yield. This ranges from “high” (will produce a lot of honey) to “low” (will produce less honey).

Table 1 continued	Italian	Carniolan	Caucasian	Buckfast	Russian	Scutellata (African)	German black
Notable Behavioral Characteristics							
⁶ Defensiveness	Average	Low	Low	Average	Low-to-average	Very High	Average-to-High
⁷ Worker behavior on combs	Calm	Calm	Calm	Variable, but generally calm	Average, but can be runny	Very nervous, flighty, prone to boil out of open hive	Nervous, flighty, prone to boil out of open hive
⁸ Robbing tendency	High	Low	Average-to-high	Average	Low-to-average	Average-to-high	**
⁹ Propolis use	Low-to-average	Low	High	Low-to-Average	Average	High	Low-to-average
¹⁰ Swarming tendencies	Average	High, swarms earlier in season	Low, swarms later in season	Low-to-average	Average	Very high	Average-to-high
¹¹ Tendency to abscond	Low	Low	Low	Low	Low	High	Low
Colony Growth Characteristics							
¹² Overwintering ability	Average, with large clusters	Very good, with smaller clusters	Low-to-average, especially in colder climates	Average-to-good	Good, with small to average clusters	None (colonies typically do not survive temperate winters)	Very good
¹³ Honey consumption during winter	High	Low	Low	Low	Low	Not applicable	Average
¹⁴ Colony growth in spring	Average-to-rapid	Rapid	Slow	Low-to-average	Average-to-rapid	Rapid	Slow
¹⁵ Brood production	High	Average	Average	Average-to-high	Average	High	Average
¹⁶ Colony population in summer	High	Average	Average	Average	Average	Average	**
Pest and Pathogen Tolerance							
¹⁷ General disease tolerance	Average	Average-to-high	Low-to-average, susceptible to <i>Nosema</i>	High, good hygienic behavior	Average-to-high	Average-to-high	Low
¹⁸ Tolerance of <i>Varroa</i>	Low	Low	Low	Average	High	High	Variable as reported in the literature
¹⁹ Tolerance of tracheal mites	Low	Low-to-average	Average	High	High	Average	Low
²⁰ Tolerance of American Foulbrood	Average	High	Average	Average	Average	Average	Low
²¹ Tolerance of European Foulbrood	Average	Average	Average	Average	Average	Average	Low
General Productivity							
²² Notes on wax production	Quick to produce good quality wax	Slow to build comb, but produces nice combs with clean cappings	Tends to produce "wet" cappings on combs	**	Slow to build comb, but produces nice combs with clean cappings	Quick to produce combs	Average propensity to construct combs, but produces good comb
²³ Honey production	High	High	Average	Average-to-high	Average-to-high	Average for colony size	Low-to-Average
*The number given to each characteristic corresponds to the numbered description in table key. **Could not find information related to given trait. Publications used to develop table: - Caron, D.M., Connor, L.J. 2013. <i>Honey Bee Biology and Beekeeping</i>. Wicwas Press, LLC. Kalamazoo, MI, USA. 368 pp. - Dietz, A. 1992. Honey bees of the world. In <i>The Hive and the Honey Bee</i> (J. Graham, ed.), Dadant and Sons, Hamilton, IL, USA. 1324 pp. - Magnini, R.M. 2014. Identifying characteristics of honey bee races. <i>American Bee Journal</i>, 154(6): 645-648. - Sanford, M.T., Bonney, R.E. 2010. <i>Storey's Guide to Keeping Honey Bees</i>. Storey Publishing, North Adams, MA, USA. 246 pp. - Shimanuki, H., Flottum, K., Harman, A. (eds.) 2006. <i>The ABC & XYZ of Bee Culture</i>, 41st Edition. The A.I. Root Company, Medina, OH, USA. 911 pp. - Tarpy, D. R. 2005. The different types of honey bees. AG-645, NC State University, Cooperative Extension Service. http://www.cals.ncsu.edu/entomology/apiculture/pdfs/1.12%20copy.pdf. - Winston, M.L. 1987. <i>The Biology of the Honey Bee</i>. Harvard University Press, Cambridge, MA, USA. 281 pp. Sections of the table were reviewed by Sue Cobey and Carl Webb.							

one cannot purchase them in the U.S. any longer.

5) **Survivor honey bees** – These bees are simply bees that survive. It does not matter to the producer of these bees how the bees survive, only that they do. Most survivor bees originate from colonies that, for whatever reason, survive with minimal beekeeper input from year to year. Most often, developers of these stocks note that the bees

are surviving without any chemotherapeutic intervention by the beekeeper. Thus, the colonies are not treated for foulbrood, *Varroa*, *Nosema*, etc. The theory is that if the bees can survive from year-to-year, then they must be developing a natural tolerance to the pests/pathogens/other stressors that otherwise kill most colonies. I believe in the theory behind survivor stock; I only doubt the practice of developing such a bee

in 5-10 years. Russian honey bees are the best, natural example of survivor stock. They are, in fact, derived from bees that survived constant pressure exerted on them by *Varroa*. However, they took 100+ years to develop on their own, and then had layers of selection placed on them by the USDA bee laboratory in Baton Rouge before their release to beekeepers. The idea of breeding from survivors means that selection is

happening at random, with no clear target in sight. This can be done successfully, in my opinion, though I feel that many of the "survivor" bees produced today are no better than any other bee chosen at random. I do have a romantic idea that there are feral bees out there that have survived for decades and without the intervention of beekeepers. I do not, however, believe that they are as common as the proponents of survivor bees indicate. My recommendation here is be realistic when hunting for and using "survivor" bees. I note this because these bees usually are sold for more than the other stocks that are not touted as survivor bees. Remember, the other stocks had to survive in order to be developed as well.

6) **"Hybrid" honey bees** – A hybrid bee is simply the product of a cross between two stocks. Given that the bee stocks available in the U.S. are hybrids themselves, most "hybrid" bees are really crosses between already existing hybrids. Generally, hybrids are produced in an effort to incorporate the beneficial characteristics of both bee stocks into a single bee. Of course, the opposite can happen as well. Hybrids have a vigor associated with them that often produces a good quality bee.

I think that every beekeeper should try multiple bee stocks before settling on the one they ultimately will use. The varying characteristics of each bee stock virtually ensure that there is a bee stock that can work for every beekeeper, in just about any management situation. I am optimistic that the quality of the existing bee stocks will improve as our understanding of breeding improves. Furthermore, we may one day be able to incorporate other bee stocks, stocks that currently are not present in the U.S., into our beekeeping operations. In conclusion, I hope this article helps you decide among the various stocks of bees available in the U.S.

Acknowledgements

I would like to thank Sue Cobey for providing feedback on Table 1 and for providing some of the photographs used in this article. I thank Marla Spivak for providing photographs and valuable information on Minnesota Hygienic queens. Finally, I thank Carl Webb for the information he provided on Russian honey bees.



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- ✓ Check food stores on a warm sunny day
- ✓ Feed winter patties for those colonies critically low on stores
- ✓ Start feeding pollen patties when appropriate for your season
- ✓ Order or make any needed equipment
- ✓ Finalize locations for new hives



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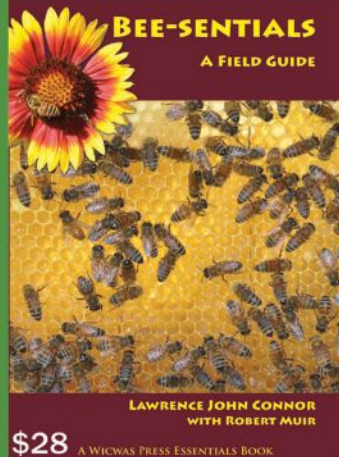
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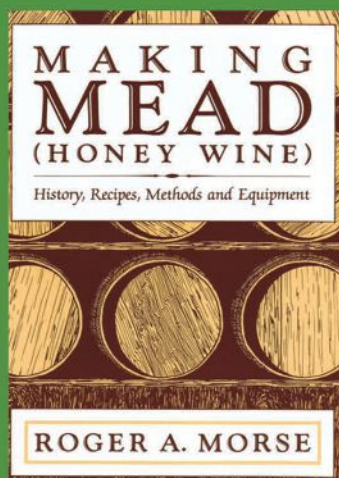


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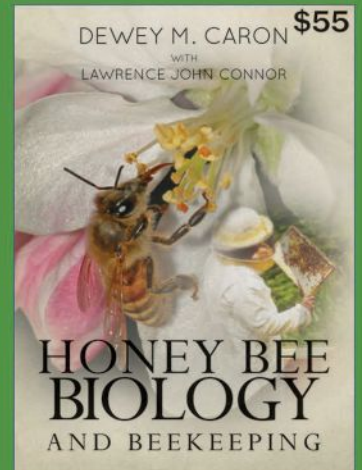
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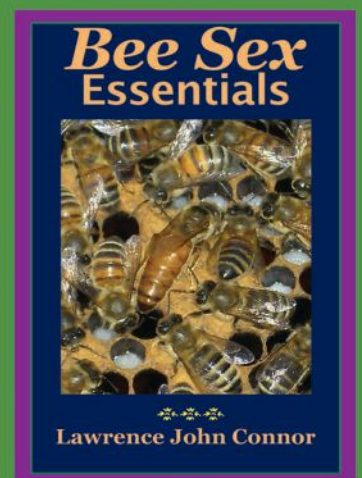
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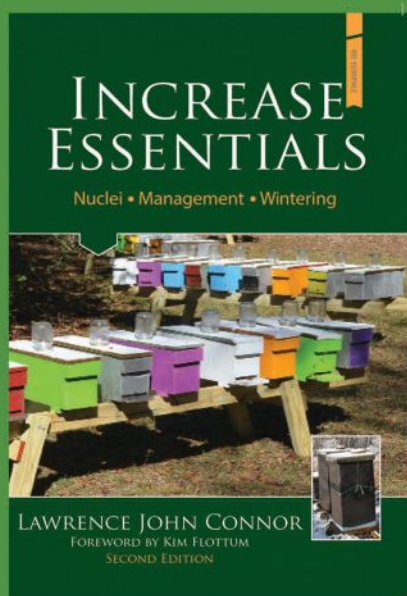
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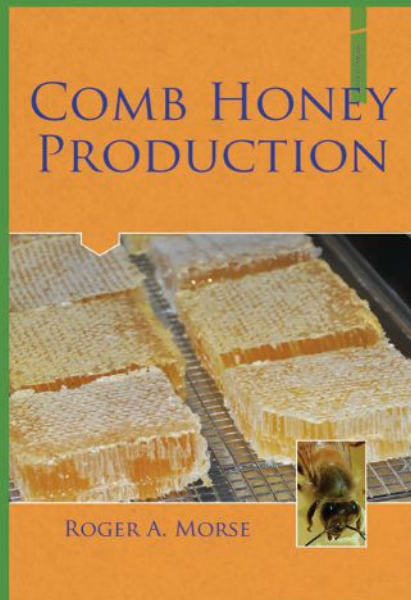
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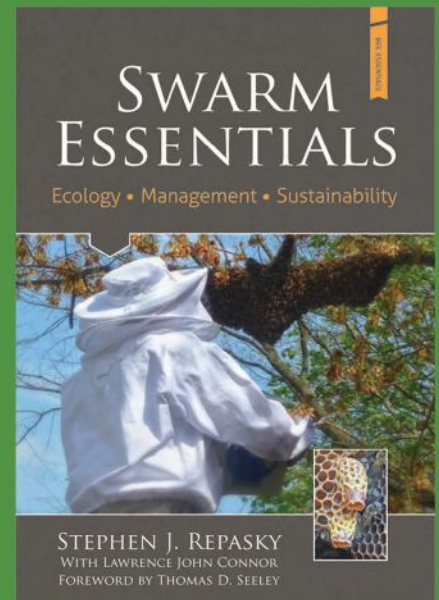
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A beehive that withstands the cold winter months has tremendous potential. In spring, over-wintered hives can be split, re-queened or managed to produce significant quantities of honey. Establishing the conditions that enable a hive to survive the winter and flourish in spring is one of the many gratifying aspects of beekeeping. So it serves to reason that finding “dead-out” hives can be a bitter discouragement. Dead-outs are just that; hives in which the entire bee colony has died. Losing a hive is frustrating and expensive. However, to an observant beekeeper, a dead-out hive can be as educational as a growing hive in spring. Here we will identify some common causes of dead-out hives and explain how to decipher the clues they leave behind. While dealing with dead-outs could be considered the “other side” of beekeeping, understanding their causes and altering our practices accordingly might help us limit their frequency in the future.

How can a beekeeper tell if a hive is dead when frigid temperatures keep bees from flying? First, check the snow or ground cover near the entrance to the hive. Fresh dead bees on the ground can be a sign that the hive is still alive. Listen carefully at the hive entrance. Some beekeepers use a stethoscope placed against the outside of the hive. If the hive lacks the reassuring hum of live bees, put on a veil and pop the lid. Watch for live bees and listen with your head close to the top bars of the frames. A sudden appearance of live bees, an urgent buzzing or a whiff of alarm pheromone may indicate that the hive is alive and well, and a simple removal of dead bees from the entrance so live bees can enter and exit is all that is needed. Now is a great time to check for honey stores while the hive is open, adding reserve honey frames or other emergency feed as needed.

What if all the bees in the hive are dead? Passionate beekeepers have been known

to grieve for a moment, considering all the time, energy and money invested into that mass of dead insects. Finding the queen curled up and dead is a major bummer. But, before planning a miniature state funeral for the deceased royalty—or pondering other hobbies to pursue—resolve not to be overly discouraged by a dead-out. Instead of dwelling on the loss, shift the focus to any hives that survived the winter and try to identify differences between the healthy hives and the dead-out hive. As disappointing as a dead-out hive can be, there is much to learn from one.

Conduct a post-mortem analysis of your dead-out hive. First, note the location of the main cluster of dead bees. Is it high or low in the hive? Check the weight of each box. Do some boxes contain honey stores? If there is a large cluster of bees and plenty of honey in the hive, it may indicate that the bees simply starved within inches of stored honey, unable to move due to cold or



(l) The cluster of dead bees can be seen on the right side of this hive body. With frame #2 pulled we can easily see bees on frames #1 and #3. Also note that frame #10 on the left has some dark fecal matter that can be scraped off. (r) This bottom board is almost completely covered with dead bees. The white substance is dry sugar the author used for emergency bee food placed on newspaper on the top bars of the frames in the top brood box. Some of that sugar has fallen down to the bottom board.



(l) Dead bees and sugar nearly cover a rubber mat used to keep weeds from growing around the hive. The bottom board still has a mouse guard attached. The bees from the bottom board and the mat are ready to be examined and then disposed of properly. Hive bodies are placed in the wheelbarrow for removal. **(r)** This is an out yard so all hive components are wheeled away, loaded into a vehicle and brought home for an autopsy, cleaning, and frame sorting.

unwilling to separate themselves from the frames of brood for which they were caring. This scenario is highly frustrating for the conscientious beekeeper who manages the bees effectively throughout the year, but still loses the entire colony over the winter. Do not stop there. Keep looking.

Pay close attention to the bottom board. Are there signs of mice? Look for feces or chewed nesting material. Examine the bottom board mess for varroa mites. If you see thousands of them, you have likely found the cause of the bees' demise or at least the catalyst for the development of a fatal disease.

Sort through the dead bees carefully with eyes peeled for small hive beetles and wax moth larvae. A healthy, full sized hive can typically handle a mild infestation of hive beetles, but too many beetles and their larvae can decimate a smaller hive. Look for wax moth larvae or their feces (little black specks) and for their webbing on the comb. If wax moth larvae or small hive beetles have overtaken a hive, it is usually because something else weakened the bee popula-

tion allowing the beetles, moths and their larvae to take ownership.

Do the bees have deformed bodies? Varroa mites can cause deformities. Do their wings show signs of Deformed Wing Virus? Are there K-winged bees—aptly named because their wings are shaped like the letter “K”? This could indicate a tracheal mite infestation.

Keep an eye out for the queen among the dead bees. Is she the marked original or has she been replaced? If she is a new one, is she small and runty? If so, she might not have mated successfully. This can result in a dead-out hive.

After analyzing the dead bees on the bottom board and in the hive, it is best to incinerate them rather than fling them onto the ground. Experienced beekeepers prefer fire instead of burial, where diseases could lie fallow in the ground until exposed again in some way.

Next, look at the hive bodies themselves. Do you see the brown spotting of bee feces on the outside of the boxes or the top bars of frames? Healthy bees do not defecate

inside the hive. Scrape as much of the feces as possible from the hive bodies and frames. If concerned about contamination, spray them with a solution of vinegar (acetic acid) and water and let them air dry in sunlight to benefit from the sun's cleansing properties.

Now, pull each frame from its hive body. Start with the wall frame, just as you would during a live bee hive inspection in order to keep the cluster of dead bees intact until you reach that area of the hive. Place honey frames in one area, pollen frames in another, and frames with unfilled comb cells in a third area. Disease-free frames can be redistributed for use in other hives. Examine each brood frame closely for “scale,” the remains of honey bee pupae hardened at the base of comb cells. The presence of scale can indicate American Foulbrood disease as can dark, sunken, perforated brood cappings. If contamination by American Foulbrood is confirmed, most beekeepers destroy by fire each frame and hive body affected in order to prevent the disease from spreading to other bee colonies.



(l) There is sealed brood to be examined in the center of the upper frame while dead bees cover most of the lower frame. **(r)** The top frame is nearly full of dead bees head first in cells; commonly referred to as a sign of starvation.



(l) The author points to his dead queen bee with the yellow dot he placed on her thorax. There is mold visible on this frame but it is minimal and not a concern. **(r)** These frames have dense patches of mold that the author will likely scrape clean to the foundation (or cut out if they are foundationless frames). Given to a strong colony, these frames could be cleaned by the bees as well. Note the cleaned, sorted frames in the background to be used as needed in other colonies.

While analyzing the brood frames, watch for little white specks on the sidewalls of cells. Those could be feces from varroa mites. But don't be fooled. The specks could also be dry sugar from emergency food sources the beekeeper provided or, more likely, bits of crystallized honey. The sugar grains and the honey crystals would likely be a little larger than varroa mite feces.

Some frames might contain mold. A little mold is not of much concern since the bees will clean it. If the mold is widespread and dense, it can be scraped off with a hive tool. On a plastic foundation frame, scrape down to the foundation, removing the comb with the mold. On a foundationless frame simply cut out the fouled portion. When giving moldy frames to a healthy, well populated hive, expect them to be cleaned fairly rapidly. In weaker hives consider that the frames will remain unclean in the hive until the population grows strong enough to clean

and use them. The same holds true for dead bees that are head first in cells. A strong, well-populated hive will clean out those dead bees quickly in order to use the comb. A weak hive will usually let the dead bees remain in the comb until they are ready to expand onto that frame.

While cleaning and sorting frames, remove any containing very dark comb. The darkened comb on foundationless frames can be cut out, and frames with plastic foundation can be scraped clean. Incineration of the old, well used comb is a wise choice. Beeswax is a chemical sponge, retaining environmental toxins picked up by foraging bees and other sources. Now, examine the frame itself. If propolis has built up on the "shoulders" of the frame, scrape it off to ensure a better fit in the hive. This is also a convenient time to remove beeswax comb and propolis adhering to the inside walls and frame rests of the hive bodies.

Cool days are best for performing an autopsy on a dead-out hive. On warmer days scout bees checking out the frames placed in their groupings of honey, pollen and open cells can become a bit of a nuisance.

With the post-mortem complete, reassemble the components of the hive and tape closed any openings to discourage critters from setting up camp, but do not be discouraged. Dead-out hives are an occupational hazard of beekeeping. While always disappointing, they are also informative. We can take the opportunities they provide to educate ourselves and adjust our beekeeping techniques accordingly. As we do, dead-out hives should become less troubling and, hopefully, less frequent.

Don Snoeyink and his bees live in Southwest Lower Michigan
Thornapplewoodlands.com
thornapplewoodlands@gmail.com



(l) Sorting frames from a dead-out provides a perfect opportunity to cull dark combs. Consider the two front and center frames. The comb in the frame on the left will be cut out and placed in the burn barrel. The comb in the frame on the right is "newer" as indicated by its lighter color due to lack of use as a brood frame. Every time a bee emerges from a cell it leaves a little cocoon skin in the cell, thus darkening the comb. **(r)** This darkened comb is about to meet its demise in the burn barrel. Some of the hive bodies in the background contain the frames sorted for re-use as the season progresses. Others are honey supers with drawn comb in storage until the honey flow begins.

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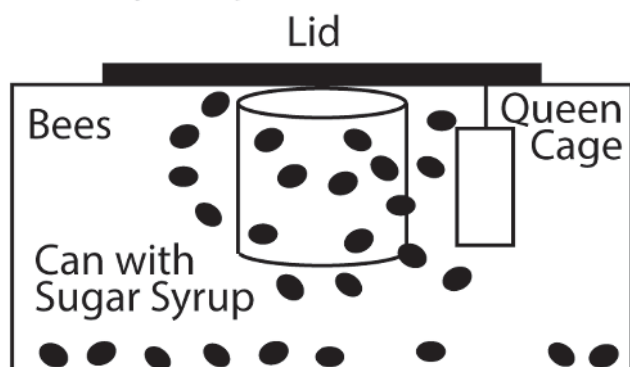


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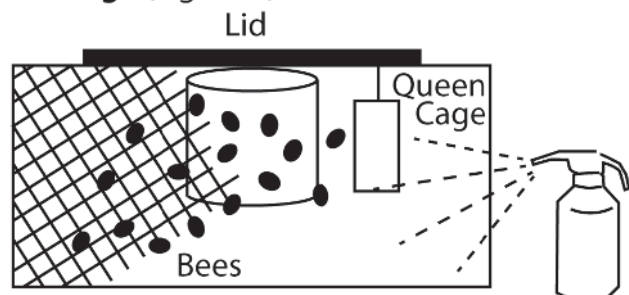
1. Package arrives. Bees are clustered around feeder can and the queen cage. Number of dead bees on the floor of the package should be small (50 – 100). The less the better (Figure 1). Package should be located in a dark place, between 50 and 55 degrees Fahrenheit. Bees should be quiet, not running and scrambling all around the inside of the screened package.

Package (Figure 1)



2. With a spray bottle, spray both sides of the screen portions of the package with sugar water (consisting one part sugar and one part water). Bees will suck it off the screens. Before the bees appear wet, stop spraying. Bees should remain dry. When bees cease to remove the sugar water quickly off the screens, stop spraying. When the screens are clear of sugar syrup, spray again (Figure 2).

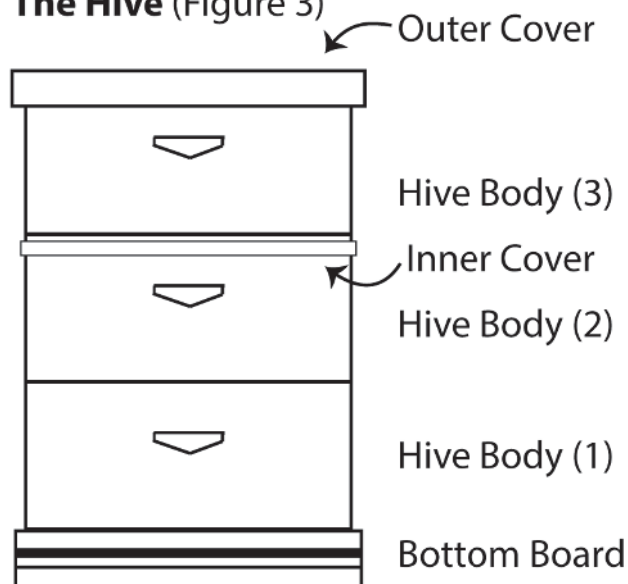
Package (Figure 2)



3. Prior to the package(s) arrival, your hive(s) should be assembled and located at the apiary site. The entrance to the hive should be closed. There are NO bees in the hive.

Ideal hive setup for this procedure includes the use of three standard hive bodies. Hive body (1) will contain the package, hive body (2) contains ten frames of comb foundation, and hive body (3) will contain the sugar water feeder (Figure 3).

The Hive (Figure 3)



side view

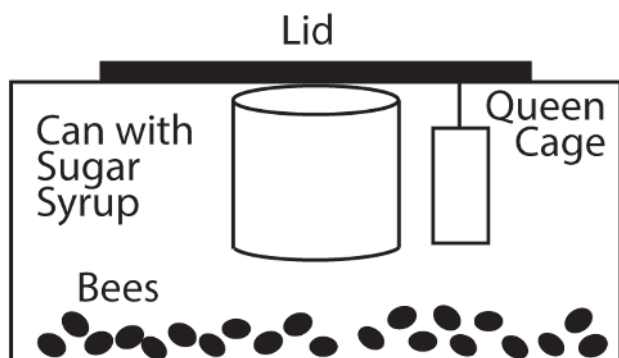
4. The best time for installation of the package is usually the middle to late afternoon, as long as temperatures remain in the fifties fahrenheit. When you are ready to install the package, gently shake the package so the bees drop to the bottom (Figure 4). Pry the lid off the package and secure the TAB attached to the queen cage (Figure 5.) Remove the feeder can. Remove the queen cage. **REPLACE THE LID** to prevent bees from escaping.
CAUTION: If the tab is not firmly secured, the queen cage may drop to the bottom of the package. Note well, wooden queen

cages may be attached to the package by a plastic strip or a 1 to 2 inch circular metal tab. Plastic queen cages are fastened to the package by a very small button. A cage may contain a single queen or a single queen and about 5 workers (attendants).

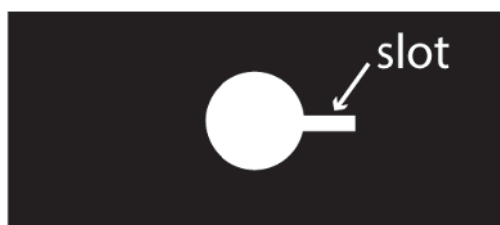
Check to ascertain if the queen is alive. If she is not, notify the supplier immediately; a replacement is essential. At the time of installation have available string, small eye screws, thin wire, duct tape, stapler and thumb tacks. Any of these items may be needed for securing the queen cage to the fourth frame in the hive body (Figure 7) containing comb foundation.

5. Remove the cork or plastic cover from the candy end of the queen cage. With a SMALL nail, pierce the candy plug (Figure 6). **CAUTION:** Do not skewer the queen with the nail.

Package (Figure 4)

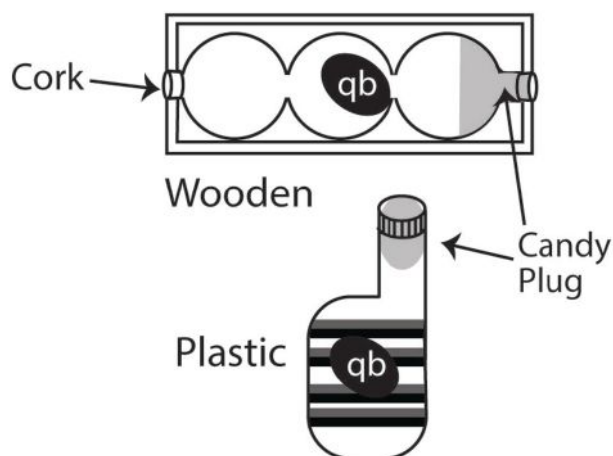


Package (Figure 5)



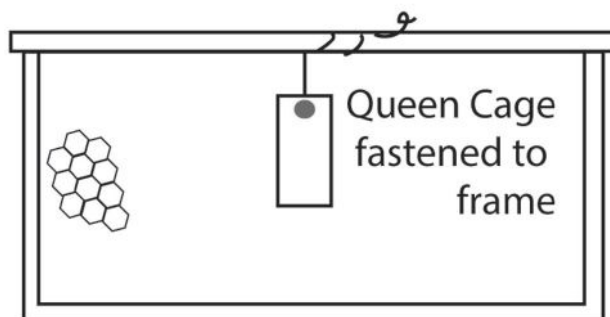
top view with lid removed

Queen Cages (Figure 6)

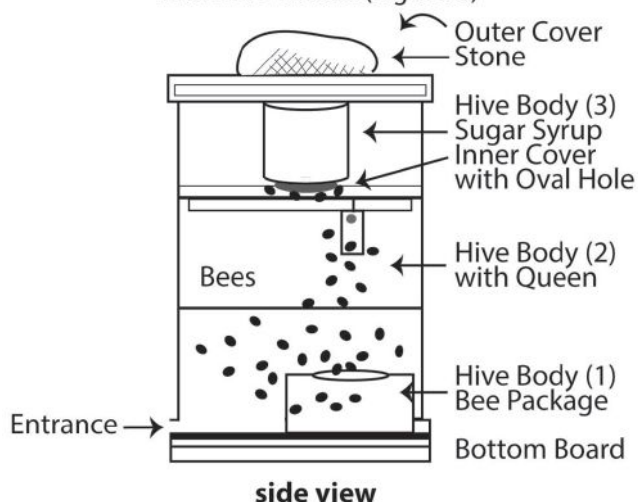


If the candy plug is difficult to pierce, continue to pierce it. If the candy plug is exceedingly hard, the bees may be unable to remove sufficient amounts of the plug to release the queen. In such cases, it will be necessary to excavate most of the candy plug without releasing the queen. Tether the queen cage to the 4th frame in hive body (2), with the candy end UP and position the cage so that the screened portion is accessible to the bees (Figure 7). Shake approximately a cup full of bees on to the queen cage. Replace the lid on the package, and return frame (4) to hive body(2). Place a pollen patty on the tops of the frames closest to the suspended queen cage.

4th Frame/Hive Body (2) (Figure 7)



The Hive Inside (Figure 8)



By placing the queen cage on the 4th frame, it will position the cluster, as they gather around the queen near the oval hole of the inner cover. This provides the cluster easy access to the feeder above, especially during cold weather.

6. Place the package (Figure 8) with the bulk of the remaining bees inside the empty hive body (1). Remove the lid from the package. Package should sit directly below frame (4) holding the queen cage in hive body (2). Place hive body (2) complete with the combs and the queen above hive body (1). Bees will exit the package and enter hive body(2) and cluster around the queen cage. Place hive body (3) above hive body (2) and place the sugar water within hive body (3). Invert the sugar water over the oval hole of the inner cover. Bees will exit the package and enter hive body(2). Open the hive's entrance so it is 2 inches wide.
7. Approximately 24 hours following installation remove hive body (1), and empty package. Place hive body (2) above the bottom board, and hive body (3) with the sugar water feeder, above hive body (2). With this stacking hive body (2), becomes hive body (1), and hive body (3) becomes hive body (2). **NEVER ALLOW THE FEEDER TO GO EMPTY.**

8. Three days after the installation check to see if the queen is out of her cage. If so, remove the cage and return frames to their original position and reassemble the hive. If the queen has not been released from the queen cage, release her.

CAUTION: The queen can fly. One must prevent this from occurring and take necessary precautions.

9. Seven days following the installation check frame(s) for eggs, larvae and possibly capped brood cells. As soon as one encounters the first frame containing at least eggs and larvae, return the frame(s) that were removed to their original position in hive body (1), and reassemble the hive. There is no need to find the queen.
10. Continue feeding. When 7 to 8 frames are drawn, and contain eggs, larvae, and capped brood, as well as some stored pollen and possibly capped honey, add a second deep hive body with frame(s) above hive body (1). This deep hive body becomes hive body (2) and the hive body with the feeder becomes hive body (3) again. Continue to feed sugar syrup (source of carbohydrates) and pollen patties (sources of protein, fats, vitamins, and minerals). If you find in steps 9 and 10 eggs, larvae, and capped brood, it is likely the queen is present.

ALTERNATIVE APPROACH

1. Instead of using three standard hive bodies for the installation, one may opt to use only two hive bodies. All other procedures and directions remain the same.
2. Hive body (1) will be used to house the package and hive body (2) will contain 10 frames of foundation with the queen cage suspended from the fourth frame.

If one elects to use 2 deep hive bodies, bees in the package must be well fed before they are installed. Twenty-four hours after being hived, hive body(1) and the empty package are removed, and hive body (2) is placed on the bottom board, and hive body (1) is positioned above the inner cover which is sitting on top of hive body (2). Invert the sugar water feeder over the inner cover's oval hole. Replace the outer cover over hive body (1). With this stacking hive body (2) becomes hive body (1), and hive body (1), becomes hive body (2).

ADDITIONAL INFORMATION

Package bees may be purchased as a two, three or four pound package with or without queens. The most commonly purchased package is a three-pound package with a queen. A two-pound package contains approximately 7,000 bees. A three-pound package contains approximately 10,500 bees.

In a study by Combs Jr. and Morse, (1971), three-pound packages with 10,500 bees, had a population decline of approximately 3,500 bees between the day of installation, and when the first new bees emerged from their cells. Remarkably, 38 days from the time the queen began laying eggs, the package colony rebounds and reaches a population of 16,000 bees, increasing the original package numbers by 5,500 bees!

Always have your smoker lit, use as needed and always protect yourself with a bee veil and/or a full bee suit.

The recommended ratio of sugar to water in feeders for packaged bees is 1 part sugar to 1 part water. The ratio of sugar to water in feeders needed to stimulate brood rearing in feeders is 1 part sugar to 2 parts water. Late summer/fall feeding, prior to winter to supplement food stores, the ratio in feeders is 2 parts sugar to 1 part water. Note: cane sugar contains no GMO's.

Although there are three or more commercially produced sugar syrup feeders, we recommend a glass gallon jar feeder be used, with up to 20 small nail holes punched in the lid. Why? Because, it can best be positioned over the oval hole with close proximity of the clustering bees, providing them the best access to the feeder during cold and/or rainy weather.

Other feeders will require bees to move greater distances from their cluster. At low spring temperatures bees may be unable to move from their cluster to other types of feeders.

During the early spring months, particularly in northern latitudes, weather conditions such as low temperatures and/or rainy weather prohibits foraging flights. In addition to adverse weather conditions, there is also a scarcity of flowering plants, which are the principal suppliers of the nutritional requirements of honey bees. Nectar provides them with carbohydrates and flower pollen provides bees with protein (amino acids), fats, minerals and vitamins.

We do not recommend adding any products to the sugar syrup. Such products, though beneficial, contain odors that are likely to attract foraging scouts searching for food to these hives which may result in the initiation of robbing behavior.

WARNING: Some individuals may be allergic to bee stings. It is the beekeeper's responsibility to check with his or her physician on such matters.

References

The Beekeepers Handbook, by Diana Sammataro and Alphonse Avitabile, 4th edition, Cornell Press.

Package Bees: Their Installation and Immediate Care, (pages 1-7) by Gerald F. Combs Jr. and Roger A. Morse, Extension Bulletin, 1971.

Acknowledgment

Henry (Hank) Hansen, Chaplin, Connecticut.

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The Rise, Flourish, and Fall of Spring Nectar Flows

Knowing your local nectar flows is an essential part of beekeeping. They tell you when to put on honey supers or if supplemental feeding is necessary. The nectar flows occur roughly by the calendar dates, but that formula approach is not sufficient. The plants respond to the weather. The weather is quite variable, so the beginning blooming dates of the plants become a variable too.

I watch the nectar and pollen plants for their coming blooms. Ultimately though, I watch the bees for what they are bringing in. Below is an account of nectar flows in my area of Eastern Virginia, mid Atlantic region, as an example. My methods can be applied to other locations further west.

Starting in early spring, bee flight begins on warm afternoons in late February. The returning foragers collect water desperately needed for brood rearing. Initially, no bees return with greenish pollen, the first pollen of the spring. That is because out in the woods, surrounding my rural apiaries, none of the maple trees have yet bloomed. Their buds have been swelling with each warm day. Soon the bees will find the early blooming

maples somewhere out in the woods (see Figure 1). And the greenish pollen pellets come pouring in the hives. Occasionally, the maple trees I am watching for the blooms are still in bud stage. Having a maple tree to watch is good to know when the bloom will come, but that particular tree could be a late bloomer, an early bloomer, or one near the middle. I figure on the average, a tree in the city will probably bloom before a tree out in the woods because cities are typically warmer.

In the spring, numerous nectar and pollen plants each make minor contributions to the overall forage of a colony. For example, Mustard Greens, planted the previous summer for their leaves, remain in the field for the winter. In the spring, up grows a

stalk and numerous yellow blooms appear (see Figure 2). Yellow Mustard fields hum with bees. Then the grower plows them, sending the plants underground, turning the fields from yellow treasures to dirt deserts, worthless for the bees, who move on. Red Bud is a small tree that blooms in the still leafless woods, a bright beacon of purple flowers, easily to spot (see Figure 3). It attracts all kinds of bees from the woods including honey bees. Sometimes I see my bees working wild Blueberries near my apiary, but mostly native bees pollinate that plant.

While the bees are building up on these minor nectar plants, I inspect the colonies to make sure they have enough food stores. At this time, colonies have large amounts



Figure 1. Early Maple flowers in the snow. The Maple nectar and pollen flow can be stopped by cold, sleet and snow. The flowers are red, but the pollen pellets on the bees coming in the hive are greenish.



Figure 2. A patch of yellow Mustard flowers under a blooming Cherry tree.



Figure 3. A small Red Bud tree blooming in early spring.



Figure 4. Black Locust flowers.

of brood, which can deplete the food stores, especially if it rains for a week or so, preventing flight for much needed nectar and pollen. Conditions in a colony change quickly at this time of the spring. This build up time goes through March into roughly mid April.

Around late April, the plant bloom I am watching now is for the main spring nectar flow, when a surplus of honey should occur. Usually the first major bloom is Black Locust. The brilliant white flowers hang in chains and their scent at night can be thick (see Figure 4). When searching for apiary sites, Black Locust is easy to see at this time. The tree appears whitish from across a field, as seen from the road (see Figure 5). The hives can fill quickly with Locust nectar, which makes a light color honey. So supers need to be on the hives. Our difficulty with the Locust nectar flow is that rain or cold weather interrupts it. The pristine white flowers turn brownish, slowly decaying, while the cold traps the bees in their hives, preventing flight. I expect only a few exceptionally good foraging days on Locust. Still, a hive can gain a considerable



Figure 6. Tulip Poplar with its pointed shape. Even in the winter with no leaves, the Poplar trees are easy to spot, which is helpful in finding new apiary sites. Their shape tells them from afar.



Figure 5. Black Locust seen from across the field.

amount of weight, when bees go wild for Locust nectar.

Either concurrent with or right behind the Locust nectar flow comes the Tulip Poplar bloom. The tree has a typical pointed shape making it easy to spot among the other trees (see Figure 6). The flower pods of the tree are large and green. They look swollen right before opening, which is something to watch for. That is an indicator that the Poplar nectar flow is approaching. Usually a Poplar tree begins blooming at the top, which is where I aim my binoculars, checking trees near my apiaries. Even high up, the green pods stand out from the leaves and are easy to see. When the flowers bloom (see Figure 7), their nectar production is impressive. Pulling the petals apart reveals the shiny nectar in the base of the flower, quite a bit, more than one bee could haul back to the hive (see Figure 8). Do not be surprised if you find other things in the flowers, providing shelter and sweet. Ants and various kinds of beetles are common.

As the Poplar nectar flow progresses, accelerated by warm weather, slowed and possibly damaged by cool to cold weather, I am watching two things on these trees: how much of the trees are in bloom and their petal drop. While it can vary among trees,

some Poplar trees seem to burst almost into full bloom while with others the progression of the bloom is slower from top to bottom. The petal drop is better seen from trees over pavement or mowed lawns. The petal drop tells me something about the finished flowers (see Figure 9). For a Poplar tree with open flowers, top to bottom, and a heavy petal drop, it is probably way past its prime nectar production (see Figure 10). Scanning the tree carefully with the binoculars shows, in addition to new flowers, many old brown flowers and green seed spikes. That is the last of the flowers, once all the petals are gone, which will mature into the seeds. When many trees are in this condition, the Poplar nectar flow is on the way out. Later in the winter, the Poplar trees will have just their seed spikes from the flowers (see Figure 11).

In unmown fields, Blackberry blooms with white flowers on thorny vines. I watch the vines to see when the first bloom will arrive. Sometimes it seems the entire vine blooms almost at once. On other vines, the bloom goes sequentially down the vine. Any way it happens, Blackberry is a rock solid nectar producer, blooming right in the main spring nectar flow.



Figure 7. A Tulip Poplar flower. What looks wet is nectar.



Figure 8. A Tulip Poplar flower, petals only. On the orange marks is the nectar, looking like droplets.



Figure 9. An old Tulip Poplar flower, near petal drop.

When the main nectar flow occurs, I would like to see dry weather, especially in the beginning, and warm nights, near 60°F or above. Cold nights or late frost are detrimental to nectar production. On numerous occasions, I have seen at least one late frost ruin a good run of weight gains on the hives. Then it takes a few more days (while I and the bees continue to suffer) for the plants and bees to recover, assuming the cold weather has passed. Another possibility is a long, cold rainy spell right in middle of the main spring nectar flow, which is troubling to say the least. (Editor's note: This cold period is referred to by the old timers as "blackberry winter," "Dogwood winter," "locust winter" or "redbud winter.")

After the main spring nectar flow has been going on for some time, by around mid May, I begin watching for signals from the plants for when the nectar flow is beginning to fade. As noted above, one can watch individual plant flowers decay. But I want *one* plant as a global indicator that the *entire* spring nectar flow is decreasing, soon to be



Figure 12. A Magnolia flower beginning to bloom.



Figure 10. Petal Drop. Petals fallen under a large Tulip Poplar tree, scattered on the sidewalk, lawn, and along the side of the road.

gone. Moreover, I want those flowers to be big and showy, easy to see from the road as I drive by.

That flower is Magnolia. I start watching Magnolia even before it blooms (see Figure 12), since as it comes, the main spring nectar fades. Not over, but the best is gone. For most colony conditions in my area, when Magnolia blooms (see Figures 13 and 14), this time is not for putting on another super even with drawn comb, definitely not one with foundation. Let the colonies gain their remaining honey weights around their brood nests, "plugging out," as some commercial beekeepers call it. (They mean restricting the size of the brood nest with honey to help reduce the over production of bees in a dearth period.)

So Magnolia with its big white flowers signals the coming surrender of the main spring nectar flow. Our summers have a few spare plants to help colonies get along, and my local fall nectar flows are weak, no big



Figure 13. A Magnolia tree beginning to bloom.



Figure 11. A Tulip Poplar tree in winter with just its seed spikes. When searching for apiary sites in the winter, I check for Tulip Poplar trees by looking for their shape (as shown in Figure 6) and their seed spikes.

weight gains. If the spring weather was wet and cold, and my bees will be short on winter honey, a summer blooming plant calls me to come south with a long nectar flow, and no swarming worries. That seductive flower is *cotton*.

Acknowledgments

The author thanks Suzanne Sumner for her comments on the manuscript.



Figure 14. A larger white Magnolia flower. Bees will work Magnolia, sometimes several in one flower. I have seen them collect the nectar and brush off and discard the pollen while hovering over the flower.

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UNDERSTANDING COLONY BUILDUP AND DECLINE PART 1

by RANDY OLIVER
ScientificBeekeeping.com



During my recent trial of the pollen subs, I was able to watch small colonies recover and rebuild the moment that natural pollen became available. But there are intrinsic limits to how rapidly a colony can grow. An understanding of the factors involved can help us to manage colonies most effectively.

At my last writing, I was freshly returned from an inspection of our five worst yards. We had left those yards thoroughly depressed, and I feared that we'd need to change our name to "Diminished Expectations Apiaries." Luckily, after I sent the article off for publication, we checked the next 35 yards, which were in far better shape, leaving us in the state of being "guardedly optimistic" (my sons' new favorite term).

There being no time to waste, we immediately hopped on mite management (a combination treatment of 25g of Api-guard plus a 7mL oxalic dribble¹. The next question was whether we would be able to fill our almond contracts. After nearly 35 years of pollinating almonds, I've come to the conclusion that a realistic "lift the box and grade from the bottom" assessment of colony condition is a much better predictor of what I should promise my growers than the (perhaps buttered rum influenced) imaginative hive counts proffered by some beekeepers in December (which so often disappointingly evaporate come February).

Our situation was that we had a bunch of 3- to 6-framers in mid December. The question was whether we could realistically turn them around with stimulative feeding to make grade in almonds. I really didn't know, since we don't normally waste time on dinks (taking our winter losses in fall). It occurred to me that I had a data set on hand that should answer that question—from the previous winter's trial

of pollen subs². So I graphed it out (Fig. 1):

Practical application: these colonies were all fed ad libitum with sugar and pol-

len subs during the winter. Only those at or above 4-frame strength on Jan 1 could be expected to make 6-frame strength by the beginning of almond bloom.

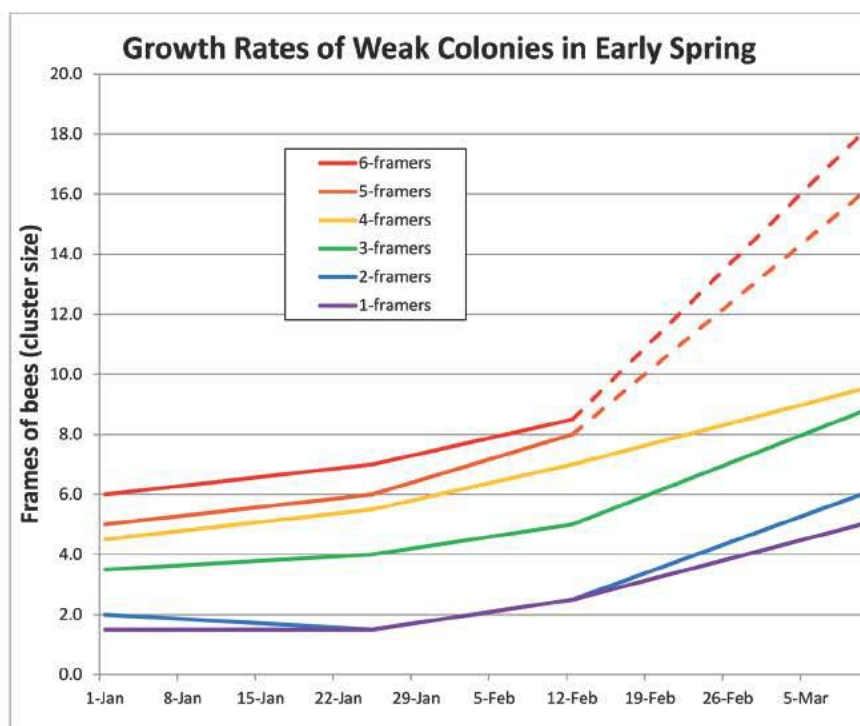


Figure 1. Median values for each group of colonies by starting frame strength; data only for colonies that did not go downhill between Jan and Feb. The dotted lines are strength guesstimates for the colonies that went to almonds, but were not individually graded when later we split them in March and April.

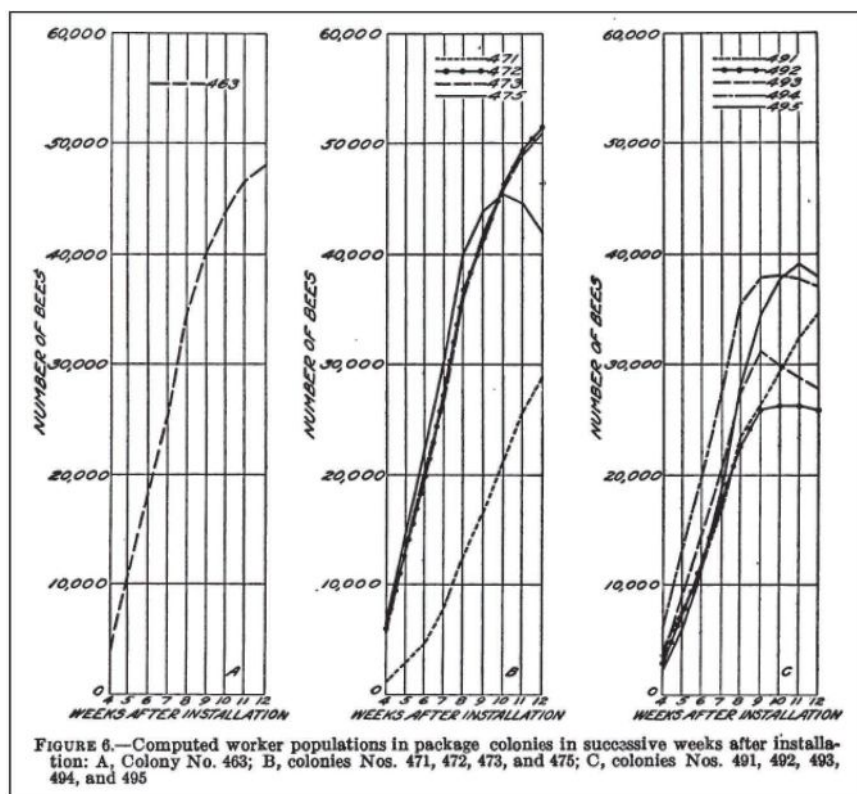


Figure 2. Plots of growth of colonies started from packages in Maryland. The three groups were started May 11, May 13-21, and May 28-June 2, respectively. Note that all colonies peaked in mid July no matter the starting date. Also note that population growth was linear for most of the buildup. Colony #463 (far left) increased between weeks 4 and 9 at the calculated rate of 1044 bees per day.

I'm not clear why the 4-framers during this time did not grow as well as the smaller colonies, but it was likely a fluke. But what surprised me was that the growth rates (the slopes of the plots) from January 25 through February 12 were nearly identical for colonies over the entire range of starting strengths. How could this be? I'd always assumed that colonies grew exponentially—the larger the cluster, the faster they'd grow.

The data above suggest that very weak colonies lose strength between Jan 1 and Jan 25, but that after that point they built just as fast as the stronger colonies. That just didn't make sense to me! And I had a practical reason for trying to understand what was happening:

Practical question: should I boost the dinks with frames of bees from my strong colonies now, or would I be better off leaving those strong colonies to build up (presumably more rapidly) and steal from them later?

Trying to find an answer to a simple question about beekeeping often shows me how little I actually know. Cursed by curiosity, this then leads me to spending days of reviewing literature, correspondence with other beekeepers and researchers, doing calculations and creating spreadsheets, and sometimes performing field experiments

myself in order to find the answer(s).

In this case I realize that I didn't really understand why colonies grow and shrink as they do. In the rest of this article, I'll share what I've learned.

HOW POPULATIONS GROW

Biological growth curves are typically exponential—the larger the population (or the developmental stage of a single organism), the faster it grows (think of varroa or other rapidly-growing pest populations, such as the number of humans on Earth). This is called *exponential growth*, in which the population seems to expand slowly at first, and then increase explosively. In the real world, such unfettered growth is eventually reined in by *limiting factors* such as running out of food or habitat, disease or predation, or by reaching the maximum body size of the organism. Growth eventually approaches a maximum value (the asymptote). The result is that the growth of any individual plant, animal, or entire population typically follows a "sigmoid" ("S"-shaped) growth curve. Since the general shape of colony population growth also follows a generally sigmoid curve for the first half of the season, I had erroneously assumed that colonies grew exponentially. In fact, this isn't the case at all, which became obvious when I looked carefully at data tediously collected in past years by some dedicated researchers.

A few diligent researchers³ have taken copious measurements of the amount of sealed brood in colonies over time. From those, by using estimated survival curves for the emerged bees, they could estimate the total population of the colonies. Let's first take a look at an example from one of the earliest, and well-cited, data sets:

MEASURED POPULATION GROWTH OF COLONIES

I've gone over the classic study by Nolan (done in 1926 and '27) with a fine-toothed comb (he performed the study during the early establishment of the package bee industry in order to determine the optimal size package to use). I've included one of his figures below (Fig. 2).

The most striking thing to me about these plots is the remarkably fast growth of these package colonies⁴ (which I'll return to in a bit). The other thing that catches my eye is that, in every case, the growth is *absolutely linear* for about a 5-week period. What happened to exponential? Although Nolan started his colonies in a warming spring, there was little difference in the rate of growth (the slopes of the straight portions of the curves) from colony to colony despite starting size or date of installation. Another surprising observation was that at 8, 10, or 12 weeks after installation, there was no particular trend in difference in colony populations, no matter whether they were started with anywhere from a pound of bees to 5½ lbs!⁵ Go figure.

Of greatest interest to me is that all healthy colonies appear to grow at nearly exactly the same rate once they get into the linear portion of the growth curve, no matter what the colony size. And it's not just Nolan's data; other data sets show the same.

A QUESTION ON METHODOLOGY

It's important to keep in mind that Nolan determined *calculated estimates* of colony populations, based upon the *assumption* that emerging bees lived for an average of 35 days. I take such figures based upon assumptions with a grain of salt, unless they've been validated by actual field measurement. His colony population estimates are figured forward from measuring the amount of sealed brood at 12-day intervals, rather than by actually counting bees or frames covered with bees. Luckily, some other researchers have gone to that effort—they would validate their calculations by counting or weighing all the bees in the hives at various time points), I've checked and their hard-earned counts of bees appear to validate the calculated values.⁶ So let's compare the calculated growth rates from a wide range of studies, including some of my own (Fig. 3).

I'd recently heard Dr. William Meikle from the Tucson Bee Lab mention that he had collected data on colony size by shaking all the bees from the hives and weighing them, so for a reality check I asked him for his data; one of his colonies on a mesquite flow grew at 626 bees per day (the brown line above).

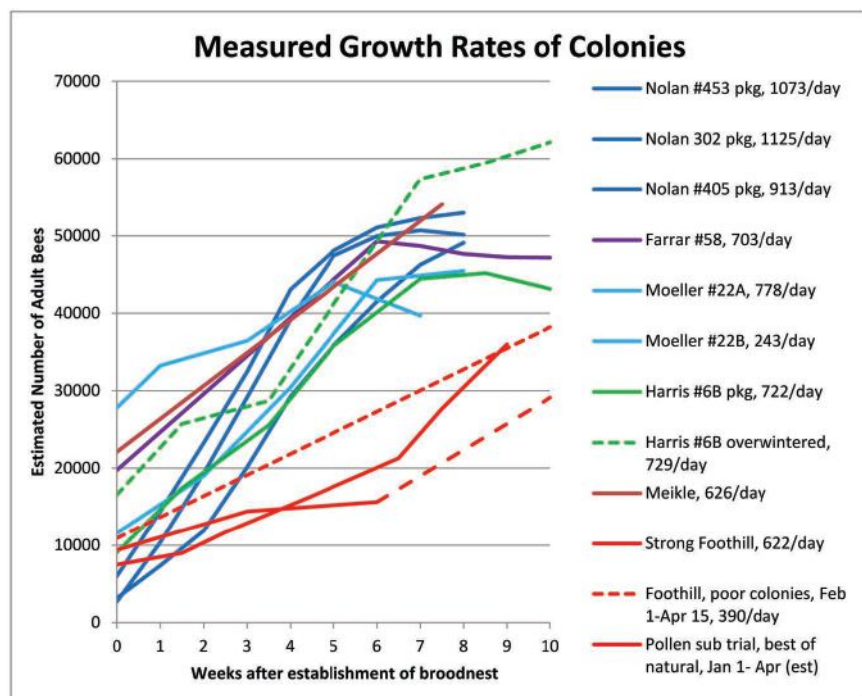


Figure 3. Growth rates of both package and overwintered colonies, generally starting with small populations. The green and blue plots are mostly historical data for exceptionally fast-growing colonies, the red for some of mine in the Sierra Foothills. The steeper the slope, the more rapid the growth. The number following each legend entry is the net gain in bees per day for the most rapid period of growth.

The data for the red lines come from my own colonies, calculated from frame strengths; the dashed portions are based upon estimates. The solid red line is derived from the mean of 21 intentionally-chosen poor colonies, growing (on average) from 6 to 21 frames of bees, over the period of Feb 1 through April 15 (including going to almonds).

I spent a lot of time working up the above graph, and found that the clearest way to compare data sets was to convert the slopes to net bee gain per day, which I put in parentheses. The linear slopes of growth are remarkably similar for colonies from different decades, and under varied conditions and times of year, suggesting that a gain of about 700-750 bees per day is about the best you can hope for.

Practical application: at 700 bees/day, a the cluster size will grow at a rate of a little better than 2 ½ frames of bees per week.

Still, the fact that Nolan's best colonies outshone mine (at gains of up to 1125 bees/day) bugged me. How the heck could a colony, when most studies find that queens lay at a sustained rate of only about 1000 eggs per day, ever gain over a thousand bees per day? I'll return to the limitations on queen laying capacity in a later part of this article, but for now, I'll give you a teaser—Nolan was dealing with package bees on drawn combs, and providing ample space for unfettered broodnest expansion. I've done something similar...

A CASE OF UNFETTERED EGGLAYING

Here in California I can purchase bulk shook bees after almonds, and occasionally find them useful. A couple of springs ago, we were driving home from delivering an order of frames of bees and brood, and had

50 caged year-old queens in full laying condition on the truck seat. There was a honey flow on, and 10 days of clear weather ahead. So I called my buddy Keith Jarrett and asked him to deliver 500 lbs of bulk bees the next day (my sons thought that I was crazy). The following morning we set up 50 double deeps of drawn comb, stuck a queen in each, and dumped 10 lbs of bulk bees in front of each hive (Figs. 4 and 5).

Before any brood reached maturity, many of the colonies had put on about 40 lbs of honey, and contained up to 8 frames at least partially covered with brood (which we then sold as nucs in order to easily pay for the bulk bees). This suggests that many of the queens, under ideal unrestricted conditions, were laying at least 2000 eggs a day.

Practical application: if you've never tried starting colonies with 10-lb packages, it's pretty amazing. I've done this several times over the years.

Anyway, the above observation also helps to explain why package bees dumped into hives of drawn comb can build up so quickly in the North. Let me wrap this segment with some remarkable observations by Nolan on the growth of smaller package colonies back in the day:

For instance, among some exceptional examples, it was reported that 1-pound packages in Ontario in 1916 built up sufficiently to gather an average of 100 pounds of surplus honey in one season. In the sweetclover [sic] region of the North a 290-pound crop was reported as the 1924 total from a 2-pound package installed in North Dakota on May 22 of that year. This particular region is marked by high colony yields because natural conditions make possible



Fig. 4. Some of the hives shortly after dumping 10 lbs of bulk bees in front of each. That's enough bees to cover all 20 frames of drawn comb in each hive. Most all the queens were accepted and recommenced laying immediately.



Figure 5. A closer view. We returned in late afternoon to brush off any clusters gathered outside of hives, and swapped the second boxes (above excluders) to balance the populations.

both exceptionally high daily gains and an exceedingly long period during which nectar is available. Sweetclover may bloom for about three months in North Dakota. A 3-pound package received in that State on June 5, 1922, was reported to have gathered a honey crop of 485 pounds before the end of the same season.

Yeah, the Dakotas used to be pretty good, huh? Nolan continues:

The points just discussed are of special interest and importance since, coupled with the fact that none of the packages studied for 10 or more weeks reached its maximum population before the ninth week, they would seem to indicate that packages should be installed at least eight to nine weeks in advance of the main honey flow if they are expected not only to replace themselves but also to reach approximately their maximum strength before the nectar flow is on.

Practical application: Nolan's data also suggest that it takes a small cluster of bees about 8 weeks to reach 8-frame strength (in relatively warm spring weather).

I've run out of room for now, but I've only just begun on this subject!

ACKNOWLEDGEMENTS

I'm especially appreciative to Lloyd Harris, who collected one of the best data sets on colony population development ever, and to me appears to be the most knowledgeable researcher on bee population dynamics. Lloyd generously provided me with much information, and has helped me with this article. I also wish to thank ARS researcher William Meikle, who provided me with unpublished data, and offered helpful suggestions to the manuscript.

Of course, I cannot forget my comrade in research Peter Borst, and also wish to thank the donors to ScientificBeekeeping.com, who allow me to spend the (unbelievable amount of) time necessary in writing these articles.

CITATIONS AND FOOTNOTES (ENDNOTES)

1. We used a heavy application of the 3.2% formula at <http://scientificbeekeeping.com/oxalic-acid-treatment-table/> and ~20 g of Apiguard; the colonies tolerated this treatment well.
2. <http://scientificbeekeeping.com/a-comparative-test-of-the-pollen-sub/>
3. Nolan, WJ (1932) The development of package-bee colonies. USDA Technical Bulletin No. 309. Available online from Google Books.
Moeller, FE (1952) The effect of stock lines upon the honeybee population-production relationship. Thesis (Ph. D.)-University of Wisconsin—Madison
Harris, JL (1980) A population model and its application to the study of honey bee colonies. MS Thesis, Univ of Manitoba. http://mspace.lib.umanitoba.ca/bitstream/1993/14743/1/Harris_A_population.pdf
4. See my comparison of the growth rate of honey bee colonies to that of today's broiler chickens at <http://scientificbeekeeping.com/sick-bees-part-17-no-sema-the-smoldering-epidemic/>
5. See his Table 10.
6. Some cyanided colonies and counted or weighed the bees. Lloyd Harris, needing to appease his advisor, "killed 43 colonies and counted them bee by bee. All 1.6 million of them." Others weigh the hive before the bees start flying, then shake

all the bees from the combs, and weigh the hive again. Either process, as you can imagine, is tedious.

7. I arrived at rough estimates of my populations by counting the number of frame interstices filled with bees, and then multiplying that number by 1820 (the approx. number of bees on a covered frame, as determined by a large data set of computer-generated counts vs. our visual gradings).

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West Virginia's Honey River Meadery Treasures Its Old World Style

by MARY AND BILL WEAVER

Photos by Kenny Kemp of the Charleston Gazette

Wine bottles by Erika May – from left, specialty tulip poplar mead, red raspberry melomel (fruit mead), and pyment (grape mead.) Note attractive color-coordinated packaging.

How do you define success? What is the good life? Many new college grads in the early 1990's answered these questions by heading to corporate America, looking forward to an accumulation of wealth.

Ben McKean, however, had very different ideas. He headed for the West Virginia mountains near Monongahela National Forest, attracted by the availability of whitewater rafting, hiking, and other outdoor activities. He purchased and began rehabilitating an 80 acre abandoned farm, on a south-facing slope so the soil would warm more quickly in spring.

"I wanted to be far enough away from urban areas to encourage myself to have a healthier and more self-reliant lifestyle," he explained. Ever since he began operating his Healthberry Farm in 1994, he has produced much of his own food. He experimented with growing vegetables for market. "I wanted to make my living in agriculture," he recalls, but the specifics of how he would accomplish that were at first somewhat open-ended.

As fate would have it, although McKean himself was not yet a beekeeper, West Virginia, his new home, also happened to be one of the best states in the east for beekeeping. In addition, his Healthberry Farm was located near the home of an exceptional Hungarian immigrant, beekeeper and mead maker, Ferenc Androczi.

One day in 1994, McKean was exploring the area and decided to follow a sign near Buckhannon, West Virginia that intrigued him: "Little Hungary Farm Winery." That day, he met the elderly gentleman who was



Ben stirs the grapes for his pyment with a wooden paddle. He uses "whole berry fermentation," (described in article), a low-tech but effective way of avoiding having to purchase expensive de-stemming and crushing equipment when using red grapes.

to become his mentor, and who would help to chart the future direction of Healthberry Farm.

The meeting was also a life-changing one for Androczi. In his 70's, he had a tremendous amount of Old World style mead-making information to pass along. He was anxious to teach his skills to another younger person who could keep them alive for the next generation.

"Frank," as he was called, was already well into his 70's and worked alone, keeping his 50 hives of bees, raising grapes, apples, and pears for his fruit mead or Melomel, and making and selling his product. Not every newly minted college grad would have been interested in spending time with, and learning a possibly not-too-salable heritage art, from an elderly man who was overwhelmed by trying to do too much hard work by himself. Fortunately, McKean was not your average 20-something young man. He was able to see the potential opportunities in the situation, both for himself and for Frank.

McKean was fascinated by Frank's story of having been a lawyer in Hungary and being imprisoned after the Communist takeover. Frank's escape from the Communist prison camp after seven months' incarceration, and his success in making his way to Austria, and from there to the United States in 1952, knowing no English, and with



Erika and Ben take a break together in the honey house.

only the shirt on his back, spoke volumes to McKean about the old man's resilience and character.

Once in America, Frank lost no time in learning English and getting a Master's degree and then a PhD in library science. When he retired from West Virginia Wesleyan University as a full professor, (he'd been attracted to the library position in the West Virginia mountains because they reminded him of his native Hungary), he was ready to follow in the footsteps of his father and grandfather in Hungary and open his own meadery, the first in the state of West Virginia.

Over time, McKean and Androczi estab-

lished a friendship and an informal mentorship. "I bought my first five hives in 1995," explained McKean, "and started planting fruit on Healthberry Farm. I was inspired by Frank, and I learned everything about beekeeping from him. I hadn't yet decided on a meadery of my own, but I was fascinated by what he was doing.

"I would stop in and ask him, 'Can I help you?' and that way, I was able to learn a lot about what he was doing. He became a very dear friend."

To the good fortune of both McKean and Androczi, Ben learned through Augusta Heritage Arts in Elkins, West Virginia, where had he taken some (unrelated) courses, that he might be eligible for a fully funded apprenticeship for them both. Old World style mead making was recognized as a heritage art in danger of being lost.

Ben filled out an application, and the paid apprenticeship replaced their informal mentorship for 1999-2000. "The grant was set up for one year, one day per week, so I could get a feel for all the stages in the process of keeping the bees, extracting the honey crop, raising the fruit, and making the melomel [fruit mead]."

When the grant ended, McKean continued the mentorship on his own.

Near the end of McKean's mentorship, Frank, by then in his 80's suffered a stroke. He lived several more years, but was never able to be active in his beloved meadery again. Ben McKean managed the business for him before he passed away at 85.

"During that time, I had the opportunity to learn about what taxes are required for the winery, and what forms and records I had to keep. I also got to try some marketing strategies that Frank had never explored that have proved to be very successful.

"I think Frank would be proud to see that I'm actually seeing it through," he continued. With McKean, and possibly others who learned from Frank before McKean met him, Frank's Old World folk art, passed

down through generations of the Androczi family, lives on.

Because the Old World methods produce meads with a richer, earthier, fuller flavor than the sometimes filtered, sanitized, and sterilized meads sold commercially today, McKean believes other beekeepers may be interested in trying them.

On his Own with Honey River Meadery

McKean bottled his first meads in 2013, after 15 years of plowing his profits from his honey sales back into his beekeeping business.

"Honey River Meadery was a full 15 years in the making," he continued. But today he is an experienced beekeeper with 90 hives (with plans to perhaps increase that number to 120) and his own meadery. Although he still sells bottled honey, most of his crop now goes into the production of his specialty varietal meads, pyment (grape mead,) and melomel (fruit mead, made with own his estate grown Everbearing red raspberries and also with West Virginia grown organic blueberries, for a separate and distinct type of melomel.)

Honey River Meadery's varietal meads include tulip poplar, one of the area's main honey crops, and basswood, from summer honeys, and goldenrod/aster from his fall honey crop. Surprisingly, he says the goldenrod/aster varietal mead has a unique, citrusy flavor. "My mead is naturally effervescent," McKean added.

"I specialize in varietal meads. I want to highlight the distinctly different flavor of mead that each honey produces. To get the honey for the varietal meads, I extract three times a year. The spring honey is left for the bees, and I'm careful to leave enough honey on the hives for winter. My bees winter better on honey than sugar syrup, which I use only in emergencies to prevent starvation."

The pyment, melomels, and specialty meads provide an interesting line-up of flavors for customers to try. They can currently be purchased at his home, Healthberry Farm and Honey River Meadery, in Dryfork, West Virginia, at two other local outlets, and at the many fairs and festivals across West Virginia where McKean sets up a stand to sell his wares, as do so many other West Virginia food and beverage producers.

AgriTourism and Farm Tours:

Other Sales Opportunities

West Virginia agritourism is another important source of honey, mead, pyment, and melomel sales. "I love to give farm tours. It gives me a chance to explain how the bees survive and interact, and about the importance of the plants that sustain them. I'm helping people connect with the foods they eat. They can see the hives that produced the honey that is in their mead. So many people today know so little about the natural world and the origins of their food."

McKean takes advantage of the current trend to buy local. Everything about his products is local: the honeys, the fruits, the grapes, even the designer of his care-



Extracting time. Erika May moves bucket of freshly extracted honey. The honey contains cappings, which are included in the mix for the primary fermentation of the mead.

fully thought-out, whimsical labels and the maker of his wooden paddle for mixing the honey into the meads.

His “Made in West Virginia from Local Ingredients” theme doesn’t only resonate with West Virginians. McKean has found a ready clientele for his products in the owners of cottages in the area who come from Washington DC and Richmond. These cottage owners attracted to his area, as he was, by the large, forested, unspoiled areas, and the opportunities for skiing, hiking, and whitewater rafting, for which McKean still acts as a guide.

These urban folks have been very open to testing new ideas, including that hazy mead with some sediment (like McKean’s Old World style mead) has a better flavor. They have also been anxious to buy bottles of his meads, pyment, and melomels to take back to the city to remind them of their wilderness summer homes. As a group, they, like McKean, consider raw, unprocessed foods to be especially healthy.

West Virginia is for Beekeepers!

“West Virginia is a great state to keep bees in,” McKean explained. There is a diversity of dependable nectar-producing trees and wild plants, which vary at the many different elevations the state of West Virginia offers.

Because the area is so mountainous, there is no large-scale agriculture here, and most of the smaller farmers in the state simply can’t afford to spray pesticides. “Out of all the cases of hive deaths that the West Virginia Apiary inspectors were called to check, they found no cases of Colony Collapse Disorder,” McKean continued. “The inspectors determined other causes for all the cases of bee mortality that they checked in the state.”

According to McKean, more and more beekeepers are moving from other states to West Virginia, because it is a better place to keep bees. Since most West Virginia beekeepers are hobbyists, there is room for the newcomers.

West Virginia beekeepers also have a very supportive department of Agriculture, and an excellent resource in West Virginia’s very knowledgeable and capable State Apiarist, Paul Poling, himself a successful commercial beekeeper in the state for many years.

Poling was personally very helpful to Ben McKean. “Shortly after Frank’s death, I knew that, although I understood how to keep a small number of hives, I needed to learn the techniques for taking care of a large number of hives efficiently and successfully.”

To give him the experience and knowledge he needed, Paul Poling hired him to work bees on a commercial scale for Poling’s Mountain State Honey Company for the 2007 season. McKean’s experiences that summer gave him the additional knowledge he needed before greatly expanding his own hive numbers to be ready to establish Honey River Meadery.



Some of Honey River Meadery’s products, from left, red raspberry melomel (fruit mead), pyment (grape mead), specialty mead made from basswood honey, specialty mead made from tulip poplar honey, blueberry melomel. Note the color coordinated packaging, and the carefully designed, whimsical Honey River labels.

Old World Mead-Making

Frank’s methods were simple, low input methods, but they produce delicious mead. Unlike many commercial mead makers in the US 20+ years ago, Frank used raw honey, which preserves all the delicate aromas and complex flavors in honey that are easily lost when honey is heated.

Mead made using Old World methods also looks different from today’s commercial meads. Old World mead is hazy, rather than crystal clear, and contains sediment. It also has more flavor variance from year to year. “I appreciate that variance,” said McKean. “It celebrates this year’s crop. I try to educate consumers that the haze is an indicator of something good and sought-after.”

As for the sediment, “Frank told me he

wouldn’t buy mead without sediment. He said the sediment was the healthiest part of the wine.” Sediment, however, is clearly a turn-off to some modern American consumers. “When they see sediment, they think the stuff is spoiled.”

So McKean is making just a bit of a change in the Old World methods he learned from Frank to make his pyment and melomel more acceptable to today’s American consumers. He believes Frank would want him to, and with good reason.

“Mead making was a family tradition that gave Frank a direct connection to his Father and Grandfather. Frank told me over and over how his Father had said, ‘There is no better melomel than mine.’”

“But,” Frank continued, “my Father never had a chance to taste mine.”



Ben and Erika check the stage of bloom on the goldenrod on Healthberry Farm.



Working bees. Note versatile hive stand. Those lids are not going to blow off in a storm! West Virginia Mountains in the background. West VA honey plants are plentiful enough that Ben can set up his yards only 2 miles apart.

"I used to wonder," mused McKean, "why Frank told me that story so many times. And then one day it was a big flash for me when I realized why. Frank was a literary kind of guy who would teach lessons with stories or songs. He wanted me to understand that he was passing it on to me. Now mine would be the best. He wanted me to take what he was teaching me and make it my own. I must find ways, using the techniques available to me, to make it finer so it would appeal to the next generation."

McKean still doesn't filter the sediment out of his wines. Unfiltered wines typically have a fuller flavor, he believes. But he does "rack" his wines several times before bottling. "Racking is simply transferring the wine from one container to another, leaving behind some of the sediment each time. When I can, I use gravity to siphon it. If there's less sediment, people don't seem to mind the cloudiness so much."

There is still sediment in McKean's wine, but not as much as in Frank's, in deference to the expectations of today's American consumers. In a practical sense, it doesn't matter how healthy the sediment might be,

if it's such a turn-off to customers that no one will buy the wine because they're convinced that with so much sediment, it must be spoiled.

A Long, Cool Fermentation Period

Another difference between today's commercial meads and those produced by the Old World methods Frank taught is that, with the Old World methods, the fermentation period is necessarily much longer. This is because no sulfites are added to artificially stop the fermentation process at a certain point so the mead can be bottled.

Making mead by the Old World methods is a much slower process. "Because I don't use sulfites, I have to allow enough time to make sure the fermentation has completely stopped before I bottle my mead," explained McKean.

"To allow for this, I age my mead for at least two years before bottling. The mead is aged at cool temperatures, in a cellar. Since fermentation slows to almost nothing in the cellar in winter, that two years must include two summers so that the fermentation will be complete."

McKean's Honey River Meadery is still in its infancy, with his inaugural batch begun in 2012. "I have bottled my first batch of mead from my 2012 summer honeys (tulip poplar and basswood.) The first mead I made from 2012 fall goldenrod and aster will be bottled shortly. I've been working on developing the label."

"I believe that the prolonged fermentation period my meads undergo, which produces a mead with about 14% alcohol, allows the mead to mellow and settle, and lets the flavors develop to more of their peak. Mead is well suited to aging. Also, using a method that allows me to bottle without sulfites makes my mead rare and unique, because it's expensive to wait two years before bottling [and selling!] the mead. It's traditional in Europe to age a mead for eleven years before drinking it, although this long a wait would probably be found in a private cellar or personal collection."

More honey per bottle of mead

McKean's meads also contain a larger amount of honey than many meads. By law, a mead must be made from a mixture that is at least 51 per cent honey. "But I am a beekeeper," explained McKean. "I produce honey. I can afford to be generous with my honey. My finished meads have about $\frac{3}{4}$ of a pound of honey in each full bottle of mead. My trademark is a sweet, dessert mead."

"My pyment finishes rich and silky on the palate because it still has, in addition to the sweetness of the grapes, close to $\frac{3}{4}$ of a pound of honey in a bottle. It doesn't need to have that. That's my style. It's almost a port style wine, although it's not fortified with brandy the way port is. I want my mead to celebrate the flavors of the local honey, which is wonderful food. This is my choice. Some people prefer a dry mead with less honey and sweetness."

McKean's pyment is only made with red grapes, because in the initial 10 days of fermentation with the skins, the red color and tannic acids dissolve into the wine for a richer, more robust flavor, as well as added health benefits from the antioxidants and phenols found in the red skins. He was happy to find a nearby supply of Cham-



(l) Ben checks shallow frame for incoming nectar. (r) Ben and Erika finished checking yard.

bourcin red grapes, a variety he considers excellent for making pyment, at Kopple Vineyard.

After those initial 10 days of fermentation with the skins, the juice is pressed out of the “must” and mixed with his dark, full-flavored tulip poplar honey.

Making Pyment - No Destemmer/Crusher needed!

This is a departure from Frank’s methods that McKean found that greatly simplifies making small batches of grape mead, or pyment. “It’s something any home mead maker can do if they purchase a flat of grapes,” explained McKean, who came across the method, called ‘whole berry fermentation,’ by happenstance. With this method, a lot of the grapes remain whole during the first part of fermentation.

“All you need for this method of fermenting the grapes is a simple wooden paddle. Frank had a destemmer/crusher to prepare his grapes, and I used to take my grapes to a winery with a destemmer/crusher to be processed. But this elaborate preparation isn’t necessary.

“I heard about another vineyard where they were doing ‘whole berry fermentation.’ I asked how they did it.”

McKean was told, “You need a vat, and just enough juice to cover the fruit, which you can press from the uncrushed grapes with the wooden paddle. Otherwise, vinegar-producing yeasts can get a start in the presence of oxygen.

“Check the grapes and juice every day, and if the juice level needs to be little higher to make sure the grapes stay covered, use your wooden paddle to press the grapes to release more juice. Stir daily, using your wooden paddle.

“After a week to ten days of fermentation, even whole grapes can go into the press, and the rest of the juice presses out well.”

What about the stems on the grapes in the clusters that have not been removed? Actually, they were an important part of Frank’s recipe. “After his grapes were destemmed, he added back about half of the stems to the “must” after it was pressed for the primary fermenting. They were part of his recipe.

“He referred to them as ‘pieces of vine,’ and because they are high in tannic acids, they give the mead an earthy, acidic flavor that blends very well with the sweet floral tones of honey. These tiny stems or ‘pieces of vine’ are part of my signature flavor also. The tannins might be too heavy for an all-grape wine, but with the honey, and always using red grapes as I do, the resulting flavor is delicious.”

Minimal-cost fermentation equipment

For the first month after the initial stirring and fermentation, McKean likes to use open-topped containers. They are easier to clean out, and they it make possible for the cappings to form a “floating wax lid” that keeps off the outside air. Cappings wax and propolis are both included.



Ben in honey house with crop of specialty meads, pyment, and melomels in sealed fermentation with air locks: in oak barrel (for pyment only); in stainless steel and plastic barrels; and in demijohns, the 15 gallon glass containers in the foreground that are protected by tan and black baskets.

After about a month in the open containers, the wax is skimmed off the top of the containers, and the mead, pyment, and melomel are put into sealed containers with air locks for the remaining fermentation, which takes place in a cellar. The mead and melomel are sealed in stainless steel containers.

The pyment, in honor of his mentor’s methods, spends a year aging in an oak barrel. “The oak adds tannins and blends very well with the pyment,” said McKean, “but I believe it distracts from the plain mead, so I only use oak for the pyment.”

To keep costs down in his fledgling winery, McKean has been able to buy oak barrels and stainless steel containers used, from other wineries, for example, that only used the oak barrels for a month or two. He scrubs them thoroughly to give them a new lease on life. “I pressure wash them. Slowly, with time, I can get them almost like new.”

Yeast Starter and Yeast

McKean adds a yeast starter for all his meads and melomels, although he does not try to kill off the wild yeasts that are already present in the honey and on the fruits. In addition, “I add a Montrachet yeast to the grape ‘must’ at the beginning of fermentation for the pyment.”

Raising Queens and Mite Control

McKean has begun raising about half of his own queens. “I’m doing it from the sustainability aspect. I want to be able to meet my own needs at the farm,” (as he has been growing most of his own food for many years.) He has found queen rearing to be very time-consuming.

“As I’m being more successful, queen rearing is paying off, but the time involved really makes the price of purchased

queens look good. I order the other half of my queens from Ismael Bautista at South Georgia Apiaries. I found him in an ad in *American Bee Journal*. He has been just great to work with.”

McKean’s preferred mite treatment, when there is brood in the hive, is “Mite-Away Quick Strips.” When there is no brood, in November, for example, or with a package or a swarm, “I like HopGuard. HopGuard is safe at any time, but it’s not as effective at penetrating cappings and killing mites in the brood cells as formic acid.”

Coming Full Circle

Ben’s motto is, “Bee happy; bee healthy.” (He is careful to caution against overconsumption of alcohol, from a health standpoint.) What better definition could there be of the good life than keeping active and earning a living by doing what one loves to do?

He’d like to add one thing more, though. He’s looking forward to doing some mentoring himself, to make sure that the Old World mead making methods he learned from Androczi will survive for yet another generation. McKean considers Androczi’s centuries-old family legacy to be a priceless treasure to be passed on to others.

He can be contacted at PO Box 40, Dry Fork, WV 26263, or 304 227 4414. His website is www.healthberryfarm.com.



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The growth of locally-based northern bee breeding and queen production operations has increased emphasis on developing methods of expanding drone production for saturation of target (disease tolerant and vigorous) drones in Drone Congregation Areas (DCAs).

STIMULATING DRONE PRODUCTION

Most vigorously-growing honey bee colonies produce many drones each year, but tend to concentrate drone production to the key colony reproductive periods of the season—when the colonies are swarming. Since most colonies in a specific region follow the same day-length, stimuli (photoperiod and temperature) and plant flowering pattern (phenology), beekeepers report that most colonies in a particular location are on the same general pattern of drone production each season. Beekeepers find that drone production peaks around the period just prior to swarming, thus providing an abundance of mature drones to fill the local DCAs with sexually mature mates for the young queens. Queens develop a full two weeks faster than do the drones, so effective drone production provides a predictive window for swarming—four or more weeks prior to the peak of swarm production, one expects to see the peak in drone production.

Colonies vary in their drone production because of their overall strength or weakness, as well as for genetically-determined reasons. Different honey bee races and ecotypes produce drones on slightly different schedules, and the movement of bees of one ecotype to a new location frequently interferes with the drone production response of the colonies. For example, colonies moving from a northern U.S. location to a warm, pollen-rich area in Florida will often produce a cycle of worker and drone brood when local colonies are not receiving this special stimulus.

Where there are two or more swarm seasons, one expects to see drone production prior to these events as well. In my area of Michigan, I often see a second swarm season in August and September when the purple loosestrife, Japanese knotweed, goldenrod and asters bloom. The level of drone production at this time is often less vigorous than the initial April to June push that colonies have with dandelion, fruit bloom, black locust, tulip poplar, clover and basswood. Some years, the second drone season barely happens when climate makes it too dry or too cold to support good drone generation.



Pollen forager with a large pellet. R. Williamson photo

Between these two time periods, it is possible, and rather predictable, that drone production will stop entirely, especially in the non-Italian races of honey bees. Russian, Carniolian and other queen families slow or stop brood production between nectar flows, and the first brood to be stopped is the drone brood.

THE NEED FOR DRONE BROOD STIMULATION

Because many northern beekeepers want to mate queens throughout the summer months, it is in their best interest to monitor new drone brood production and the number of mature drones contained in surrounding colonies. Where weather cooperates, it is also in the beekeepers' best interest (of getting quality queens mated to as many drones as possible) to stimulate drone production early in the season, especially of desirable drones, which I refer to as target drones. Non-target drones are from lines or queen families that are not desirable for mating partners with queens. The most obvious member of the non-target drones are African drones from invading colonies or colonies of southern migratory operations that contain queens that have mated with some African drones. Other non-target drones are identified as drones from a different race or ecotype of honey bee. For a Russian queen producer, they want to have as many Russian drones in a DCA as possible and need to replace non-Russian drones with the correct drone line.

How can you stimulate early and off-season drone production? Some beekeepers



Protein patty being consumed by worker bees. This particular patty contains no pollen, but lots of sugar. It is very popular as an emergency winter feed and an early boost to brood production, including drone brood.

bring in colonies from almonds or excellent buildup areas in a southern location that are filled with adult drones, as well as drones in all stages of brood development. Unfortunately, not all of these colonies will continue to support these large numbers of drones if the colony is not filled with pollen and nectar resources, or the area the bees are moved into cannot yield a large amount of pollen and nectar that is so essential for drone production.

Colonies that have been moved from a resource-rich area, as well as locally overwintered colonies, are often fed protein supplements to stimulate drone and worker brood production early in the season and to produce drones when the natural nectar and pollen flow has ended temporarily until the

late-season flow begins. Such feeding has become increasingly risky because of the quick development of the small hive beetle (*Aethina tumida*) on these food patties as they are an ideal nutrient and hiding place for the beetle larvae.

WHAT AND WHEN TO FEED

Given a choice, bees prefer natural pollen as their protein source. When artificial diets are compared to natural pollen, they fail to be as attractive as the pollen in choice tests. In such comparison tests, the pollen or protein are usually mixed with a percentage of sugar or high fructose corn syrup to attract sugar-hoarding house bees and consume the pollen or protein substitute at the same time.

As a graduate student at Michigan State

University, I was involved in collecting pollen with pollen traps, cleaning and freezing it for late winter and spring feeding to the university colonies. We made a cookie-dough like mixture of pollen softened in sugar syrup and formed it into patties. These were kept in the freezer or refrigerator until we were ready to feed the bees. No soy flour or brewer's yeast was added to the mixture. The patties were placed on the colonies, immediately over the brood nest, in late February or early March, to stimulate the colonies to produce brood earlier than they would have before natural pollen became abundant in nature. When the early maples, elms and other pollen sources started to release pollen, the bees would continue to feed on the pollen patties at night and on cool days when they could not forage.

In nature, bees use pollen that is placed and stored within a few inches of the brood nest. The pollen patties must be placed as close to the brood area as possible to give the maximum benefit. A common mistake new pollen-feeding beekeepers make it to place the pollen patties on the top of the stack of supers they are overwintering. The bees rarely are able to use this pollen if the brood area is not directly underneath the pollen, and it goes to waste.

Early feeding results in stronger colonies. Feeding must continue to keep the bees and developing brood alive and maturing in a healthy manner.

Feeding pollen to bees comes at considerable risk if the pollen is from an unknown source, or if your own colonies have collected pollen during a disease infestation or while being exposed to pesticides. The one and only time I purchased pollen to feed to bees, I spent a lot of money and infected every colony with chalkbrood. Apparently, the pieces of the chalkbrood mummies were in the pollen, and when we added sugar syrup and made patties, the bees received perhaps the best method of contamination with the fungal disease known to researchers. The brood we produced, and especially the drone brood, was infected with the disease, and we lost nearly all the drones we were working so hard to produce. It was a costly lesson on feeding contaminated pollen.

Never collect pollen during miticide treatment and when local farmers are applying any pesticide that may end up in the pollen pellets. This is especially true of any dusty compounds, such as seed treatments. Find areas that are remote enough from agricultural areas and other pesticide risks to locate hives and run pollen traps. For many beekeepers, this is a pollen flow following the major nectar flow, but this all depends upon the floral array in each area. Make sure you do not trap pollen late into the season and keep the colony from storing adequate pollen reserves in the hive itself. If the trap allows, let the bees collect pollen for their own use every other day or so, carefully harvesting the pollen and getting it into the freezer as soon as you can.

I know that pollen feeding stimulates colonies to increase the brood area and initi-



Dry protein powder being gathered by bees in Hawaii.

ate drone brood production. I do not have data on the benefit of pollen feeding and the number of drones produced, but it is certainly a good connection when kept disease and pesticide free.

POLLEN SUBSTITUTES

There are a number of pollen substitutes like protein powder or protein patties that are used in protein feeding. These work very well when there is no natural pollen available in the late winter and spring. Pollen substitutes have been heavily researched and studied by a number of scientists and manufacturing companies. They have a tendency to harden as patties, but many types are softened with more sugar concentration and the addition of certain lipids and other materials designed to keep them soft.

When I checked with the protein-selling vendors at the California Beekeepers Association in November, none of them could give me an answer about increased drone production as a result of feeding their protein mix. Instead of drone brood, the vendors referred to worker brood. They all seemed to have selective hearing when I asked about drone brood, but talked about worker brood instead. After all, feeding protein to bees has the intention of producing more brood and then more bees for rapid buildup and colony growth. Once started, protein feeding needs to continue or there will be a break in the food supply, and colonies will suffer. One manufacturer said he would get back to me with data from the research team that worked on their product, if there are any data. I hope there are, as we need to have a predictable tool for feeding to colonies that will generate abundant healthy drone brood and adult drones. Since protein feeding is so important to sperm formation in larval drones and for sperm migration in newly emerged adult drones, we need to have this information available. I want to be able to feed a patty of food starting in February or early March and know that the bees will have abundant drones early in the season. Then, in the summer, I want a material that I can feed as the nectar flow is fading and maintain drone numbers and vigor. If drones are the forgotten member of the bee colony, drone nutrition is probably only an after thought. That must change.

Note: Pollen or protein feeding is required in many parts of California, with several years of extreme drought and limited floral sources. I appreciate the diversity of flowering trees and flowers here in the Midwest, and hope the efforts to produce drones will continue to produce larger numbers of well-mated, locally adapted queen honey bees.

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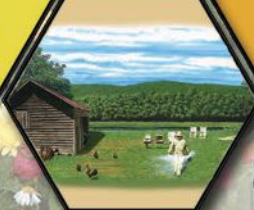
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*The Road to *Apis mellifera*: Putting the “Honey” in Honey Bee*

I’m convinced that beekeeping provides a place for nearly every kind of human personality and interest. There are as many reasons for getting into beekeeping as there are beekeepers, and whether the initial attraction in your case was pollination for your garden, a sideline income, a family tradition, a social outlet, a shared family project, or a taste for honey, I hope that at least part of the reason was a frank fascination with the colonial life of these social insects. The term “social insect” was coined by humans as a descriptor for ants, termites, and group-living bees and wasps because we saw in their teeming populations, appearance of order, and elaborate nests an appearance of our own societies and infrastructures. But as we will see in the next few months, the term “social insect” is falling under new scrutiny.

My purpose here is not to unpack the vocabulary of sociobiology but instead to begin laying out an evolutionary history of

our bee, the western bee, *Apis mellifera*. I’m doing this with beekeeping in mind – so we can better understand why it does what it does and how it has solved life’s problems. I suggested last month that it’s time we beekeepers become students of this evolutionary history so we can mine it for clues to modern bee health management. This column and the ones to follow are written in context to opinions I’ve expressed in earlier months about the shortcomings and limits to the management paradigms that have prevailed in beekeeping up to this point.

At the beginning of a journey it’s helpful to know where we’re going; so let’s remind ourselves that the honey bee is an example of a so-called *eusocial* insect, as spelled out by the venerable (and still quite active) biologist E.O. Wilson¹, and by definition must express three characteristics: (1) cooperative brood care, such that individuals in the same nest help tend the common brood, (2) reproductive division of labor,

such that some individuals abandon reproduction in order to help others reproduce, and (3) overlapping generations, such that some or all offspring remain at the nest to help their mother rear another generation. It is possible to possess some but not all of these characters, thus giving rise to lower and higher expressions of sociality. Sweat bees, for example, often express characters (1) and (2), but not (3). Among the eusocial species it is possible to be eusocial only part of the year. The bumble bees and many wasps fit this pattern; over winter these species exist in a solitary state – represented by single mated queens in hibernation. These solitary queens emerge in spring and single-handedly found a nest, forage for food, and rear the first batch of workers. Only at that point do the workers take over foraging, the queen stay at home, and the colony achieve a truly eusocial state. We call these *annual* eusocial colonies, as opposed to *perennial* eusocial colonies like the honey bee that



Figure 1. In contrast to perennial social species like the honey bee, with annual social colonies all the individuals die in fall except for newly-mated daughters who overwinter in isolated hibernation and emerge next spring to start new colonies. This hornet nest in autumn is now dead and abandoned.



Figure 2. In the Southeast there are rare examples of “annual” yellow jacket species that didn’t read the books. Instead of dying out in fall they overwinter and persist for a second season, making unusually large colonies. Being at the extreme southern edge of their range it is possible these colonies are able to hunt insect prey all winter.

live together as a group 12 months of the year. It is no accident that perennial colonies tend to have larger populations. Annual colonies die out in fall (Fig. 1), leaving behind only the newly-mated queens to hibernate and start the cycle over again. I have to mention some interesting exceptions that pop up in Georgia and Florida – occasional colonies of the annual yellow jackets, *Vespa maculifrons* and *V. squamosa* that skip that part about dying out in fall and persist for a second season^{2,3}. These colonies can become amazingly huge and make for interesting photographs when they show up in unexpected places (Fig. 2).

But back to the matter at hand – our destination is this: the modern European honey bee, *Apis mellifera* – a vegetarian perennially eusocial bee adapted for strong seasonality and winter survival. For simplicity's sake I will indeed focus on the European honey bee, as opposed to African races, although the African lineages will have something to say in this series as well.

Our story could begin 3.6 billion years ago with the appearance of the first simple cells on Earth, but let's shave off a few zeros and start instead 146-76 million years ago when the first flowering plants, the Angiosperms, started appearing in the Cretaceous epoch. The wasp ancestors of the bees were already here, and some of them started abandoning their primitive carnivorous diet in preference to plant pollen – a new form of protein. Flowering plants, for their part, responded to these serendipitous pollinators by secreting nectar to attract them better, helping ensure cross-pollination and seed formation, thus engendering one of the most famous examples of co-evolution – the tight relationship between flowers and bees. Eventually these proto-bees diverged entirely from their wasp relatives to focus exclusively on a vegetarian diet, evolving along the way fuzzy bodies that pick up pollen grains, pollen baskets on their legs, and honey stomachs.

We can thus linger a minute to soak in the fact that bees are vegetarians and obligated to a diet of pollen and nectar. This characteristic is ancient and is in fact the driver that separated them from the wasps. It is the reason we can truthfully say that when bees use their stings they are not being *aggressive* (like their predatory ancestors) but rather *defensive* of their nests. It is the backstory of any conversation about whether this bee or that one makes a better pollinator for crop X, Y, or Z, because the dietary needs of a species will go hand in hand with the pollinating efficacy of that species. Consider for a minute the well-known observation that highly specialized and efficient pollinators are overwhelmingly represented by *solitary* bee species (or eusocial species in their solitary queen phase). It is plausible to hypothesize that for these species, which often have very brief active seasons measured in weeks or even days, it is extremely important that they are good pollinators for whatever plants happen to be blooming at



Figure 3. The bee's heritage of vegetarianism combined with a perennial social life cycle combined with the need for winter food storage gives us an evolutionary explanation for honey and everything associated with it.

the same time. It is in their selfish interest to ensure the reproduction of those plants so they will be available next year to feed and sustain their offspring. Matters are less urgent for a perennially eusocial species like the honey bee which has the leisure, so to speak, of visiting the whole season's panoply of flowers available in the neighborhood. For such a flower shopper there is less selective pressure to become a pollinator specialist for any one.

But only to a point. What *does* matter is quantity of pollen and enough successive flower flushes (plant species) to provide it. Because the colony is actively rearing brood the entire growing season it must extract between 37-75 pounds of pollen from its immediate foraging range⁴. In Europe, this is known to occur with at least 31 significant pollen-bearing plant species. However a recurring theme is that when examined locally the bulk of pollen comes from relatively few plant species; across Europe, 5 plant species are responsible for 60% of annual pollen yield⁴ – so even a honey bee has to be a “good enough” pollinator to sustain a minimally diverse plant community within its foraging range. And by extension, a perennially eusocial organism like the honey bee will not do well in a monoculture or similar plant species-poor habitat. Although evidence is thin, there are opinions that honey bees further benefit nutritionally from a species-rich succession of pollens across a given season.

There's more to be said about a vegetarian diet in the evolutionary history of the honey bee, and it will show up again in the months ahead. But now I'd like to hypothesize another idea about vegetarianism – whether it is conducive to, or even a precursor for, the evolution of perennial

eusocial life in cold latitudes. Most eusocial species living in cold climates defer to an annual life cycle: everyone dies in fall except for newly-mated queens who revert to primitive isolated hibernation for overwintering. Alone among the perennially eusocial cold-climate species stands *Apis mellifera*. Is there something unique about vegetarianism that enables the concept of *food storage*? because this is really what we're talking about with a group of insects that live together, forego hibernation, and weather a long food dearth. What is honey besides nectar, dehydrated and acidified to resist spoilage? And what is bee bread besides pollen, fermented and acidified to resist spoilage? The only case of food storage I can find for perennial wasps is in fact nectar⁵, but the equivalent need for protein for a cold-weather perennial wasp would be the storage of meat – which doesn't seem to happen. I admit that the problem of storing meat in cold climates doesn't seem very difficult, but we must remember that evolution never tells us “what could have happened,” only what did. For whatever reason, acidifying pollen proved a successful strategy for storing protein over winter, and thus honey bees were able to preempt other challengers for the niche of “large nest population, cold-climate perennially eusocial insect.” Far from being so much rigmarole, these facts strike at the very definition of *honey bee*. It explains the existence of *honey*, and the fact that our colonial bee is perennial means it has a large population and can make a lot of it. It is the evolutionary explanation for the long romance between humans and *Apis mellifera*, all the stories, books, poems, and songs written about sweet honey and the industrious bees that make it. It is the evolutionary explanation for the beekeeping industry. It doesn't get much more fundamental than this.

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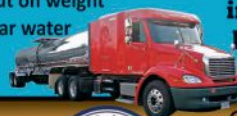
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Comb Honey Corner

by **RAY NABORS, P.H.D.**
raymond.a.nabors@gmail.com

Comb honey like all honey production requires Angiosperms, which are flowering plants. For the most part these flowering plants will be dicotyledonous ones. I do plant things that will provide nectar and pollen for bees. You may think your property does not have enough area for plants to make much difference. You will have much more space than you think on a ½ acre or even ¼ acre lawn space. Even though horizontal space may be limited, vertical space is much less limited. Trees make ideal honey plants. However, for whatever you plant there is more than one consideration. Many trees make dark honey. A few make light colored honey. Numerous annual and biennial plants make light colored honey in large quantities. Time of bloom is also important. A mix of early and late blooms will extend the honey flow.

If you have bees in an apiary near your residence, the plants in and around the apiary are most important. Bees will work plants that are close rather than travel farther for distant plants. Some plants produce much more nectar than others. That will also have much bearing on how far bees are willing to go. Bees have a very good sense of economics. They will go farther for high quantity nectar plants, passing by plants that are closer with lower nectar production. They are able to determine what plants provide the most nectar for the distance travelled. Bees also make such a determination about the amount of available pollen for the distance travelled. Bees will also go to the closest water source. I recom-

mend using a water source in the apiary. A 5 gallon chicken water jug will easily service 20 colonies. A 2.5 gallon one will take care of 10. Fill the water container, the lid will keep bees out of deep water. Put 1" - 2" gravel in the bottom tray to keep bees from drowning. Bees need water, give them clean water.

Trees for bees start with maple in this area. All species of maple provide nectar and pollen early in the spring. Plant two or three of the same species and they pollinate producing seeds for more. I prefer *Acer rubrum* the red maple because the growth is fast and they are precocious. The maple honey is never harvested here. The quantity is not enough for harvest, but the tree is so early, it will provide much needed nectar and pollen for spring build up. Another plant that I use for spring build up is dandelion. Most folks try to kill this plant out of a lawn, but here it has free territory. Bees get both nectar and pollen early from dandelion which will continue to bloom after Maple has subsided. Dandelion nectar is dark and strong of flavor, but the bees need it early for buildup. Red buds come in after maples. They have nectar and pollen. The nectar seems to make the bees have much additional bowel activity.

Various fruit trees produce ample nectar and pollen for bees to build up in spring. These trees have a good quality honey, but not good quantity. They also provide pollen. Apple and Pear are about the same as far as bees are concerned. Do not expect a crop of honey though they need bees for pollination. If you do not want the fruit, consider ornamental crabapples and pears. Many varieties make small fruit consumed

by birds. Stone fruits are also good producers including peaches, plums, and cherries. Many varieties are made for flowering and do not produce fruit. Trees in the rose family, including all the above, that produce fruit will require frequent applications of chemical protection products to keep out insects and diseases or you will not get any fruit worth eating. That dilemma can be solved by making such applications at or just after sundown. Use products that are soaked in or gone within the night to protect the bees the next day. Ornamental fruit trees do not require sprays. Fruit trees bloom after maples and dandelions.

By now you must wonder, what if I want trees that produce large quantities of honey. We will start with Tulip Poplar, *Liriodendron tulipifera*, a plant with many blooms full of much nectar. This is the most copious source of nectar I know of. I must confess a liking for this molasses flavored honey. It is dark and strong. Those who did not grow up where this tree was a major source of honey may not like it. Basswood trees, *Tilia* sp, make a light colored mild honey preferred by many people. One species is native to North America, the others are from Eurasia. All are good nectar sources making ample honey. Another source of light honey is black locust trees, *Robinia pseudoacacia*. This honey is not only light in color, but sought after wherever it is produced. The black locust will not produce every year unfortunately. When it does produce, it makes a full super or more of superior honey. Bees visit many other trees, but the ones listed produce either large enough quantities of nectar to produce honey or produce



maple



apple



peach



black locust

early when bees need honey and pollen to build the colony. The trees listed are widely adapted. There are local trees that produce in many areas of the country, but are limited in geographic distribution and will not grow in all areas.

Some of the best nectar sources come from perennial, biennial or annual plants. All legumes seem to produce nectar and pollen for bees. Hairy vetch is my favorite. It will cover a large area quickly and produce copious quantities of high quality honey. Crown vetch, planted by many highway departments, will not help the honey bees since the plant's corolla tubes are too deep for honey bees to reach the nectar. Alfalfa produces good honey. These plants are relatively short. Some clovers will produce good honey. You will need to let vetch grow to seed in order to keep a stand. We are talking about a patch of prairie in the



hairy vetch



tulip poplar

lawn. Legumes do not all stand up to regular mowing or will not produce nectar if not allowed to flower. Most bean species, (also legumes) will provide bee forage in summer. It takes a large planting of beans, the size mentioned below, to make honey. Soybeans are an option. Plantings of green beans and shell beans will not work quite as well. The best nectar producers are sweet clovers. A combination of white and yellow sweet clover will produce for three weeks and make two or more supers of honey. Sweet clover grows to a height of 6 feet. It does make a high quality honey. If you do not mind a tall plant, sweet clover is the best legume.

The best biennials I know of are all in the cabbage family. The yellow flowers of wild mustard produce a delectable honey. Radishes, cabbages, broccoli, rape (canola) and turnips will all produce nectar-laden yellow flowers if allowed to seed. The quality and quantity of the honey is excellent. A large patch of cruciferous plants will produce a large quantity of quality nectar and reseed itself very well. These plants are harvested before they flower in most gardens. They make excellent honey plants for the beekeeper. Crucifers produce flowers in spring, but also will flower in the fall. It is possible to get two crops in one season with a large patch of these plants. These plants are not often thought of as honey plants in the south and central parts of North America, but they have an undiscovered potential there.

Finally, cotton plants provide a good summer nectar flow. Cotton requires the same climate as tomatoes. If you can grow tomatoes, you can grow cotton. North of the Missouri Bootheel, it must be started in a greenhouse. Start plants in large 4" pots. This plant blooms for a month in summer, has extra floral nectaries, and produces a tasty light amber to yellow honey. It is a relative of okra. Surprise, cotton bolls are edible and actually sweet when small and tender. If you reside where it does not grow, it is a tropical perennial hibiscus with beautiful large white blooms. Squares are the name applied to the flower buds. Bolls are the name for the fruit or seed pods, and the flowers are referred to



yellow sweet clover



basswood

as blooms. Bees love the plant. I have seen them pass over a bean field to get at a cotton plant. Cotton does not like cold or wet soil. It will die below 40 degrees.

Which are the best sources? For comb honey, the ones that make light colored honey are best. Basswood and black locust trees, perennial legumes like hairy vetch or biennial legumes like sweet clover and biennial plants in the crucifer family and annual beans all make large quantities of quality honey. If someone asked which should I plant, my answer would be why not all of them? All of these plants will grow anywhere in temperate North America. The seeds or plants are readily available in most places. They are widely adapted. There are regional relatives of these plants that grow well in only parts of the country. Black locust is a legume that can be started from seed or the trees can be bought. They sprout from the roots which is good since the black locust borer tends to kill them after a few years of bloom. Basswood is a long lived tree with few natural enemies, but it does not produce until after a few years of growth.

A patch of prairie planted with vetch will live for years. The growth can be held to less than a foot. An area 150 feet by 20 feet will produce honey quite well. An area that size can include crucifers in large quantity that can be planted twice each season to produce 2 crops each year. The crucifers will appreciate the nitrogen fixed by the vetch, while the vetch will like the soil friability made by



white sweet clover

crucifer roots. Annual beans can be planted to fill in summer nectar. In these days of monoculture, providing good forage plants for honey bees will help the bees tremendously. Comb honey production is not successful without a high quantity nectar flow. Large garden spaces planted to legumes and crucifers will provide an extended honey flow of high quality from spring until winter. Plant your home ground for the bees this year.

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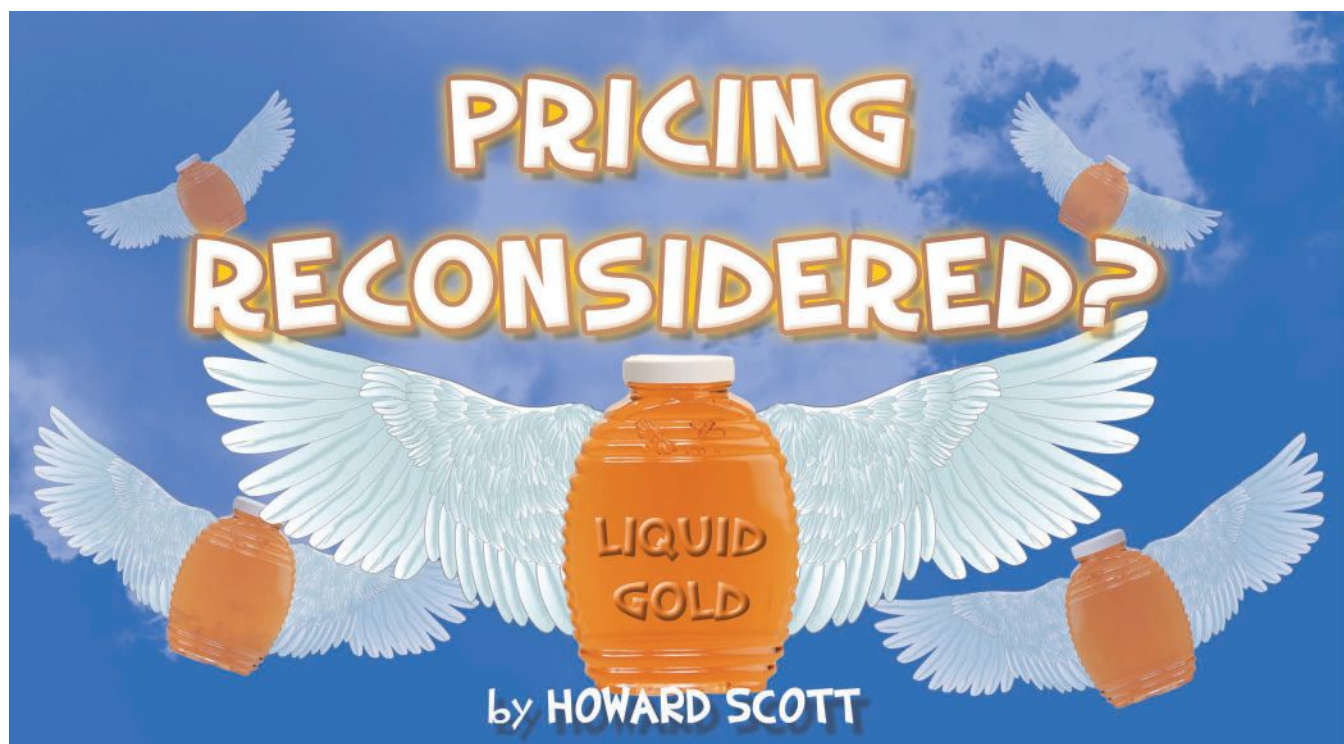
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Yes, our honey is much better—and healthier and tastier—than store-bought product, and we deserve to get more for it. And yes, it is more difficult to over-winter hives now than it was 20 years ago, and this creates extra expenses. And yes, possibly because of environmental changes, bees are producing less honey now than, say, in the '70s. But does that mean we can charge anything we want?

Here are my reasons that I believe we might be overcharging. First, the gap is getting to be a giant gulf, an oceanic difference. Supermarket honey is now around \$5.00 a pound in our market place (the Northeast). Certainly we have a right to charge more, but 2 and 1/2 times—isn't that a little gouging? Particularly since supermarket and local honey sold for about the same price 15 years ago. Is the discrepancy such that consumers might start to say, "I can no longer afford the good stuff. The other stuff will do."

My honey price in 2004 was \$4 a pound. Today I charge \$9 (my price to my customers). I increased a dollar from last year. To my way of thinking, \$9 is just about the farthest limit one should charge. It's over double the ten-year-old price, which is almost 20% inflation. People remember when

they paid much less. They will get tired of paying huge increases every year, even if they understand the value of local honey. Remember, the product hasn't changed, but the perception has. So there should be some easing on the upward trajectory.

We are beekeepers after all, not really capitalists. In fact, this proclivity to be 'independents' is one of the aspects that wooed us into the activity. We do not want our product to be put out of the reach of everyday folk. We do not like being called "price gougers." We do not even want our products to be upper-end boutiqueish. High-priced honey (with the exception of Manuka) sometimes seems exorbitant.

The question becomes, what is exorbitant? Is a Mercedes overpriced at \$60,000? Since one could buy a car for \$15,000 that does essentially the same thing, \$60,000 is high. But the styling, superior maneuverability, and prestige factor could be said to account for the difference. So \$60,000 is not an unreasonable price for a top-of-the-line auto. I don't know if we could make that same argument for local honey.

Sure costs have gone up, and we need to make some money (those of us backyarders) to recover our costs if we are to continue the activity. But you don't need to overcharge to make money. If you obtain some harvest and you sell at, say \$9 a pound, you will at least break even.

Say you get 100 pounds of honey from three hives. You give away 25 jars and sell 75 jars at \$9, which yields \$675 revenue (75 X \$9). Even if you have to buy three packages (if none of the hives overwinter) at \$100 a package, that's only \$300 expense. With all the other expense—foundation, sugar, medication, bottles, labels—which might run \$250—you come out ahead.

Revenue	\$675
Expense	
Packages	\$300
Other	\$250
Total	\$550
Profit	\$125

You didn't make much, but you covered your expenses, enjoyed the activity, and took pride in giving away 25 jars of that magic potion. Lucky you.

Commercial beekeepers, on the other hand, do need to make a living. But very few commercial operators are charging \$12 a pound. One Massachusetts commercial beekeeper harvests a lot of comb honey. That's his high-priced product. In contrast, he sells one-pound liquid jars for \$7 or \$8. And he makes his livelihood with that pricing strategy.

In this part of the country, one can buy 60 pound containers of strained honey from commercial beekeepers for \$3 pound, or \$180 for the 5 gallon container of honey. So, putting in bottle and label cost, you can still sell at \$9 a jar, and more than double your cost. Doubling one's money is about all a retailer can expect to make.

I know that location is an important determination of price. An affluent town will accept a higher price more readily than a middle-class community. But I often see local honey priced at \$7 to \$8 in parts of this state. Enough people will discover that local honey can sell for much lower prices, and suspect that they are being price-gouged. Given enough time, the product's demand could decline. After all, honey really competes with sugar and jams, and their prices haven't risen 250% in a decade.

To prove my point, next year, charge \$18 a pound. I dare you! Yes, some people will

buy the product, but planted in their minds will be the notion that they are paying an excessive premium. Such disgruntled consumers will start to examine the claims that local honey is so much better than store-bought product. They might speculate that local honey is also heated. They might question what kinds of conditions local honey is processed in—dirty basements, cobwebbed garages. They might notice the detritus often found in local honey, and wonder what it is. Possibly, they will begin to believe that local honey is not so much better than store-bought honey.

Economists refer to this as the elasticity of demand. At a certain level, demand is inelastic, but above that price point, demand turns elastic. And consumers will start to switch to alternatives. They will switch even though the alternatives aren't healthy for them.

One might argue that, at our fair this summer, no one flinched at purchasing honey at \$12 a jar. But perhaps several buyers took notice, and mentally determined that they will not be making purchases here next year. To the proud beekeeper who says that honey is not economics, I respond that everything is economics. It is always the matter of divvying up scarce income against an array of purchases.

We have successfully worked hard to differentiate our honey from store-bought product. Local honey is recognized as a superior, even special, product. But let's not destroy this trust with greed.

Scott, a 30-year Pembroke, Mass. beekeeper, is the author of the best-selling BEE LESSONS. He has published over 150 articles for ABJ. Contact him at dancinghill@gmail.com.

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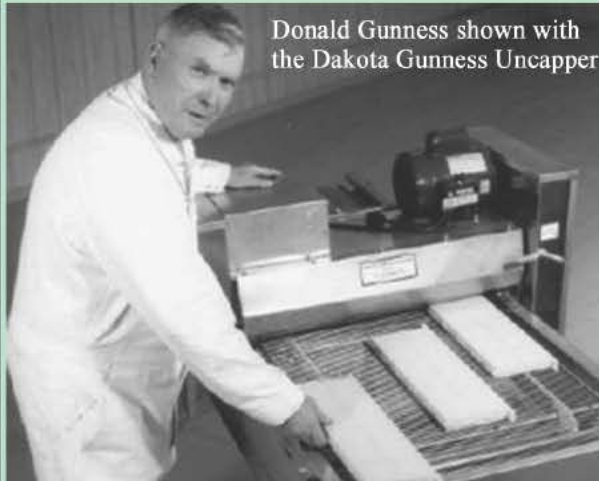
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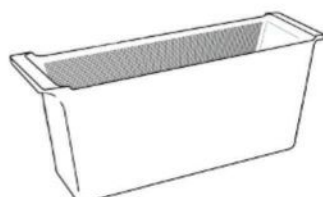
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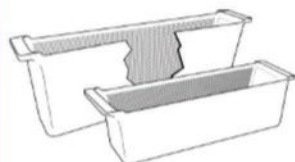
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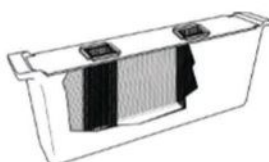
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Support of Canadian Neonic Lawsuit on the Rise; No Financial Risk for the Beekeepers Involved

by **JEFFREY CARTER**

A lawsuit in Ontario, Canada against neonicotinoid manufacturers Bayer CropScience and Syngenta is gaining momentum.

At the same time the province appears likely to become first jurisdiction in North America to restrict the use of the insecticides. Used prodigiously in North America as a seed treatment in corn, soybeans and canola, the chemicals have been connected to the decline of honey bees and other pollinators.

In late November, Ontario's agriculture announced its intention to implement a legislated curb on their use. That's to come on July 1, 2015.

The regulations are to be enforced during the 2016 growing season. By 2017, the intention is to reduce usage by 80 per cent.

"We're pleased with the announcement. We want it to be extended to all persistent, systemic and mobile pesticides," Tibor Szabo, spokesperson for the Ontario Beekeepers' Association, said.

"We've had tremendous support from the public. They want government to do its job."

The announcement comes on the heels of another disastrous season for many beekeepers in Ontario. The estimated winter kill was placed at 58 per cent – the highest percentage loss on record – but problems didn't stop there.

According to Provincial Apiarist Paul Kozak, there were 345 bee kill incidents in Ontario reported to Canada's Pest Management Regulatory Agency by 60 beekeepers in 2014 – a higher number than in 2013 or 2014. Thousands of hives were affected.

The difference in 2014 is that fewer incidents were reported around planting time.

Jim Coneybeare, a honey producer near Fergus, said the improvement at planting time may be related to the use of the dust-reducing fluency agent used by growers and other measures that were implemented.

However, he said the weather differences compared to 2013 and 2012 may have had the greatest influence.

Beekeepers like Jerry Jerrard of Kawartha Lakes Honey said this year's incidents were often chronic in nature rather than acute. In other words, colonies tended to dwindle over the course of the year rather than being killed outright by a heavy dose of the insecticides.

Ontario beekeepers do not blame insecticides for all their problems – the varroa mite and nosema continue to be major concerns – but there's a growing recognition that the neonicotinoids act on a sub-lethal level to impair bee functions.

According to the *Pollinator Health* discussion paper released by Ontario's agriculture and environment ministries, "A growing body of research indicates

that this sub-lethal exposure harms bees by disrupting their ability to forage (gather pollen), navigate (return to their hives) and reproduce or by adversely affecting their immunity and making them more susceptible to viral pathogens."

The Ontario government's intention is to treat neonicotinoid, seed treatment insecticides as a "last resort." The proposed restrictions require qualified farmers and pesticide applicators in Ontario to receive integrated pest management training for growing corn and soybeans, document IPM efforts, and present a third-party documented, risk assessment before being granted approval to use insecticide-treated seed.

For seed companies, the emphasis is on making non-treated seed available. They could be changes required on how the seed-



John, Davis and Steve Bryans of Munro Honey along with Bill Murray support a legal action against Bayer CropScience and Syngenta concerning the use of neonicotinoid seed treatment insecticides. Munro Honey is also named as one of the two plaintiffs.

treatment insecticides are marketed and the disclosure of pesticide content information.

Close to 100 per cent of Ontario corn acres and 60 per cent of soybeans were sown with treated seed in 2014.

It was only in 2013 that seed companies operating in Ontario began offering seed corn treated with fungicide but not insecticide. Farmers had to make a special request and some reported the price was higher for insecticide-free seed.

The proposed restrictions have been condemned by the Grain Farmers of Ontario (GFO), an organization representing farmers growing the province's three largest crops, soybeans, corn and wheat, and by CropLife Canada, a group representing seed and agricultural chemical companies. The two organizations have also been highly critical of the class action lawsuit launched by Siskinds LLP and two Ontario apiaries – Sun Parlor Honey and Munro Honey.

Three Siskinds partners, litigation specialists Dimitri Lascaris and Mike Robb and environmental specialist Paula Lombardi, spoke at the annual meeting of the Ontario Beekeepers' Association on November 21.

The lawsuit asks for \$450 million for a claim period from 2006 to 2014 for all beekeepers in Canada, outside of those in Quebec. According to Lascaris, there is no financial downside for beekeepers, including the two plaintiffs, Sun Parlor and Munro.

Neither is there a need for beekeepers to opt out of the action against neonicotinoid insecticide manufacturers Bayer CropScience and Syngenta, he said.

"They're trying to persuade people to opt out of the case so that their liability will be less."

An opinion piece that appeared in the October 27 edition of the *Financial Post* did raise the spectre of financial risk for beekeepers. According to its author, Paul Driessen, "Beekeepers blaming pesticides for bee losses could face bigger losses in court."

Driessen is a senior policy advisor with The Committee for a Constructive Tomorrow, a lobby organization based in Washington, D.C. that promotes what it refers to as a "balanced perspective" on environmental issues.

The law firm is currently campaigning to sign on additional beekeepers to the suit. As of last November, more than 100 from Manitoba have Ontario had joined and there have been serious inquiries from beekeepers in other jurisdictions, including Alberta where the Alberta Beekeepers Commission announced its opposition to the lawsuit earlier.

According to a September 17 statement, "The Alberta Beekeepers Commission recognizes that the use of certain agro chemicals can adversely affect honey bees, but also recognizes the benefits of using seed treatment technology in agriculture. In particular, compared to the organophosphates and foliar applications of

pesticides previously used, seed treatment technology significantly reduces honey bee exposure to pesticides."

The Canadian Honey Council (CHC) has not yet come out in support of its affiliate organization in Ontario.

CHC chair Gerry McKee, a honey producer in British Columbia, said there's not yet enough science to oppose neonicotinoid seed treatments. At the same time, McKee said all Canada beekeepers oppose insecticides being used prophylactically (as an insurance policy against pests) either in their own hives or for producing agricultural crops.

"We are reluctant to come out and encourage a moratorium on these products for corn and soybeans. It could lead to a more undesirable outcome."

The Ontario Beekeepers' Association passed a resolution at their annual meeting to withhold one category of fees from the CHC.

Szabo said there are conflicts of interest at the CHC. One relates to some members being paid by either Bayer CropScience or Syngenta for their canola pollination services in Western Canada. The other concerns support from the companies sent directly to the CHC.

The lawsuit against Bayer and Syngenta is based on the Ontario's 1992 Class Proceedings Act.

The first hurdle is to have a motion for certification approved by the Ontario Superior Court of Justice.

The first hurdle is to have a motion for certification approved by the Ontario Superior Court of Justice. That decision will come no earlier than the second half of 2015, according the Siskinds' litigation team handling the case.

Following that is a period set aside for discovery with a trial following. Any time along the way, a settlement could be reached out of court.

"The idea is to let claims to be brought forward together so that cases that would otherwise not be brought to court are heard... It levels the field against companies like Bayer and Syngenta," Robb said.

If the lawsuit is certified, beekeepers wishing to opt out will have that opportunity Lascaris said. If a settlement for compensation is reached, beekeepers who have not opted out will have an opportunity receive damages.

Meanwhile, Robb hopes more beekeepers will sign a retainer with Siskinds so the lawsuit gains momentum. The objective is to bring 3,000 beekeeping operations on board in Ontario alone.

Both Munro Honey and Sun Parlor have signed a contractual arrangement with Siskinds which shifts the financial risk to the law firm, he said. In addition, Siskinds plans to apply for a type of insurance through the Law Foundation of Ontario that will cover their costs in the event the case is lost.

In the case of a win, Siskinds will profit. Lascaris said the usual fee amounts to 20 to 25 per cent of the recovery.

In the case of a loss, Siskinds will pick up tab, including some of the costs accrued by the defendants.

Lascaris said it typically takes years for a lawsuit of this type to reach trial. However, less than 10 per cent of suits reach trial for a variety of reasons, including the implementation of out of court settlements.

Siskinds is pursuing a second neonicotinoid, class action lawsuit against Bayer and Syngenta, this one on beekeepers in the Canadian province of Quebec. That was announced last October.

Siskinds has taken on powerful clients before, Lascaris said, including Bayer and other defendants over a case related to the price fixing of chemical products. According to Lombardi, Siskinds is recognized as the top litigation law firm in Canada, if not North America.

Along with the legal and political wrangling, new research into the impact of neonicotinoid insecticides is being conducted in Ontario under the guidance of Dr. Ernesto Guzman of the University of Guelph. At this time, preliminary findings are being withheld.

Graduate student Dave MacKay is involved with a study looking at the impact neonicotinoid-laced corn pollen and nectar on honey bees.

Two sets of hives are involved in the trial. One set was placed near a field of corn planted with seed treated with the neonicotinoid clothianidin. The other set next near a field of organically produced corn.

The hive locations were about six kilometers apart so that the bees would be exposed to similar weather conditions. Pollens and dead bees were collected from traps at the hives for analysis.

MacKay said there were some interesting findings, but would not elaborate further. The trial is to be repeated in 2015.

Nuria Morphin, also a graduate student, is involved in a study looking at the potential interaction between clothianidin and the ability of honey bees to resist varroa mites. Evaluated were honey bee larvae and adults exposed to field-realistic sub-lethal doses of the neonicotinoid and larvae and adults that had not.

The larvae were compared for development, mortality and weight. Haemolymph (bee blood) samples were taken.

A similar approach was taken with the adult bees and there was also a detailed evaluation of their grooming and foraging behaviors and memory retention.

Honey is produced throughout Canada, as far north as the Subarctic. The biggest producing provinces are Alberta and Saskatchewan. More than half the producers are located in Ontario and Quebec.

There are about 3,000 honey producers in Ontario alone. About 250 of these have 50 or more hives.



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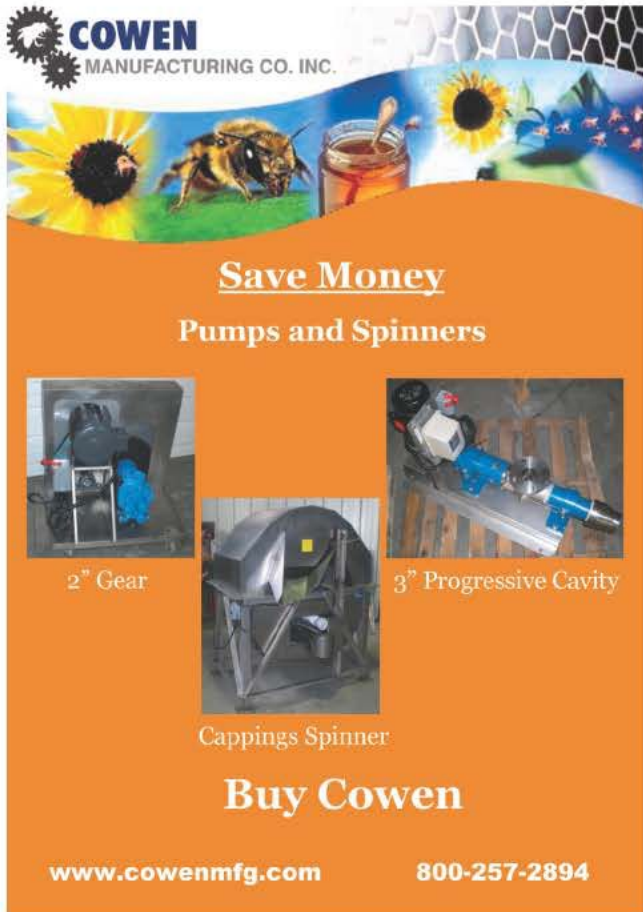
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THE FEDERAL GOVERNMENT COMES TO THE AID OF CANADIAN BEEKEEPERS



BY **ABBAS EDUN**

Probiotics, according to the World Health Organization, are live micro-organisms which, when administered in adequate amounts, confer a health benefit on us.¹ They are not a cure, but rather more of a preventative measure. They help our intestinal bacteria perform their tasks more efficiently, and take over when such bacteria are overtaxed, or are weakened, or even destroyed by stress, poor nutrition or antibiotics. The biological process through which probiotics operate is related to their ability to compete with pathogenic microorganisms for adhesion sites, to antagonize those pathogens or to modulate our immune response.

The term “probiotics” was first used by Daniel Lilly and Rosalie Stillwell² in 1965. It is derived from the Greek words *pro* and *bios* which mean “in defense of life.” The concept of probiotics dates back to 1907, when Nobel Prize recipient Eli Metchnikoff³ suggested that the longevity of Bulgarian peasants resulted from their consumption of fermented milk products. He intimated that the dependence of the intestinal microbes on the food makes it possible to adopt measures to modify the flora in our bodies and to replace the harmful microbes by useful ones.

If probiotics are beneficial to us, a team of researchers are of the opinion that they may also be helpful to honey bees. They are aiming to improve the health of bees with probiotics and nutritional supplements. The team is a part of the Centre de recherche en sciences animales de Deschambault, and will be headed by two Professors Nicolas Derome and Pierre Giovenazzo, both of Laval University.⁴

CRSAD is a non-profit organization formed in 1999 to make significant and specialized farm resources available to the agri-food sector; its founding members are the ministère de l’Agriculture, des Pêcheries et de l’Alimentation and Laval University.

CRSAD is a dynamic and diverse research centre, and has a major role in animal production. It manages significant resources to promote the development of research in animal science in a context of dialogue and partnership.

On Wednesday, Sept. 10, 2014, Parliamentary Secretary M. Pierre Lemieux intimated that the Government of Canada wished the country to become a world leader in beekeeping research. CRSAD therefore received a grant from the Department of Agriculture and Agri-Food Canada.

Mr. Lemieux spoke in French; a translation of his speech is as follows:

“On behalf of Canada’s Agriculture Minister Gerry Ritz, I would like to thank

everyone present at this world-class research centre for helping to deliver innovative solutions to the agricultural industry of Quebec and of Canada.

The agricultural and food industry in Deschambault and across Quebec is a powerful driver of our economy, generating over \$22 billion in sales and employing about 65,000 persons. Quebec is also a major player in world markets.

Agriculture and agri-food exports have increased 80 % over the past decade. This is excellent news, and that is why our Government continues to work with the province and industry to maintain this growth and to keep the agriculture and food sector strong.



Parliamentary Secretary M. Pierre Lemieux on the left and M. Jean-Paul Laforest, president of CRSAD.

Today, we are here to tell you about an important investment we are making to support bee research. Bees are an integral part of agriculture. They not only produce delicious honey, but they also play a critical role in the pollination of crops like blueberries, and of other fruits and vegetables.

In 2013, the exports from Quebec of honey and wild blueberries totalled \$11.6 million and \$57.2 million, respectively. So we appreciate the work that is being done at CRSAD to protect the future of these busy workers.

Unfortunately, in recent years, beekeepers all over the world have faced significant challenges with colony losses. In response, Canada's science community is working closely with our industry partners and their international counterparts to share expertise and keep abreast of emerging issues concerning bee health."

[Author's note: Honey bee colonies have recently been suffering a high rate of mortality in Europe, Canada and the USA. The losses have been occurring at the most stressful periods of the colony's life cycle: wintering, spring build up, and when it is needed for pollination. Many hypotheses have been proposed to explain these serious declines in population and it has become increasingly apparent that multiple factors are involved and that they are acting synergistically. Some of the factors are environmental ones, others are diseases, stress, and the use of pesticides.

Colony Collapse Disorder (CCD) is the name that has been given to a condition which is characterized by an unexplained and rapid loss of the adult population of a colony. The weakened colony usually consists of a queen and a small number of young workers. In many cases there is a lot of food left over, but it remains untouched by robbing bees or pests such as wax moths and small hive beetles for some time after the collapse.]

"The Government has also made significant investments in research to safeguard our bees, and we are pleased to take another step forward today. I am delighted to announce a federal investment ⁵ of \$260,000 to test the effects of probiotic supplements on the health of bees and their resistance to four major diseases ⁶ affecting bee colonies."

[Author's note: The present research project, BeeProbio, aims to test the efficiency of both probiotic and nutritional supplements, independently and in combination, to quantify synergetic effects. Two commercially available broad spectrum probiotic strains (Bactocell® and Levucell® made by Lallemand Inc.) and several honey bee gut isolated strains will be tested, including Bifidobacteria and Lactobacillus. The former are a group of bacteria that normally live in the intestines. They can be grown outside of the body and then taken by mouth as medicine. Lactobacillus, also called Döderlein's bacillus, is a genus of gram-positive

facultative anaerobic rod-shaped bacteria. It is a major part of the lactic acid bacteria group, so named because most of its members convert lactose and other sugars to that acid.]

"This research aims to pave the way for the future commercialization of feed additives that will result in healthier, more productive pollinators. They are an integral part of a successful harvest, and our Government will continue to support projects that protect and promote the health of our bees.

A healthy bee population means a prosperous agriculture industry, and I am proud of our Government's commitment to beekeepers and our agricultural sector as a whole. We understand that by investing in pro-active initiatives like these, we are helping to ensure that this industry can continue to create jobs and growth for the regions of Quebec."

Another speech, also in French, was made by M. Jean-Paul Laforest, president of CRSAD.

Here is a translation of a part of it:

"CRSAD prides itself on being one of the most versatile research centres in the field of animal production. In fact, in addition to dairy cows, beef cattle, goats, pigs and poultry, we are working on honey bees. Yes! The bee is an animal; it is indeed extremely useful, since it provides us with that delicious product, honey.

I am delighted to announce a federal investment ⁵ of \$260,000 to test the effects of probiotic supplements on the health of bees and their resistance to four major diseases ⁶ affecting bee colonies."

Beekeeping therefore has an economic value in Canada ⁷ of great importance not only to honey and other products of the bee, but also for its contribution to pollination, and the success of many crops, especially fruits.

The maintenance and development of beekeeping is based in part on the health of bees and colonies and several pathogens pose a problem to beekeepers. It is at this level that the project 'BeeProbio: sustainable strategy optimizing the health and productivity of the colonies' wishes to intervene. The project will focus on the development of sustainable alternative strategies to control some particularly insidious diseases that are responsible for major losses of bee colonies. The benefits to the beekeepers of Canada are potentially huge and will have an impact on many other agricultural sectors which are among the most important in Canada. Such a research project, which will provide innovative solutions, can only be done with the support of partners who believe in the future of production. On behalf of CRSAD, I would like, first of all, to thank our chief partner, the federal Government for providing

money to support a project that will enable our country to provide leadership in protecting bees and in the conservation of biological diversity in agriculture. I must also mention that the partnership between the Beaverlodge Research Farm and Agriculture and Agri-Food Canada, shows that the collaboration between research institutions is not only possible, but also desirable in the development of innovative solutions to complex issues. I would also like to acknowledge the co-operation of a highly valued industry partner in this project, Lallemand Inc."

[Author's note: This is a privately owned company founded in Quebec at the end of the 19th century by Fred Lallemand. He was a young immigrant who left his native Alsace province in France after the Franco-Prussian war of 1870-71. The plant on Préfontaine Street in Montreal was built in 1915, and the production of baker's yeast started there in 1923. Roland Chagnon, whose family still owns the company, acquired it in 1952 and started to expand it. Today, it produces a range of liquid, cake, and dry yeasts for the fuel ethanol, beverage alcohol, and baking industries. The company researches, develops, produces and markets yeasts, bacteria and related products with the aim of reproducing, managing and optimizing natural fermentation processes in the agri-food industries.]

"But it takes more than funding to carry out a research project and get results that will be applicable to users quickly; we also need people who are committed, tenacious, and creative. I therefore conclude by congratulating the main contractors of the project for obtaining this important funding : researchers Nicolas Derome, Laval University; Pierre Giovenazzo of CRSAD; Richard Degree, Lallemand Inc.; Stephen Pernal of Agriculture and Agri-Food Canada; and Shelley Hoover, Alberta Agriculture and Rural Development. Getting the funding was nonetheless the easy part. Now these people must roll up their sleeves and deliver. I have no doubt that these researchers will do it brilliantly."

Footnotes

1. Report of a joint FAO/WHO expert consultation on evaluation of health and nutritional properties of probiotics in food.
2. The function of IB is to aid our digestion by synthesizing vitamins, converting dietary fiber, and degrading toxins. IB also help to stimulate the development of our immune system.
3. Probiotics: Growth-promoting factors produced by microorganisms. *Science* 147: 747-748.
4. *Essais optimistes*. Paris. *The prolongation of life. Optimistic studies*. (P. Chalmers Mitchell, Trans.). London, England: Heinemann. (Original work published 1907). He was the exponent of modern immunology and a scientist at the Pasteur Institute.
5. It is the oldest centre of education in Canada (the 4th oldest in North

America), and was the first institution on the continent to offer higher education in French. It is ranked among the top 10 Canadian universities in terms of research funding.

6. The money is a part of the Research and Development stream of Agriculture and Agri-Food Canada's (AAFC) AgriInnovation Program, a five-year, \$698-million initiative under Growing Forward 2. The latter is a comprehensive federal-provincial-territorial framework aimed at encouraging innovation, competitiveness and market development in our agri-food and agri-products sector.
7. They are the two microsporidians *Nosema apis* and *Nosema ceranae*; American foulbrood caused by the spore-forming *Paenibacillus larvae*, the most widespread and destructive of the brood diseases; and European foulbrood, *Melissococcus plutonius*, a bacterium that infects the midgut of bee larvae.
8. Its beekeeping industry is valued at \$100,000,000 and consists of an annual average of 7,000 beekeepers maintaining 580,000 colonies.



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It's All In the Family - Henry's Wisconsin Honey Farm

by CHARLES and KAREN LORENCE

Generation One:

Henry Piechowski and his brother Leon were born on the family farm south of Redgranite, Wisconsin. As the kids got older, each kid had to have his own niche. Two of them - Henry and Leon - got their first beehives and went into the bee business together. They started the business in 1931 when home on the farm, producing honey for the family. As the brothers got older, what was then Piechowski Brothers' Honey Company split into two separate operations about the time Henry got married and Henry labelled his honey, *Piechowski Honey Company*. Henry married Esther Jakubowski, a city girl from Milwaukee. Esther met this handsome beekeeper and really must have loved him because she moved to a small town and became the dynamic driving force in the marketing aspects of the business. At that time they had about 300 - 500 hives. Honey was 10¢ a pound. Henry would bring his package bees in from Alabama from 1938 until the late '50s. In 1962, he set up an operation in Ocean Springs, Mississippi where he made splits and raised queens. In 1955, he changed the name of the company to *Henry's Honey Farm* and that is what it remains today. Because there were so many Polish living in the area, he still maintained the Piechowski brand because they thought that honey was better than Henry's Honey.

Henry was a pioneer in his field, establishing pollination services and marketing programs for honey in Wisconsin and throughout the country. He held leadership positions in the Wisconsin Honey Producers' Association and the American Beekeeping Federation. Leon passed away in the mid 1950s and Henry died during the 2008 ABF Convention which was in Sacramento. In addition to the shock of Henry's death, the Piechowskis had just lost their woodworking shop to a fire the Sunday before they left for California. Henry and his

wife had twelve children and many of them just naturally 'migrated' into the business.

Generation Two:

According to *John Piechowski*, Henry's son, of Redgranite, Wisconsin, he started beekeeping when he was eight years old and got his first hive. At age ten, he was out helping the men because he was big and strong enough to lift and carry boxes.... jumbos, that is! It was all part of the family operation and he went out with the hired men to see that they were working and more-or-less supervise them. On the way home, they'd stop at a tavern and the fellows would buy John a Pepsi. Dad Henry didn't like the idea that it now was 'fun' to be with the men so, at age 14, John started driving the truck for the bee yard. At that point, he was old enough to go on his own.

With such an early start in beekeeping, the question arose: "Did you ever think of becoming something other than a beekeeper?" Laughingly, John told us his story. "I couldn't get out of school fast enough. I went into the National Guard and then signed up for first semester at the Univer-

sity of Wisconsin, taking all the 'stuff' you have to take. Second semester I saw there was a class in beekeeping so I signed up for it. I was called into the dean's office and told that I couldn't take it because it was a grad class and I was only a freshman. I told the dean that I was leaving college then because I knew I was going to be a beekeeper. Well, the dean called me back and wanted to talk about it. He wanted to know WHY I wanted to take the class and I told him I was born and raised on a farm and I kept bees and I wanted to get more education on it. The dean then told me that he would let me take it, but I would be on probation... that I'd have to get an A grade on the first test. On my first test I produced an A and from then on, everything was fine. In that first class, there were 13 to 15 people and eight or nine of us ended up being commercial beekeepers. Emmett Harp was one and he is known for his fine queen breeding in Wisconsin. Dave Miksa sells queens in Florida. This was probably the best class in beekeeping that the university ever taught. It was so interesting because we had this grad student from Canada who was working under Dr. Moeller - Donald Peer. We learned from each other!

In about 1968, dad Henry and John, along with other beekeepers formed the Wisconsin Cooperative Pollination Service, which set up standards for pollination. The co-op was designed to organize beekeepers to get better prices and conditions. The service has more or less disbanded now as pollinators take care of their own contracts, but John continues with his regular customers. In the early 1950s, a professor from the university wanted to do research on Birdsfoot Trefoil so John provided 10 - 15 hives for that. In the late '50s he started pollinating cranberries. It was about 10 or 12 years ago that he started pollinating almonds in California. He merely sends them out there for pollination services.



Henry's Honey Farm was founded by Henry Piechowski and, with the help of his wife Esther, it became a thriving business which has been handed down through four generations.



John and his wife Marilyn were awarded the Wisconsin Honey Producers' Association "Pioneer Award" in 2012. John has been active in the WHPA, the ABF, and has worked with Wisconsin legislators on many issues. He is a packer of award winning honey.

In about 2000, John started using California as his source of package bees. It took a couple of years to work out the bugs, but he now brings packages and queens back for his dead-outs.

John is really a 'go-to' man when it comes to getting things done. He served as northeastern Wisconsin district chairman for many years. Several committees were fortunate enough to have him work for them. The Wisconsin Honey Producers' Association awarded John and wife, Marilyn, the Pioneer Award in 2012. He has worked on legislative issues in Madison and has



Mary Piechowski Kettlewell began keeping bees in 1987 and, together with husband Derald, keeps 100 colonies today. She is active in the Wisconsin State Honey Queen program, the Wisconsin State Fair, and chairs three committees for WHPA.

had contact with the legislators on many issues. Some of the most impressive honors John gets yearly are ribbons in Wisconsin and at the national convention competition. Knowing how much work goes into producing show-quality honey, he was asked what his secret was. "Absolutely no secret," was his answer. "This is basically the same honey I put on the shelf." That alone speaks for the high quality honey that John markets.

Today John runs 1400 - 1500 hives. So....where and how does John market his honey? Wisconsin is a great honey state and Henry's Honey Farm honey is known consistently for mild and unique flavored honey from all of the state's wonderful flowers. Most of *Henry's Honey Farm* honey is marketed in Wisconsin and sold through local stores and stands. He also sells creamed honey - about 500 cases a year. John has always produced cut comb honey. He *could* sell 10,000 boxes, but is lucky to get 3500 on the market.

Wife, Marilyn, is John's 'right-hand-woman,' working in the management end and extracting. She is the 'gopher' when needed, answers the phone, is there for the honey customer, and delivers honey orders. She makes the strainers and keeps them sparkling clean.

Just a sideline about how they met: They rode together to an Iowa State bee meeting and he picked her up in Prairie du Chien, Wisconsin on his way out to western Iowa. They got along beautifully and, when they were introduced, they were introduced as "Mr. and Mrs. John Piechowski." On the way home, John said to Marilyn, "What did you think of that label?" We all know what happened next...they were married in the summer. That was 49 years ago!

When asked what was the worst thing that had ever happened to him in beekeeping, John replied that it was tipping over a load of bees in Illinois. He had to go back and pick them up rather than having a day off and he couldn't have the date he had planned with a girlfriend!

According to *Mary Piechowski Kettlewell*, the division of labor was solidly drawn in a family of twelve children and, as a daughter, she was expected to extract, bottle, or sell the honey. It wasn't until her father retired in 1987 that he gave her two hives of bees and she began to be an active beekeeper herself.

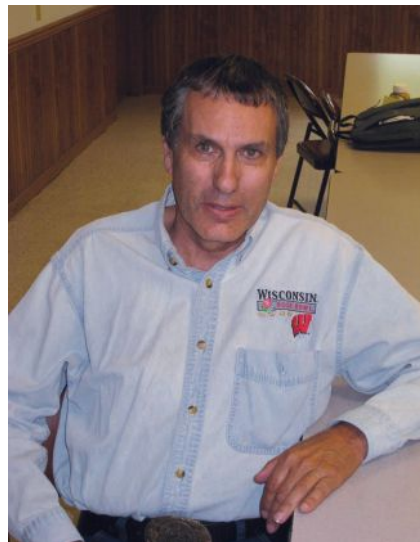
Derald Kettlewell lived about 10 miles from Redgranite and started dating Mary, never intending to become interested in bees. In fact, he was so 'respectful' of bees that, on one of those first dates, he found a bee truck that had just arrived from Mississippi in the driveway. Bees were swarming around the truck and what did Derald do? He honked and honked and honked until Mary came out of the house. Not a way to make a good impression on future in-laws! Nevertheless, Derald married into the family and loves it today because, in his own words, "It is an extension of being a farm kid." When he and Mary would go down



George Piechowski, one of the twelve children of Henry and Esther, is also a beekeeper. He keeps about 100 hives and sells his honey directly to brother John to be marketed.

to Mississippi in the winter time to visit the Piechowskis, talking to Grandpa Henry just piqued his interest. And...we all know beekeepers love to talk...so it wasn't long before Derald was stung also.

In 1988, just after getting her first hives of bees, Mary and Derald attended their first American Beekeeping Federation Convention (ABF) in Houston, Texas with her parents. What was intended as a 'nice vacation' turned into a 27 year run as she hasn't missed a convention since that very first one! According to Mary, her interest in the honey show really began when their son,



Mary's husband Derald is past president of the Wisconsin Honey Producers Association and has been active as assistant manager of the state fair honey booth, worked on organizing the first Kids and Bees Expo in Wisconsin, and was the honey queen chair for a few years. He is also active in the ABF, working with judging and the auction.



Anna Kettlewell, Derald and Mary's daughter, started keeping bees at a young age. She began working the bees when she was about eight years old. She became the Wisconsin Honey Queen and then the American Honey Queen in 1999. As a result, she now mentors each queen candidate, helping them to make the most of their experience.

Andrew, wanted to show his beeswax. She started playing a big role in the honey show at that time and has added to it a working interest in the queen program.

In the early '90s, Mary and Derald became more active in the Wisconsin Honey Producers' Association. She has served as treasurer for six years, has been on the Honey Queen program, and has been very active in the Wisconsin State Fair honey exhibit. She chairs three committees presently and facilitates relationships between the WHPA and the public. In her own words, "We have worked with some very incredible and dedicated people over the years and have come to appreciate how very much beekeepers love their bees and their industry."

The two have continued to expand their colonies to their present 100. In 2009, they established Badger State Apiaries and provide honey for restaurants in the Milwaukee area, two tea stores, and informally to friends and neighbors.

Today Derald is president of the Wisconsin Honey Producers Association and has been active as assistant manager of the state fair honey booth, worked on organizing the first Kids and Bees Expo in Wisconsin, and was the honey queen chair for a few years. At ABF, he is active in the auction, running the computer and doing



Dan Piechowski is the son of Marilyn and John and it's no surprise that he started beekeeping as a 4H project when he was just nine years old. Dad, John credits Dan with being the driving force behind the business. Dan is in charge of all the labor and sales..an invaluable resource to making the business run smoothly. Dan has been active in the Wisconsin Honey Producers' Association and has been in the ABF since 1987. His wife Gina supports him in the family-run business.

'behind the scenes' stuff. He helps Mary with the judging competition.

George Piechowski, one of the twelve children of Henry and Esther, is also a beekeeper but not to the extent that John is. His beekeeping is more of a hobby, sidelined with being a farmer (400 acres), a fireman, and a Waste Management driver. Living on the old family farm in Red Granite, Wisconsin - a Century Farm, no less - George has the opportunity to reflect on the heritage that has been passed on to him. The original honey house is still there and one can picture what it must have been like with the whole family working together. This is the farm where Dad, Henry, was born. George keeps about 100 hives, selling his honey by the barrel to brother, John. He does not do commercial pollination, but does have bees on family farms that include apples, pumpkins, and strawberries, keeping them at the same location all year. His goal? Produce lots of honey! George had worked with the family business until 1984 and opted to get out of it then. He realized later that he really missed beekeeping and, in 1990, bought out a retiring beekeeper and continues with the 100 hives he now has. His wife, Mary, is his 'spare hand' when it comes to helping wherever she is needed. Before she married him, Mary knew nothing about bees. She never knew a beekeeper...never was exposed to anything like that. And then she met George and the rest is history!

George was asked what his most memorable beekeeping experience was and he echoed what brother John said...."I clearly remember bringing bees up from Mississippi when I was 10 years old. John was

driving the truck and I was in the passenger seat. I heard a funny noise and looked out the back window and there were bee hives scattering all over the road. The trailer hitch had broken and we had a real mess on our hands!"

He still helps out with Henry's Honey Farm, stopping at least once a week at the



Gina and Dan's two daughters, Jalyne, age 10, and Larissa, age 7, are well into keeping their own bees. Both girls have attended WHPA and ABF conventions for most of their lives. At their age, they are excellent promoters of our honey.



Jalyn and Larissa's bee yard is near their home and they can visit and work the bees with Dad's help almost anytime. Their hives have been to California at least twice for pollination. Grandpa John and Dad Dan work the bees with the girls. Great grandpa Henry would be pleased!

business to do odds and ends, help with extracting, and so on. When he is retired from his full-time job, he plans to do a bit more beekeeping. He, too, is active as a Wisconsin Honey Producers' Association member. When asked how he feels about the business, he replied, "This is really a neat family endeavor."

Generation Three

Anna Kettlewell started keeping bees at a young age. She began working the bees when she was about eight years old, but got serious about it when a teenager and in college. She and her parents (Derald and Mary Kettlewell) manage *Badger State Apiaries* and sell honey to a local restaurant chain, at a tea shop franchise, and through direct marketing. They keep about 100 to 150 hives west of Milwaukee.

Probably the most intriguing thing about Anna, however, is her dedication to the queen program. As a youngster, she was urged by Grandpa Henry and Grandma Esther to participate in the Honey Queen program in Wisconsin. She began by being selected to represent the southeastern district of the Wisconsin Honey Producers in 1997. Then, in 1998, she was selected as Wisconsin Honey Queen because of her written and verbal communication skills, as well as her knowledge of honey bees, beekeeping and honey.

In 1999, Anna went on to compete in the American Honey Queen program. She became the American Beekeeping Federation (ABF) queen that January and began traveling coast to coast, promoting honey and the work of the honey bee - pollination. Because of her experience as queen, she has made it her goal to help each honey queen candidate and ultimately each honey queen to make

the most of her experience. Her exuberant nature has brought out the best in each candidate and has really promoted the queen program through her sage advice and engaging personality.

Since then, Anna has continued to work with the program, serving as vice president of the Wisconsin Honey Producers' Association, managing the Wisconsin Honey Queen Program, and promoting the queen agenda through ABF.

Mary and Derald's son, *Andrew*, has been mentored by Liz Vaenoski in wax sculpting. Even as a teenager, he was entering wax competition. Liz would give Andy one secret a year and did a lot to encourage him. After he won the second or third time, at the Colorado Springs convention, Andy and Liz were given their awards. Derald was taking their picture and Liz motioned for him to come over. "Here..you hold this stuff," she said, giving Derald the trophies and plaques. "Andy and I need to take a walk down the corridor here." When they came back, Derald asked Andy what Liz had to say.

"You and I have been getting lots of awards. People appreciate the good work that we do with the wax and we have a good reputation in the industry. Now...you have to keep your nose clean or I'll "@#*%". ...[well you know Liz so fill in the blank...].

Dan Piechowski is the son of Marilyn and John and it's no surprise that he started beekeeping as a 4H project when he was just nine years old. "It was a way of life...all we knew," was Dan's comment about why he loves his bees so much. He and his two brothers, Jerry and Ron, decided to get into the business and had about 100 hives and their own equipment. Dad, John credits Dan with being the driving force behind the business. In the mid 1980s, when they were dis-

cussing if they should continue with Henry's business or not, it was Dan who said, "We're going to make it and we're going to make it happen!" Dan is in charge of all the labor and sales..an invaluable resource to making the business run smoothly. The brothers are no longer in the business, but Dan has been active in the Wisconsin Honey Producers' Association at the state level, going back almost 20 years as district chair, vice president and president throughout those years. He has been in the ABF since 1987 and was a delegate a couple of times.

Perhaps Dan's most interesting fact is that his wife Gina has NEVER BEEN STUNG!!! That's fourteen years of living in a beekeeping household with no stings!

Generation Four

Gina and Dan's two daughters, *Jalyn*, age 10, and *Larissa*, age 7, are well into keeping their own bees. Jalyn started three or four years ago; Larissa two years ago. Their bee yard is near their home and they can visit and work the bees with Dad's help almost anytime. Their hives have been to California at least twice for pollination. Jalyn especially wants to follow in Anna's footsteps and become honey queen. She's already well prepared as both girls have attended WHPA and ABF conventions for most of their lives. When asked how their classmates felt about their beekeeping experiences, they both replied that their friends loved when they were able to talk about honey bees in their classrooms. With all of their experience in hands-on beekeeping and their attendance at bee meetings, either of them would be a great candidate for honey queen! At their age, they are excellent promoters of our honey.



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A Beekeeper's Life in Morocco

Part 2

by William Blomstedt

The next day we began the beekeeping tour. First we picked up Amir, whom I met the previous night. Khalid is an amiable guy, so we were always bringing friends with us, meeting others elsewhere, and it helped me get a variety of answers to my questions. After eating lunch we returned to his shop, climbed three floors to the top of the building, and then scrambled even further to a remote part of the roof where Khalid kept 5 hives. The bees did pretty well in the city for there weren't many other hives and the area had plenty of hidden urban flowers. Down below, in front of the shop, Khalid kept an unoccupied hive with a few frames of comb and foundation. This was for customers to see, but would also sometimes catch a swarm from the roof-top bees.

The main two types of bee subspecies in Morocco are *Apis mellifera intermissa* and *Apis mellifera sahariensis*. *A.m. intermissa* is the more common bee, ranging across North Africa from Libya to Morocco. It

is a pure black bee: industrious, hardy and adapted to dry climates. *A.m. sahariensis* is more rare, only native to Saharan oasis habitats in southern Morocco, and is golden striped with black. As one would expect, *A.m. sahariensis* can work in hot temperatures, greater than 100° F, but it is also able to survive the cold as the dry desert air cools down rapidly. *A.m. sahariensis* is also adept at finding both water and flowers, but according to Khalid it is more vulnerable to varroa.

Most Moroccan beekeepers use an open-mated mix of these two bees, whatever they can get their hands on, but Khalid told me he is one of the rare keepers of *A.m. sahariensis*. A few years ago he traveled in Morocco's desert regions in search of pure *A.m. sahariensis*. He reasoned that a non-migratory beekeeper might have untainted lines, and when he found an old, stay-put desert beekeeper, he took bee samples and sent them to a lab in Germany for identification. When the results showed

these bees were *A.m. sahariensis*, Khalid returned and bought all seven hives. He has used these to populate his colonies. Khalid is skilled in artificial insemination, having once trained in Poland with Prof. Jerzy Woyke. He inseminates a few dozen queens each year, and sells a few hundred openly-mated queens to other beekeepers for 150 dirham (around \$17) each. He found the F1 generation between *A.m. intermissa* and *A.m. sahariensis* to be a good, productive bee.

After successfully descending from the upper roof, we piled three-across in his truck cab and drove out of the city. The next two days we spent driving in and out of town, usually with another friend or two, looking for hives, looking inside of hives, or looking for places to put hives. It was on these trips when I learned of the real state of Moroccan beekeeping, and began to see the tough life these beekeepers lead.

Firstly, there are far, far too many beehives in Morocco for the amount of



(l) *Apis mellifera sahariensis* (r) *Apis mellifera intermissa*





(l) Amir and Khalid climbing onto the upper part of his roof (r) Cruising around with the boys

forage available. One of the first locations we visited was Khalid's bee yard, which sat next to a small forest of eucalyptus trees. Morocco has three main types of eucalyptus and when I was there the Tuart (*Eucalyptus gomphocephala*) was flowering. These eucalyptus have large, fat blossoms which dust your hands with pollen if you handle them. One can even suck on the flower to taste a bit of sweet. While some of these trees had blossom, Khalid complained that they were old trees, and not as productive anymore. The real worry was the number of hives within sight. This location was where Khalid kept his grafting trailer, as well as 100 hives, but another beekeeper had set another 100+ hives just down the road. Most all the hives were one story high, and every one we looked into seemed weak, with only three or four frames of brood. Khalid walked around his bee yard, without a smoker or a veil, popping open lids, until one angry hive chased us out of the yard.

I followed him around a corner and was shocked to see another 100+ hives, and then further down another 100+. All beekeepers, and bees, were fighting for this small patch of trees. By the look of the state inside the hives, everyone seemed to be losing.

This flood of hives in Morocco only happened recently – in 2010 Morocco began a 10 year agriculture project named Le Plan Maroc Vert (The Green Morocco Plan). Though agriculture only creates ~15% of its GDP, it employs around 40% of the population, making it one of the main industries in Morocco (tourism and phosphates being the others). Le Plan Maroc Vert aims to improve the agricultural section by investing in technology and research while improving water resource management and reducing fossil fuel consumption. Beekeeping did not seem to be a main focus of Maroc Vert, but it did include the creation of a federation of beekeepers in 2011. According to the website, the federation is meant to bring associations and cooperatives together, provide education and improve production. The beekeepers I spoke with told a different story, saying the federation was made up of businessmen and members of the

ministry of agriculture who cared more for their share of the “cake” donated by global organizations (like the World Bank or USAID) than the bees. According to the tales I was told, much of the cash was siphoned off, beehives were dispensed to new beekeepers as a means to “improve production,” but then these beekeepers were not given adequate training. Morocco may be the one country I have visited where there are no worries about the aging beekeeper population. However, basic beekeeping education seems to be lacking, and widely lamented.

Khalid and the other Moroccan beekeepers I spoke with complained about the number of beekeepers, and beehives, saying it has destroyed the honey production. Because they were all migratory, it seemed as if there wasn't a patch of flowers in the country without a small city of hives fighting for it. Pollination fees had gone by the wayside as well. Formerly, orange or almond growers would pay beekeepers to put their hives in the orchards, but when the supply of bees skyrocketed, the beekeepers were happy to bring their hives in for free, just for the nectar and pollen. Even then, the growers would allow too many beekeepers

¹ I think. Khalid sometimes had trouble translating how many zeros should go at the end of a number. Perhaps it wasn't that many, but in any case, far too many bees for the available forage.



(l) Giant blossoms of *Eucalyptus gomphocephala* (r) Patting the blossoms of *Eucalyptus gomphocephala* on the skin shows their pollen



(l) A giant city of beehives we found just at sunset. More than 1000 hives within sight (r) Khalid kept asking me to take pictures of dead beehives like this. Finally, I had to ask him "How many pictures of these do I need?"

in, thinking the more the better for their crop.

This "too many beehives" became the theme for the entire weekend, and the main impression I took away from Moroccan beekeeping. The next day we drove towards Casablanca, renowned as the setting for the classic film, but in reality an intimidating mega-city the size of Dallas or Houston. Turning away from the highway, Khalid drove us on gravel roads to a government-owned eucalyptus forest in blossom, rural on one side and brand new golf course on the other, its fairways lined with high-end cookie-cutter houses. Khalid was searching for other beekeeper's yards, and quizzing me on how he could get satellite imagery of the area. Beekeepers weren't allowed to put their hives in this forest, but needed to be somewhere around it so Khalid would ask pedestrians if they had seen any hives, and wherever they pointed, he would or hop out of the truck and run over a hillside, coming back to report he found 100 hives there, 300 hives there.

But the real bang occurred around sundown when we came to an open, fallow

field where a mega-city of hives sat a hundred yards from the edge of the forest. It seemed that each beekeeper, around 10 of them, put 100-120 hives right next to each other so there were more than 1000 hives within a quarter mile. We wandered through the grid, opening some, seeing the same weak few-brood colonies time after time, until one of the beekeepers, who was feeding his hives down the row, came to make sure we weren't causing any harm. He and Khalid had a long chat in Arabic and he told us the previous year there had been 20,000 hives in this spot.¹

Too many beehives leads to weak hives and starving bees. Khalid warned me that much of the honey in Morocco is merely sugar syrup that beekeepers have fed bees and then harvested (aha! I thought, remembering the suspicious honey in Er-Rich), creating a climate of distrust for customers. People tended to buy honey from beekeepers they knew or trusted, a fact

which rang true back in his shop; whenever a potential customer appeared Khalid was quick to offer taste tests of the throat-warming honey and show the pictures of his bees in the desert.

During their conversation the sun had fully gone down and the darkness was rolling in. After chatting for 20 minutes, Khalid and the beekeeper swapped phone numbers and we parted ways. We went back to the truck while the beekeeper waded across the field, to his hives, where he continued feeding under the light of his headlamp.

Sunday morning we started in the office once again, first jumping on to the computer to check the weather. The wind is perhaps the most important meteorological factor for Moroccan beekeeping and every morning and evening, Khalid would check windjammer.com, a website meant for surfers. His rule was that if the wind was less than 10 mph and the temperature greater than 70° F for the coast, or between 80-95°



Khalid Zari and Abdkrim Chenaf opening a strong hive



Drinking sweet mint tea with beekeepers



(l) Strangely, this hive was attacked by snails. They didn't do the hive any harm. Snails are frequently eaten in Morocco.
(r) Khalid and Amir among his hives

in the desert, the honey conditions were good. However, it needed to be a westerly wind, for the desert winds from the east were extremely dry and rendered pollen unpackable. But then, too much wind from any direction was also bad. The pitfalls seemed many, and the ideal conditions for honey production so difficult to line up.

This day we visited another beekeeper named Abdkrim Chenaf. His house and beehives were on a property on the southern outskirts of the El Jaidida, within range of a small eucalyptus forest. Luckily for him the area was developed so that other beekeepers could not find a place to put their bees within foraging range. Because of this, I was able to see my first so-called strong beehives. These had around six frames of brood, and had two or even three supers. Later at night, Khalid showed me photos of his beekeeper friends on Facebook, them proudly standing next to hives that were waist high – apparently the exemplar of good hives in Morocco.

Abdkrim, like Khalid, did not treat for varroa. Khalid is friends with French Bee Breeder John Kefuss, and is a believer in the Bond “Live and Let Die” method for his

bees. Khalid said that legal varroa treatments were available, but expensive, and most beekeepers used other methods, like tick powder meant for animals (an amatraz-based product called Ectaz is common). Other than varroa, Moroccan beekeepers also have to deal with wax moth, as well as small hive beetle. Foulbrood, of either variety, does not seem to be a problem.

Abdkrim and Khalid then brought me to visit a few bee cooperatives. As a part of the Maroc Vert, the government created a scheme which gave 100 hives to a beekeeping cooperatives, with each cooperative consisting of seven members. Perhaps the thought was that the most experienced beekeeper would teach the other six, or that they could share the labor and costs of the extractor, but mainly it has lead to shoddy beekeeping and an excess of neglected hives. Khalid told me that Arab people don't work well together and advised me to read sociology books so I could better get to know their cultural mindset, but I don't think this tendency is limited to Arabs. Making beekeeping management decisions with only one other person can be a hassle, and with six other people it would probably be impossible. Some of the smarter beekeepers signed up to a cooperative with six members of their family so that it was

a co-op only in name. Walking through a beekeeping co-op, I watched Khalid and Abdkrim opening up dead single-story hives and Khalid continually saying, “You see? Look? Take a picture. Bad beekeeping,” before moving onto the next.

It may have been bad beekeeping, but without the right environment to support the bees, even the best beekeeper wouldn't be able to do anything. Another problem Moroccans face is the cutting down of eucalyptus forest for charcoal. Khalid showed me an area which looked like the desolate edge of the Sahara, but five years prior had been eucalyptus forest. The desire of short-term profit had led people to kill trees, either by poisoning them and or just bribing the local police and cutting them down. It dawned on me that the sardines we ate earlier that afternoon had been grilled over charcoal, and that we ate them seated next to a giant truck full of potato sacks of charcoal that were on their way to a lamb-feasting festival.

After seeing more weak and dead hives than I cared for, we returned to Abdkrim's house for sweet mint tea and a bread and honey snack. This lead to another taste-testing session, as Abdkrim pulled jar after jar of honey from a milk crate sitting in the corner of his dining room. I tried coriander



Tasting honey at a road-side stand

Various types of honey produced in Morocco



honey for the first time and was astonished at its odd, floral flavor. It was nothing like the herb, nor like the spice, but distinct in its own way. How many odd flavors can a plant produce?

By the time we left Abdkrim's the sky had morphed into a threatening gray stew. The summers in Morocco were hot and sunny, but it rained during the autumn and winter, and this would be the first of the season. Khalid said it was both good and bad news: the rain meant the end of the eucalyptus blossom, but it also meant another shrub would flower in a few weeks. For all the troubles he faced, Khalid had a pretty sunny disposition about life and bees. He is an enthusiastic guy, who has done a number of things in his young life, but bees are his main passion. His father wanted him to take over his own business, an iron forge, but it's not the life Khalid wanted to live. In this way I felt connected to Khalid — he really cares about bees and wants to work with and learn from them. At one point Khalid explained to me the difference between beekeepers in Morocco — there are beekeepers who are only concerned about money, he said, where bees are merely a business that could essentially be exchanged for cattle, chairs or any commodity or livestock. However, for Khalid, and others like him, bees are a passion, and he puts the money he earns back into their welfare and progress. But to my mind these differences exist in the US, and perhaps everywhere.

Later, as we were driving back to the shop, Khalid slowed down for a traffic light, his eyes darting to the right. "Look at that!" he said. I followed his gaze to a group of people waiting at a bus stop, with the most prominent being a pair of girls.

"What, those girls?" I asked

"No," he said, pointing to the tree above them, "eucalyptus blossom."

There's a true beekeeper, I thought. For all the weak and dead hives I saw, it was the three days of bouncing around with Khalid in his truck that taught me what I wanted to know.

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Many thanks to Khalid for his hospitality, as well as Abdkrim Chenaf. Also, a nod to John Kefuss who set me on my way once again.

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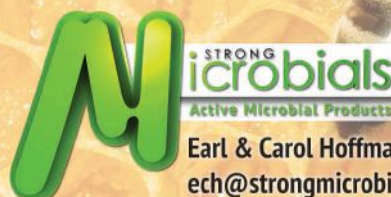
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FAMILY ARALIACEAE —THE ARALIA OR GINSENG FAMILY



There are about 70 genera and 700 species in the Araliaceae that are comprised of trees, shrubs and herbaceous plants that are spread widely through the temperate regions with centers in the Indo-Malayan area and also in tropical America.

For the beginner, this can be a difficult group to identify because many of the vegetative traits which can be seen easily are shared by other families. The most definitive characteristics reside within the flowers, but due to the usual small size of the flowers and the variability they exhibit, it takes some experience to distinguish these characteristics with certainty.

Vegetative characteristics: Members of the family often are prickly, some are climbing, others are bushes or small trees. The

leaves are generally alternate, (rarely opposite), and can be entire or variously lobed or palmately¹ or pinnately compound and are usually without stipules.²

Floral Characteristics: The flowers are small greenish or white, radially symmetrical³ and can be one of the following: unisexual⁴ (the species then dioecious or polygamous) or bisexual.

The flowers are commonly in umbels⁵; but sometimes are racemose. The calyx usually has 5, more rarely 4 sepals, that are greatly reduced, sometimes to merely teeth, or there may be none. There are usually 5, but rarely 4 or 10, petals that are usually free, but can rarely be united to varying degrees, sometimes only at the tips. When sufficiently united, they fall as a unit. There are usually 5 stamens, more rarely there are 3 to many stamens. They are located in a ring inside the petals and generally alternate with the petals and like the petals, are attached to the top of the ovary, i.e. the ovary is inferior. The pistil is usually compound and made up of 5, but more rarely 1 to many carpels.⁶ There are usually more than 2 styles⁷ (sometimes many) that are usually free, but sometimes are joined together with lobed stigmas. The ovary is inferior⁸ and contains 2 to 15 cells, each with a single ovule (immature seed). The fruit is a berry⁹ or drupe which only rarely splits into segments.

As mentioned above, there is a great deal of variability in the Araliaceae with many of the nonfloral characteristics being shared by various other families. The ovary being inferior to the other floral parts, the multi celled inferior ovary with just a few seeds, the petals and stamens often of the same number and the rudimentary or totally lacking calyx generally identify the Family. The small size of the flowers, however, will require some type of magnification and some experience in the dissection of these small parts.

The Araliaceae is economically not an especially valuable plant family as are the timber trees for example. There are a number of the family members that are used as house plants, English Ivy as an example. In warmer southern states many of these can be used as ornamental garden plants. The rice paper plant (*Tetrapanax papyriferus*) is the source of rice paper. The aromatic root of wild sarsaparilla (*Aralia nudicaulis*) is used as a substitute for sarsaparilla. *Panax ginseng* has for many years been used by the Chinese for the treatment of various ills. *Panax quinquefolium* is used in the U.S. as a stimulant.[3 & 15]

¹ Palmately compound: when the lobes of a leaf originate from a common point like the fingers of a hand. Pinnately compound: a leaf where the leaflets are arranged along opposite sides of an elongated central supporting structure.

² Stipules: a pair of smallish leaf-like structures found near the attachment point of a leaf.

³ Radially symmetrical: The floral components, such as the petals and stamens are arranged around a central point.

⁴ Unisexual: the flowers within a plant are either male (with stamens) or female (with a functional pistil). Dioecious: The staminate (male) flowers and pistillate (female) flowers borne on separate plants; Polygamous: with both unisexual and bisexual flowers on the same plant. Bisexual: With both male and female parts.

⁵ Umbel: a flat or convex inflorescence with the floral stems (pedicels) arising from approximately the same point; Racemose: in racemes (an unbranched elongated inflorescence where the flowers are distributed along a central axis on individual floral stems).

⁶ Carpel: The basic single unit of the female part of a flower. There can be more than one carpel represented in the flower, in which case the pistil is considered a compound pistil.

⁷ Style: The usually elongated part of the pistil between the ovary and the upper part of the pistil that collects pollen during the pollination process (the stigma).

⁸ Inferior: where the petals and calyx arise from on top of the ovary.

⁹ Berry: a fleshy fruit developed from a single pistil with several to many seeds. While many recognize some of the common berries as berries, the definition would also extend to tomatoes. Drupe: a fleshy fruit without a means for opening (seams, pores etc.) usually containing a single seed that is surrounded by a stony covering. Examples include cherries and peaches.

Devil's walkingstick, Hercule's club, Angelica tree

Scientific name: *Aralia spinosa*

Origin: Native to North America

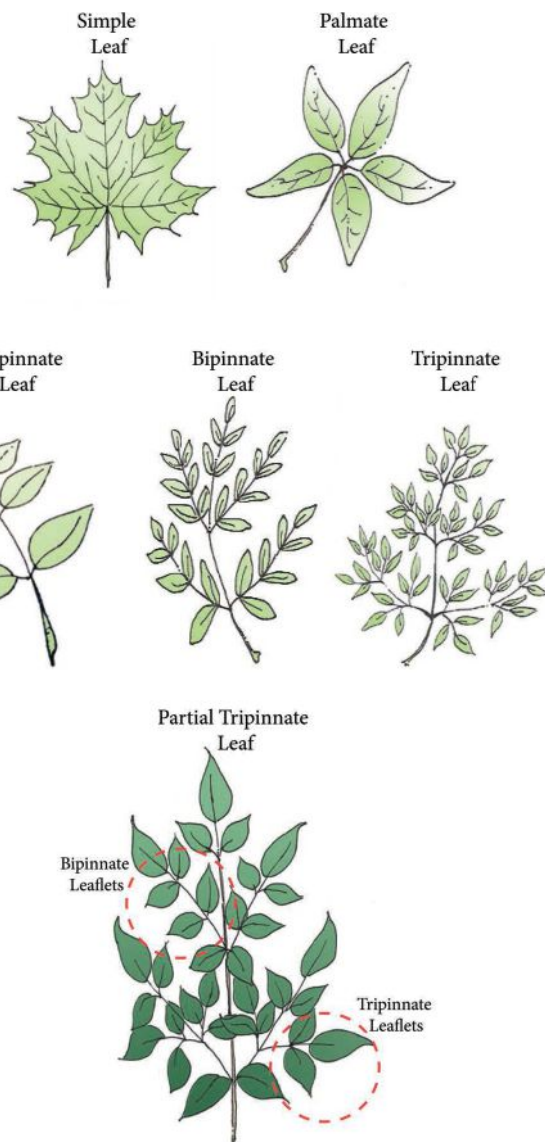
Plant description: *Aralia spinosa* is a few branched, flat-topped bush or small tree that grows to a height of 12 m (~39ft) and sprouts from the root system forming clonal thickets. The trunk frequently develops few if any branches and the plant becomes an erect trunk with a crown of leaves.^[13] The plant stem, branches and often the petioles¹ and leaf rachis² are armed with stout prickles.

A short discussion concerning leaf structure is appropriate here. In the accompanying illustrations, **each illustration represents an entire leaf. The smaller subparts of the compound leaves are referred to as leaflets.** Simple leaves, such as in maple, are not divided into leaflike structures (leaflets), though they may be deeply cleft. Compound leaves generally come in two forms: Palmately compound leaves, such as those of horse chestnut, have their leaflets spread out like the fingers of a hand, whereas pinnately compound leaves have their leaflets attached to a central 'stem' (axis or rachis) much like the two sides of a feather. The stem below the attachment of the bottom leaflets or the stem of a simple leaf is referred to as a petiole. The leaflets of a pinnately compound leaf can be attached to the rachis in either an opposite or alternate configuration. At the base of both simple leaves and compound leaves an abscission layer is formed that allows the leaf to break away from the more permanent stem to which it is attached. For both compound and simple leaves there generally is also a bud at this location though it may not be obvious and will require some more investigation on your part to be seen. This bud will become the next leaf if there is to be a leaf there, as for example, next year. If there is a bud there, and the leaflets are without associated buds, you can be quite certain that the leaf is compound. If there is later a replacement leaf, it will be derived from the bud at the base of the leaf. Alternatively, if there are buds at what you suspect are leaflets of a compound leaf, you are not dealing with a compound leaf.

Pinnately compound leaves can have leaflets that are themselves compound and even those divisions can be compound and so on. The accompanying illustrations provide examples of unipinnate, bipinnate and tripinnate leaves.

The **leaves** of *Aralia spinosa* are 50-120 cm (~19.7-47.2 in) long and 50-100 cm (~19.7-39.4 in) wide and are twice compound and sometimes partly thrice compound and are placed alternately on their stems. Remember that this last statement refers to the whole leaf not its parts, i. e. don't confuse 'leaf' with 'leaflet.' The bottom illustration provides an example that conforms to this description, i. e. where there is a partial set of thrice compound leaflets (the bottom tier of leaflets).

My visit to the Michigan State University Herbarium, where I could study the *Aralia spinosa* specimens housed there, suggests



Different leaf configurations, particularly pinnately compound leaves. Figure provided by Kennon Lorick.

that the twice compound condition is the norm and that the partial thrice compound condition is relatively uncommon.

The relatively firm leaflets are acute-ovate³ or acuminate-ovate often with some serration toward the pointy tip and are 4-10 cm (~1.6 - 3.9 in) long. The veins of the leaflets curve upward before they reach the leaflets edge.

The flowers are perfect⁴, quite small, creamy white and are borne in umbels⁵ on terminal compound panicles.⁶

The Fruit is a black, 5-angled drupe⁷ that is about 6mm (~0.24 in) across.^[4]

Distribution: The plant is generally found in moist or wet woods.^[4] In Florida it is an understory plant of upland and lowland woods.^[10]

Blooming period: Gleason and Cronquist^[4] provides a blooming period for Northeastern U.S. and contiguous parts of Canada as June and July. In Michigan, Barnes and Wagner^[2] indicate that it blooms late July and August with the black fruits appearing in August and September. Pollet^[13] in his blooming-date graphs for Louisiana seems to indicate that the species blooms from a little later than mid



Distribution of *Aralia spinosa*^[16].

¹ **Petiole:** The leaf stalk that most of us would call the leaf stem.

² **Rachis:** The main axis of a structure, in this case the supporting structure of the compound leaf.

³ **Ovate:** Shaped like the central longitudinal section through an egg with the stem at the large end, **Acute:** tapering to a point with relatively straight sides. **Acuminate:** Tapering to a point with concave sides. **Serrate:** with teeth around the edge.

⁴ **Perfect:** Having both male and female parts (stamens and pistil).

⁵ **Umbel:** a flat-topped or convex inflorescence where the individual floral stems arise from nearly a common point.

⁶ **Panicle:** A branched inflorescence where those branches branch again to hold the flowering parts. The flowers bloom from the bottom upward.

⁷ **Drupe:** A drupe (or stone fruit) is an indehiscent fruit in which an outer fleshy part (exocarp, or skin; and mesocarp, or flesh) surrounds a shell (the pit, stone, or pyrene) of hardened endocarp with a seed (kernel) inside.



Aralia spinosa flowers. Photo taken at the Arnold Arboretum of Harvard University in Boston on 8/3/2003.

June to about mid August. His text, however, states that it blooms July and August. Pellett^[12] indicates in western Pennsylvania the

plant blooms with buckwheat and yields best when the season is too dry for buckwheat to yield.

Importance as a honey plant: Oertel^[11], from his questionnaires, found the species to be of at least some importance in NC, LA, and IN. Ayers and Harman^[1], from their questionnaires, found the species to be of some importance in LA. Pollet^[13] describes the species as being very attractive to honey bees in LA. Pellett^[12] states that, while the plant yields nectar abundantly, it does not often provide surplus. Harvey Lovell^[6] states "Bees and other insects form great clouds over the thousands of flowers in each cluster."

Honey: Pellett describes the honey as being light in color, having a good body, and a "fair" flavor. Pollet^[13] describes the honey as being light amber and sometimes bitter. Harvey Lovell^[6] agrees with Pollet, but omits the "sometimes."

Pollen: Pollet^[13] rates the species as a good source of pollen.

Additional information: If left undisturbed, the species often develops into a large planting as a result of both seeds and the spreading root system.^[13]

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ANOTHER MEMBER OF THE ANACARDIACEAE

*Brazilian pepper tree,
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tree, Florida holly*

Scientific name: *Schinus terebinthifolius*

Synonyms: *Schinus terebinthifolia* orth variety

Origin: Brazil^[5]

Plant description: In the literature there is considerable variation in the descriptions of *Schinus terebinthifolius* especially where it concerns numbers of various parts and measurements of those parts. In the description provided here I have tried to accommodate this variation, but it is possible that one could encounter outliers to even this description.



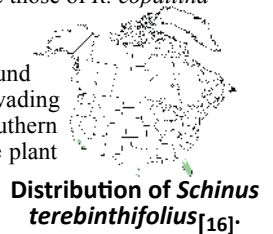
Schinus terebinthifolius. Described as female flowers. Photo © Lawrence M. Kelly. While the single in focus flower clearly has a pistil, the anthers are a little suspicious. Miller and Wilken^[7] describe the stamens as being vestigial in pistillate flowers. This is apparently fairly common in members of the Anacardiaceae. I provided a photo of this from one of the sumacs in the October 2006 column (page 853). Compared to that photo, the stamens in this photo don't appear to me to be very vestigial, but might have had their pollen largely removed, for example, by bees. A discussion with the director of the Michigan State University Herbarium suggests that I might be wrong about this particular species. *Reader comment is invited.*

Schinus terebinthifolius is a dioecious¹, stiffly upright evergreen shrub or small tree that grows to a height of about 25 ft (~1.2 m). The pinnately compound² leaves are frequently 15 cm (~6 inches) long, placed alternately on their stems and generally consist of 3 to 9, but sometimes as many as 13 leaflets that are usually about 2.5 inches (~6.4 cm) and sometimes to at least 8 cm (~3.1 in) long. The leaflets are dark green above and lighter beneath. They range in shape from lanceolate³ to elliptic and their margins are sometimes entire, but are also often toothed. The crushed leaves give off a distinctive turpentine odor. The small white male and female flowers are found on separate plants in conspicuous (in some references described as inconspicuous) dense, bracteate⁴ clusters in the leaf axils.⁵

The fruits are bright red drupes about 3/16 inch (~4.8 mm) in diameter that are distributed in conspicuous clusters in female plants and frequently appear about November to February, but can be evident at almost any time of year.^[10] The season of maximum fruit color is sometimes listed as the Christmas season.^[18]

Schinus terebinthifolius might be confused with another member of the same family, the winged sumac, *Rhus copallina*, but the two can usually be separated by the following two characteristics. *S. terebinthifolius* usually has 3 to 9 and only rarely 11 leaflets per leaf whereas *R. copallina* has 9 to 23. The berries of *S. terebinthifolius* are glabrous⁶ and bright red, whereas the those of *R. copallina* are hairy and dark red.^[10]

Distribution: The species is generally found in disturbed moist to mesic⁷ sites, often invading coastal communities of the Central and Southern Florida peninsula.^[19] With its red fruits, the plant makes an attractive landscape ornamental and fruiting specimens are available commercially at garden centers. The species has,



Distribution of *Schinus terebinthifolius*^[16]



Apparent *Schinus terebinthifolius* male flowers. Photo taken at the Fairchild Tropical Botanical Garden in Coral Gables, FL on 5/20/2005.

¹ Dioecious: a plant where male and female flowers are on separate trees. Remember it as: the "di" part suggests "it takes two to tango".

² Pinnately compound: the individual leaflets come off the central axis like the sides of a feather.

³ Lanceolate: Shaped like a lance with the stem coming from the large end. Elliptic: more or less like an oval. Entire: not toothed.

⁴ Bracteate: Pertaining to bracts that are small leaves or leaflike structures, at the base of a flower or inflorescence.

⁵ Axil: The upper angle between the leaf stem (petiole) and the stem from which it arises.

⁶ Glabrous: hairless and smooth.

⁷ Mesic: Generally moderate growing conditions that usually includes moisture and sometimes temperature.

however, become a troublesome weed in many habitats throughout central and southern Florida and into the Keys.^[10] The included map indicates that it is also found in several other states⁸, and I imagine possibly becoming weedy there as well.

Blooming period: There seems to be some discrepancy in the literature about the blooming period of the species. Wunderlin^[19] indicates spring and summer whereas Morton^[9] and Sanford^[14] provide a blooming period of August to October and Hortus Third^[5] indicates late summer.

Importance as a honey plant: Interestingly, Oertel^[11] did not find the species to be of special importance to the beekeeping industry of Florida whereas from their questionnaires, Ayers and Harmon^[1] found the species to be “very important” in Florida. Julia Morton^[9] indicates that it was considered a good honey plant in a number of areas in Florida where it has formed extensive thickets, but that bees may at times show an abrupt “disinterest” in it. Sanford^[14] includes the species among Florida’s major honey plants, stating, “This is one of Florida’s best nectar-producing plants.” Despite the small areas in California and Texas in which the species is found, I have not found the species listed as a honey plant in either state. The Peruvian peppertree (*Schinus molle*) is mentioned in the 1941 Vansell and Eckert^[17] publication where it was credited as having only a minor importance in both honey and pollen production.

I found nothing about the species in the Honey Plants books by John Lovell^[7], Harvey Lovell^[6] or Frank Pellett.^[12] Perhaps its importance is of relatively recent origin as it began to be planted as an ornamental at least in Florida.

Honey: Julia Morton^[9] describes the honey as medium amber and of medium density with a distinctive peppery taste, and that it sells well as “Florida holly honey.”

Sanford^[14] describes the honey as having “a distinct “peppery” taste and is not considered by many to be table grade, but is “accepted well locally.” Vansell and Eckert^[17] describe the honey of *Schinus molle* as having a “hot and peppery taste.”

Additional information: Julia Morton^[9] points out that when in bloom the plant may cause skin and respiratory irritation and fruits eaten in quantity by children and pets may cause enteritis.⁹

The Author is indebted to the Michigan State University Herbarium for being able to view the specimens housed there and for the use of their library. He is especially indebted to Alan Prather for our discussions about compound leaves and the diversity that can be exhibited by the anthers of female plants.

⁸ The map provided here represents my best efforts at portraying the county map for the species presented by the USDA plants Website^[16].

⁹ Enteritis: Inflammation of the intestines.

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