ABRC 2024 PROCEEDINGS





FOR ALL YOUR BEEKEEPING NEEDS

CHECK OUT



www.Pierco.com



AgriSea Bee Nutrition

- Essential Amino Acid Profiles
- Individual Bee Mass (weight) Improved
- Reduction of Nosema
- No Residues in Honey
- Nutrients Sustaining Cell Metabolism



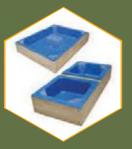
Exclusive Supplier of AgriSea



MITE CONTROL TOP FEEDERS

EXTRACTION







BEEKEEPING KITS

IN-HIVE FEEDERS

PROTECTIVE





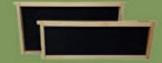


WE OFFER DOUBLE & TRIPLE



Frames -Plastic

- Super Strong & Durable
- Safe FDA food grade plastic
- Required



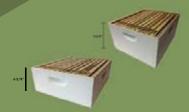
Frames -Wood

- Stronger than Industry Standard
- 3/4" top bars
- Assembled, Glued, and Stapled



Snap-in Foundations

- Impervious to wax moths,
- Preferred by Professional Beekeepers
- Precision molded, perfect cells
- Easy to use Snaps into wood frames



Commercial **Grade Boxes**

- Honey Supers & Hive Bodies
- Added Strength 1 5/8"
 Top Joint
- ◆ Honey Supers & Hive Bodies
- Added Strength 1 5/8"

 ✓ Added Stren Top Joint



April Bee Culture...

- **Mailbox**
- **Next Month**
- 7 **Honey Prices**
- 8 **New Nutrition Guide** From Honey Bee Health Coalition
- Found in Translation 10 Let Bees be Bees Jay Evans
- 12 A Closer Look Honey Fermentation Clarence Collison
- 18 Hams Don't Lie Neither do honey supers Stephen Bishop
- 19 We are Stronger Together We could do better John Miller



Cover Photo by Jerry Hayes

22 Off the Wahl Beekeeping

Feedina Your Bees New(ish) Beekeeper Column Richard Wahl

Minding Your Bees and Cues 26

First Flights

Becky Masterman & Bridget Mendel

30 **Bait Hive**

> Freebies Greg Carey

Swarm Catching 34

Thoughts and Tips for Success Ross Conrad

40 **Bees and Women**

> Mrs. Anna Lucy Frey Nina Bagley

How to Protect Your Queen 42

And Keep Her Alive David Burns

44 **New Research on Probiotics**

Understanding it for Beekeepers Vera Strogolova

800.289.7668

Executive Publisher - Brad Root Associate Publisher, Senior Editor – Jerry Hayes, Jerry@BeeCulture.com, Ext. 3214 Layout and Design – Emma Wadel, Emma@BeeCulture.com Advertising and Customer Service - Jennifer Manis, Jen@BeeCulture.com, Ext. 3216

Contributors

Clarence Collison • James E. Tew • Kim Lehman • John Miller • Ed Colby Jay Evans • Ross Conrad • Tracy Farone • Bridget Mendel • Becky Masterman

POSTMASTER: Send address changes to BEE CULTURE, The A.I. Root Co., 623 W. Liberty St., Medina, OH 44256

Subscription Information

Subscription information
U.S., one year print, \$34; two years print, \$62; one year digital, \$24; one year print and digital bundle, \$44; two years print and digital bundle, \$70. All other countries, (U.S. Currency only), one year print, \$74; two years print, \$148; one year digital, \$24; one year print and digital bundle, \$79. two years print and digital bundle, \$158. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), April 2024, Volume 152, Issue 4, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Subscriptions, Book Orders - www.BeeCulture.com • info@BeeCulture.com

Advertising - 800.289.7668, Ext. 3216; Jen@BeeCulture.com

Published by The A.I. Root Co. Copyright @2024. All rights reserved.

Contents

48 Mentoring

The Ins and Outs, Part 1 Lisa Boesen

50 Kid's Corner

All the buzzz...
Kim Lehman

54 ABRC 2024 Proceedings

Part 1

66 Research at the

E. L. Niño Lab

At UC Davis, Part 2 **The UC Davis Series**Elina Niño

72 Bee Tech Recap

Canadian National Beekeeping Convention and Tradeshow Nicole McCormick

75 **Bee Tech**

Study Hall – From the Editor Jerry Hayes

76 Witch Hazel

Should You Plant?
Alyssum Flowers

80 Vacuuming a Defensive Hive

A Procedure for it Teresa Krzewski

82 **Pollen**

It Might be a Trap
Greg Carey

86 Super Frame Popper

Build It!
Ed Simon

88 **Do I Have a Future** in Beekeeping?

A fifty-year reflection
James Tew

93 Honey Recipe

Oatmeal with Elderberry Honey
Fay Jarrett

- 94 Calendar and Classifieds
- 95 Index and Image Contest
 Splitting Hives and Making Nucs
- 96 **Bottom Board**

Pain Management
Ed Colby





By John Martin







Bee Culture Photo Contest



Yellow Jacket Removal Article

Hi Ross, I just wanted to thank you for your recent article in Bee Cul*ture* about chemical free yellow jacket removal: https://www.beeculture. com/chemical-free-yellow-jacket-removal/

I had NO IDEA these bugs were worth that much. Anyways, I'm the newest member of the HollisterStier "Venom Collection Team" and I would never have known about this opportunity to serve my community (& allergic folks all over North America) without your article. Thank you!

All the best. James

Ross's Response

You're welcome James. Happy hunting. Ross

The Surry County Beekeepers Association (SCBA) in North Carolina is having a Photo Contest which begins April 1st and ends June 30th. Participants will submit their own photo of a honey bee(s) as a fundamental pollinator along with a 250-350 word essay explaining and highlighting the photo. The photo must show the importance of honey bees as pollinators in gardens, production agriculture and supporting the stability of our environment. All Rules and Guidelines are posted on the SCBA website https://surrycountybeekeepers.org/bee-contest.

Five judges, Bob Binnie - Blue Ridge Honey Company, Gary York - 100.9 WIFM Radio, Lane Kreitlow - Bee Buzz, Jessica Flinchum - Photographer and Jim Huges - SCBA will select the winners.

1st Place \$1000.00 2nd Place \$500.00 3rd Place \$250.00

Winners will be highlighted in Bee Culture Magazine, Catch the Buzz and Bee Buzz. We would like to thank our sponsors 100.9 WIFM, Blue Ridge Honey Company and H&S Bee Supply for all their support and direction.



The Best **BEEKEEPING** Magazine In **AMERICA!**

- 12 Big Issues A Year
- Beekeeping How To, When To, Where To
 - Urban Beekeeping **Explained**
 - Paper or Digital **Editions**

www.BeeCulture.com

Celebration of Kim Flottum's Life

April 13, 2024 12:00 Noon

Medina Community Church 416 South Broadway Street Medina, Ohio

Please come and help us as we honor Kim's amazing journey and share memories with each other as we try and manage life without him.

If you are coming from out of town or state please let Kathy know so we can help with any questions or details. There will be a meal served after the service.

Questions or messages you can contact Kathy kathyksummers@gmail.com 330.461.1081





on purchases of \$150 or more. Some items do not apply. FREE SHIPPING



Formic Pro™ is the next generation in formic acid treatments for mites. Made of all natural materials, this product can be used during the honey flow. Unlike Mite Away Quick Strips, Formic Pro™ has a longer shelf life of 24 months after manufacturing date and no temperature requirements for storage.

BIOXal Oxalic Acid

Oxalic acid is a newly registered chemical control for Varroa Mites. Can be used in both drench and vaporization methods. Best used during broodless periods late fall through early spring, in packages, and nucleous colonies. Can be used on colonies during a honey flow with supers in place. Available in 3 sizes.



M01758 Oxalic Acid - 35 grams M01764 Oxalic Acid - 350 grams



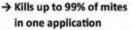


M01463



Mite Away Quick Strips are a Formic Acid polysaccharide gel strip which, when placed in the brood chamber of a honey bee hive, is an organic miticide that kills the Varroa mite where it reproduces under the brood cap.





- → Continuously-released in the colony over a six-week period, ensuring healthy and productive hives
- → Proven safe and effective for more than 15 years
- → Leaves no significant residues in hive products

An effective Varroa mite control strip

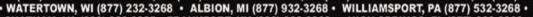












CHATHAM, VA (800) 220-8325
 FRANKFORT, KY (888) 932-3268
 HIGH SPRINGS, FL (877) 832-3268





NEXT MONTH

Region 1

- · Food stores and feed
- Inspect for overview of colony health
- Sample for *Varroa*, treat per **HBHC Tools** options
- Split to replace Winter loss
- · Manage for swarming
- Replace poor queens
- Add supers where appropriate
- · Add drone comb for Varroa IPM

Region 2

- *Varroa...* Sample, treat, sample again
- · Check queen brood pattern
- · Make splits
- · Add supers
- Manage swarming, make room
- Feed if needed
- · Move colonies to bloom

Region 3

- Mite sample and treatment
- · Equalize colonies
- Split time
- Check queens / replace queens
- Add supers
- · Extract early honey
- Check for hive beetle buildup
- Check for swarm cells

Region 4

- Spring has sprung
- Splits
- Rotate old comb out
- Check for swarming
- Alcohol *Varroa* sample, treat using **HBHC Guide**
- Feed if necessary
- · Get supers on
- · Equalize colonies

Region 5

- · Varroa mite check and treatment
- · Rotate hive bodies
- · Feed until dandelion bloom
- Requeen overwintered colonies
- · Get ready to split
- · Remove old comb
- · Add brood boxes for added space
- Use demaree method for swarm control

Region 6

- · Mite wash and treatment
- Check queens brood pattern
- Add supers to strong colonies
- Nectar flow is now / add supers
- Swarm prevention time
- Do you have enough equipment for honey flow?

Region 7

- · Check food stores
- · Mite sampling and treatment
- Swarm management
- Check queens brood pattern
- Feed syrup
- Split colonies, make nucs
- · Combine colonies where needed
- Bee careful if using OA or Formic. Collateral damage happens

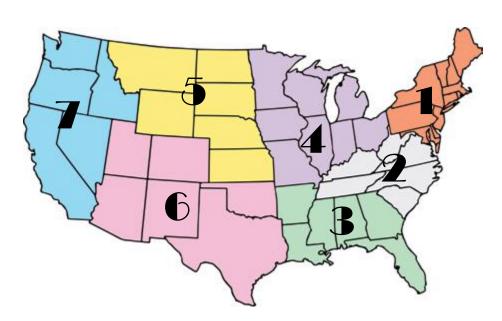
MAY

Honey Reporters Wanted

We are expanding our Honey Reporter population in EVERY region. We ask that you fill in most of the sections, most months, and our short survey at the bottom. We give you a FREE subscription for your service. So if you are interested fill out the form https:// forms.gle/EnZW531NHM7sbMUz8 OR send an email to Jen@Bee Culture.com and put REPORTER in the subject line. Include name, email, phone number and mailing address and we'll get you the next Honey Report form. Sign up today and be a part of the BEST Monthly Honey Price and Beekeeping Management Report in the industry.



Scan this to go straight to the form online!



APRIL - REGIONAL HONEY PRICE REPORT

REPORTING REGIONS												
1 2 3 4 5 6 7							Hist	History				
											Last	Last
	EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS Range Avg. \$/lb					Month	Year					
55 Gal. Drum / #, Light	2.30	-	2.90	2.85	3.13	2.45	3.00	1.79-3.60	2.80	2.80	2.78	2.82
55 Gal. Drum / #, Amber	2.75	3.55	-	2.81	3.50	2.33	2.70	1.70-3.60	2.83	2.83	2.68	2.79
60# Light (retail)	266.25	328.33	283.33	223.43	221.67	239.33	350.00	168.98-385.00	259.36	4.32	242.26	220.53
60# Amber (retail)	266.11	295.00	283.33	229.00	-	242.80	237.50	160.00-380.00	260.01	4.33	246.95	217.27
WHOLESALE PRICES S	WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS											
1/2# 24/case	98.36	119.60	80.00	93.00	87.36	90.00	-	46.00-153.60	97.68	8.14	101.31	98.89
1# 24/case	164.28	186.33	158.00	137.68	181.42	137.76	144.00	96.00-268.80	156.82	6.53	170.21	152.48
2# 12/case	148.30	216.00	135.00	124.33	173.76	156.00	156.00	84.00-264.00	148.51	6.19	152.65	139.04
12.oz. Plas. 24/cs	135.69	146.08	146.00	108.46	114.92	120.00	240.00	78.00-360.00	133.04	7.39	141.37	117.85
5# 6/case	164.22	240.00	-	134.37	156.48	127.00	-	101.95-330.00	158.47	5.28	159.56	154.76
Quarts 12/case	195.25	207.60	235.67	180.27	193.95	196.20	216.00	120.00-288.00	198.93	5.53	193.73	191.79
Pints 12/case	108.75	135.50	120.00	106.90	154.75	121.50	-	72.00-288.00	123.06	6.84	123.22	115.93
RETAIL SHELF PRICES												
1/2#	6.75	7.66	6.37	5.69	5.45	6.25	8.17	3.00-13.00	6.64	13.28	6.56	6.32
12 oz. Plastic	8.89	8.34	8.75	7.09	6.41	6.95	12.67	4.59-20.00	8.32	11.09	8.42	7.50
1# Glass/Plastic	10.76	11.55	12.19	9.58	10.53	10.83	14.40	6.49-20.00	11.13	11.13	10.96	10.33
2# Glass/Plastic	19.05	20.75	20.58	17.26	21.55	15.50	27.00	8.99-36.00	19.53	9.77	18.76	17.45
Pint	14.30	13.12	11.78	12.23	16.85	16.40	17.20	7.49-30.00	13.72	9.14	13.36	12.32
Quart	26.33	23.39	22.18	21.09	21.38	25.00	28.80	11.20-42.00	23.39	7.80	23.30	21.79
5# Glass/Plastic	44.18	48.33	44.50	32.04	38.85	29.18	-	18.00-90.00	39.14	7.83	39.11	35.08
1# Cream	14.66	13.78	12.00	11.42	-	15.00	15.00	8.00-25.00	13.36	13.36	13.56	12.36
1# Cut Comb	16.50	15.68	15.29	16.60	-	20.00	18.00	8.00-30.00	16.29	16.29	16.32	14.83
Ross Round	13.49	15.06	25.00	12.00	-	-	16.00	7.25-25.00	14.71	19.61	14.56	11.89
Wholesale Wax (Lt)	7.89	7.80	7.50	5.88	6.50	6.67	4.50	3.52-10.00	6.96	-	7.33	8.10
Wholesale Wax (Dk)	5.82	8.02	6.33	6.02	-	4.75	-	2.25-10.00	6.41	-	6.50	6.95
Pollination Fee/Col.	107.00	121.25	96.50	171.00	-	-	63.33	50.00-275.00	116.71	-	100.75	105.76
Almond Fee Only	-	_	-	192.50	180.00		-	165.00-250.00	190.00	-	192.14	-
Price of Nucs	196.39	187.50	176.88	199.38	190.00	227.50	211.33	125.00-250.00	193.17	-	191.69	-
Price of Packages	167.60	148.33	168.75	149.60	160.00	150.00	-	125.00-250.00	157.32	_	153.42	-

Please note: anywhere within each region that there is a '-' it is because no information was sent to us for that specific item in that region.

How do you compare to our honey reporters? All data collected is from January / February 2024.

Average Honey Flow Time and Amount per Region

Region 1:

Timing of Flow: No flow Amount of Flow: No flow

Region 2:

Timing of Flow: No flow Amount of Flow: No flow

Region 3:

Timing of Flow: No flow Amount of Flow: No flow

Region 4:

Timing of Flow: No flow Amount of Flow: No flow

Region 5:

Timing of Flow: No flow Amount of Flow: No flow

Region 6:

Timing of Flow: No flow Amount of Flow: No flow

Region 7:

Timing of Flow: No flow Amount of Flow: No flow

Mite Treatment per Region

Region 1: Most used no mite treatment. Region 2: Most used no mite treatment.

Region 3: Most used no mite treatment.

Region 4: Most used no mite treatment.

Paris 5 Mart and 1 marks treatment

Region 5: Most used no mite treatment.

Region 6: Most used no mite treatment. Region 7: Most used no mite treatment.

Top Blossoming Plants per Region

Region 1: Nothing

Region 2: Maple, Henbit

Region 3: Dandelion, Henbit, Maple

Region 4: Nothing

Region 5: Nothing

Region 6: Juniper

Region 7: Crocus

Overall Top Blossoming Plants

Most responded with no plants

blooming due to Winter weather and temperatures, but a few plants were starting to bloom in some areas: Maple, Henbit, Dandelion, Crocus,

Snow Drop, Jasmine

New Nutrition Guide

From Honey Bee Health Coalition

Beekeepers now have a valuable resource at their fingertips with the release of the latest comprehensive *Honey Bee Nutrition Guide* from the Honey Bee Health Coalition. The guide is a review and manual for supplemental feeding in beehives, giving beekeepers a simple approach to the complex and nuanced world of honey bee nutrition.

"Understanding honey bee nutrition is no simple task, given the intricate social structure and diverse needs within a colony," said Dr. Priya Basu, Assistant Professor of Pollinator Health and Apiculture at Mississippi State University and the principal author of the Guide. "The Honey Bee Nutrition Guide addresses these challenges headon, providing practical insights for beekeepers to navigate the seasonal variations and colony requirements effectively."

"Honey bee nutrition is a complex topic that varies based on land-scape, time of year and beekeeping objectives," said Ana Heck, Apiculture Extension Educator at Michigan State University. "Bees have changing nutritional needs as they progress through life stages from larval development to foraging workers. This guide serves as a roadmap for beekeepers to understand and meet the colony's nutritional needs throughout the beekeeping season."

Foragers, the scouts of the bee world, play a crucial role in sourcing floral resources such as pollen and nectar. In the absence of these natural resources, supplemental feeding becomes essential. The guide delves into the various considerations beekeepers must account for when deciding on supplemental feeding strategies, including the colony's brood status, seasonal nutritional needs and food reserves in the hives.

The guide also reviews the history of supplementing colonies with diets other than pollen, which dates back centuries. The guide traces this history, highlighting pivotal moments such as Amos Ives Root's tests with various supplements in 1875 and the foundational re-

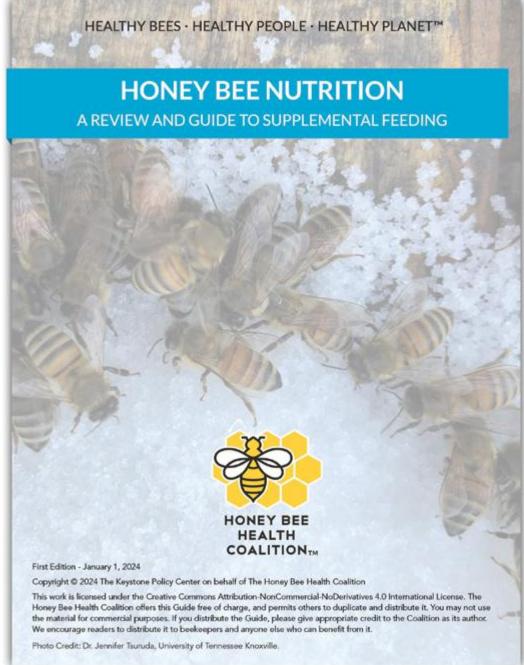
search by Mykola H. Haydak and Elton W. Herbet Jr. in the United States. The guide also emphasizes the importance of understanding the limitations of artificial supplements compared to the nutritional richness of natural pollen.

"With practical insights, historical context and a focus on sustainability, the *Honey Bee Nutrition Guide* aims to empower beekeepers to make informed decisions for the well-being of their colonies," said George Hansen of Foothills Honey

Company and member of the guide's review committee. "This essential resource will undoubtedly contribute to the advancement of sustainable beekeeping practices."

The guide also includes a series of interviews with six commercial beekeepers who summarize what works for them when providing supplemental feeding to their honey bee colonies throughout the year, depending on their location and their beekeeping practices.

For a copy of the *Honey Bee Nutrition Guide* and more information, please visit https://honeybeehealthcoalition.org/nutritionguide/.



CERTAN S SACK





B402 / Certan

is the most advanced, effective and economical product for the protection of your combs from damage by wax moth

Concentrated solution of Bacillus thuringiensis



Completely harmless to humans and honey bees

Proudly made in the USA



Environmentally friendly





100% against wax moth larvae

Efficacy of up to



Only one application needed for complete protection









Leaves no

residues in wax

or honey

FOUND IN TRANSLATION

Letting Bees be Bees

Jay Evans, USDA Beltsville Bee Lab



Listen along here!

Using insights from the natural habits of bees to improve one's beekeeping is an old art. Hygienic behaviors are good examples of a complex set of protective behaviors, part of a bee colony's 'social immunity', that occur naturally in many bee populations. Boosting these behaviors through breeding can result in better colony outcomes. Why some bee lineages fail to enact hygienic behavior is thought to reflect costs and benefits, nonstop vigilance is costly and possibly even causes self-harm, while having those traits when times are tough (now, for example, given Varroa mites) can lead to better growth and survival. This makes the use of 'immunity' in social immunity an even more apt term. 'Individual' immunity can save the lives of humans, or bees, or plants, when warranted by infection, but this immunity is most helpful when it is turned on only as needed and used in ways that do not harm the responsive individual (witness autoimmune disorders in

humans). In this way, social and individual immunity are also analogous to the use of antibiotics. When done judiciously, they can be lifesavers, but nobody rides for free.

A recent paper presents an atscale view of one of the most studied social immune traits, arguably just behind hygienic behavior. Bees of many species collect plant resins as they forage, collectively called propolis when it is smeared on the nests of social bees. Marla Spivak (University of Minnesota) and colleagues worldwide have perfected the art of studying honey bee propolis, from collection to chemistry to outcomes (one 2017 study is summarized here: https://www.beeculture.com/ found-in-translation-4/). Controlled studies in bee cages and manipulated colonies have shown benefits of propolis in the short term but, short of calling for landscape-level shifts to plantings with the best harvestable resins, or selection for bees that are propolis pigs (neither of which is a

giving bees an incentive to gather more. One such incentive turns out be a series of grooves in the otherwise smooth Langstroth hive body. Maggie Shanahan from the Spivak group headed up a team that deployed rough and smooth Langstroth hives, filled with related bees traveling the same commercial beekeeping routes, to see if the simple act of promoting propolis affected key bee traits. They also deployed propolis 'traps' alongside rough hive bodies in a stationary large-scale apiary. The group's research, along with reviews of a decade of studying propolis, is described in an open-access article in the journal PloS One (Shanahan, M.; Simone-Finstrom, M.; Tokarz, P.; Rinkevich, F.; Read, Q.D.; Spivak, M. Thinking inside the box: Restoring the propolis envelope facilitates honey bee social immunity. PLOS ONE 2024, 19, e0291744, doi:10.1371/journal. pone.0291744). The results for colony strength were subtle and statistically significant in only one of several sampling points. First, more propolis was stored in the 'rough' boxes than in boxes fitted with propolis traps and both stored more propolis than smooth boxes, so roughing up boxes did change collection behavior by

April 2024









Resin birch (Betula glandulosa), Birch family (Betulaceae). Wet meadow along the road FR-110 to the Chepeta Lake, Uintah, Utah; elevation 3170 m (10,400 ft). Author: Andrey Zharkikh from Salt Lake City, USA / CC BY 2.0

bees. Stationary colonies showed no differences in colony size (aggregate of bees and brood), and migratory colonies showed significantly larger colonies for 'rough' boxes in only one of three sampling points. This suggests that the benefits of propolis could be conditional on other pressures (disease loads?) out there. Supporting a role of propolis against disease, the scientists saw significant decreases in genetic signals from the agent behind European foulbrood (https://journals.plos.org/plosone/ article/figure?id=10.1371/journal. pone.0291744.g009) and even a hint (a non-significant trend) of reduced Varroa levels in propolis-rich hives. As in prior studies, the individual immune responses of bees in a propolis-rich environment were lower, perhaps reflecting lower costs at the individual level in fighting off disease. Of some concern, in one experiment, smaller colonies with 'rough' walls tended to store substantially less honey than did smaller colonies not prompted to collect extra propolis. This needs more exploration, but it is possible that smaller colonies, after devoting effort to building their propolis envelopes, had to cut back on

foraging trips for nutrients. In support of that, when smaller colonies were already housed in propolis-lined boxes, this cost seemed to disappear. So... not fatal to the premise at all, but suggestive that, as previously stated, nothing in this life is free. The authors and others continue to explore the dynamics of propolis collection, beekeeper prompts and health effects, and they will be the authorities on when it might make sense to rough up your hive boxes.

But back to the world bees are sampling on their flights... it is pretty well-known which plants provide the resins that become propolis. If these plants are limiting in the environment, it is conceivable that part of "planting for bees" could be setting up the (mostly) trees that provide such resins. Daniel Dezmirean and colleagues in Romania have been investigating the effects of a range of plant chemicals on bee health, and they have summarized the list of potential beneficial propolis-sources in Dezmirean, D.S.; Paşca, C.; Moise, A.R.; Bobis, O. Plant sources responsible for the chemical composition and main bioactive properties of poplar-type propolis. Plants 2021, 10, 1-20,

doi:10.3390/plants10010022).

While this study focused on Europe, there is substantial overlap between their identified tree groups and related trees and shrubs in the U.S. For the other critical component, "can honey bees collect propolis (or other plant resources) 'only' as needed?" we can sluggardly go to the ants and ant researchers, who are well along this path of investigation. I have highlighted before a study from Switzerland showing that ants not only use resins in response to fungal disease but actually 'potentiate' that resin by mixing it with their self-made formic acid (Brütsch, T.; Jaffuel, G.; Vallat, A.; Turlings, T.C.J.; Chapuisat, M. Wood ants produce a potent antimicrobial agent by applying formic acid on tree-collected resin. Ecology and Evolution 2017, 7, 2249-2254, https:// doi.org/10.1002/ece3.2834) In a practical sense, this suggests that the benefits of resin could depend on other incoming plant compounds or beekeeper-applied treatments. It also shows how letting bees be bees, with some guardrails, could lead to them making their own wise health decisions. This does not mean you can drop other management tools quite yet! Happy Spring, and keep an eye on what your bees are collecting out there. BC





Honey Fermentation

Clarence Collison

Sugar tolerant yeasts occur naturally in honey. If they are not killed by heat, they can cause fermentation when honey moisture levels exceed 17 percent. High moisture levels can result from extracting honey that is not fully ripened by the bees, allowing honey to absorb moisture during processing and storage or from granulation. Fermentation usually occurs after granulation. Since there is more moisture in the top layers of crystallized honey than in the bottom layers, fermentation begins at the top of the containers and works downward.

The yeasts develop on the glucose and fructose of the honey, producing alcohol and carbon dioxide. The alcohol in the presence of oxygen is further broken down into acetic acid and water, giving the honey a sour taste. The first signs of fermentation are whitish streaks appearing in granulated honey and honey leaking from the container. As the honey is heated, considerable foaming will occur. The degree of spoilage or effect upon flavor and quality depends upon the length of time fermentation is allowed to proceed before being stopped by heating.

Storage of honey below 50°F or above 80°F will prevent fermentation indefinitely. Lower temperatures are preferred since higher temperatures can cause deterioration in honey color and flavor. Honey heated at 145°F

for 30 minutes will be safe from fermentation if protected from further yeast contamination. Higher temperatures (155°F to 160°F) are sometimes recommended, but only for a few minutes. Failure to lower the high temperatures quickly will result in a damaged product. Honey should always be heated in a double-jacketed heating vat to avoid contact with direct heat. Have at least one inch of water around the bottom and sides of the container. This ensures circulation of the hot water around the bottom and prevents scorching the lower honey layer by direct heat. Keep the water level near the top of the container and loosen the container's lid to allow for expansion.

Knowledge of the moisture and temperature conditions influencing growth of microorganisms in honey has long been used to control the spoilage of honey. Microorganisms in honey may influence quality or safety. Due to the natural properties of honey and control measures in the honey industry, honey is a product with minimal types and levels of microbes. Microbes of concern in post-harvest handling are those that are commonly found in honey (i.e., yeasts and spore-forming bacteria), those that indicate the sanitary or commercial quality of honey (i.e., coliforms and yeasts), and those that under certain conditions could cause human illness (Snowdon and Cliver, 1996).

Primary sources of microbial contamination are likely to include pollen, the digestive tracts of honey bees, dust, air, earth and nectar, sources which are very difficult to control. The same secondary (after-harvest) sources that influence any food product are also sources of contamination for honey. These include air, food handlers, cross-contamination, equipment and buildings. Secondary sources of contamination are controlled by good manufacturing practices (Snowdon and Cliver, 1996).

The microbes of concern in honey are primarily yeasts and spore-forming bacteria. Total plate counts from honey samples can vary from zero to tens of thousands per gram for no apparent reason. Most samples of honey contain detectable levels of yeasts. Although yeast counts in many honey samples are below 100 colony forming units per gram (cfug), yeasts can grow in honey to very high numbers. Standard industry practices control yeast growth. Bacterial spores, particularly those in the Bacillus genus, are regularly found in honey. The rod shaped bacteria and spores of Clostridium botulinum are found in a fraction of the honey samples tested — normally at low levels. No vegetative forms of disease-causing bacterial species have been found in honey. Bacteria do not replicate in honey and as such, high numbers of vegetative bacteria could indicate recent contamination from a secondary source. Certain vegetative microbes can survive in honey, at cool temperatures, for several years. However, honey has antimicrobial properties that discourage the growth or persistence of many microorganisms. Typically, honey can be expected to contain low numbers and a limited variety of microbes (Snowdon and Cliver, 1996).

Fermentation of honey is a big problem due to osmophilic yeast occurring everywhere. These specialized yeasts are able to spoil honey having a high water content. The higher the water content of the honey, the more likely fermentation and spoilage is. The absolute water content is not responsible for the metabolism of the yeast but the amount of free water, described as water activity, is. The water activity is defined as the relation of the water vapor



Refractometer. Author: Jacek Halicki / CC BY-SA 4.0

pressure of the food (p) to the water vapor pressure of pure water (p_0) at the same temperature. Consequently, the water activity of pure water is one, each addition of water-fixing substances causes that $p < p_0$ and that the water activity becomes <one. The water activity of honey is within a range of 0.5–0.65.

The water activity needed for development of microorganisms is below 0.98 and depends on the class of microorganisms (around 0.70 for mold; 0.80 for yeast and 0.90 for bacteria). Osmophilic yeast are specialists which have an obligate need for high sugar concentrations and are able to grow to a minimal water activity until 0.6. Such osmophilic yeasts cause honey fermentation (Gleiter et al., 2006).

Molecular-fixed water has no influence on the water activity, this parameter is dependent on the free water content. The water in honey is mainly fixed to sugars via hydrogen bonding. The monosaccharides glucose (27-45%) and fructose (33-42%) are the main components of honey. During crystallization of honey, mainly glucose crystallizes by forming glucose monohydrate, fructose is more soluble and stays in solution for longer time. The water fixed to glucose in solution is set free during the crystallization process which means that the water activity increases. Honeys having higher water contents sometimes are separated into a crystallized phase at the bottom and a liquid phase on top. This layer containing high water content increases the risk for spoilage of honey via fermentation (Gleiter et al., 2006).

Determinations concerning the water activity of honey in addition to different honey types are sparse. Gleiter et al. (2006) determined how far different types of honey and their state (liquid/crystallized) influence the water activity. In total, 249 samples of different honey types were analyzed concerning water content and water activity. They found that the water activity of crystallized honeys is higher than that of liquid honeys. Furthermore, a dif-

ference between flower and honeydew honeys could be detected. In liquid state, honeydew honeys show higher water activities than flower honeys having the same water content. However, no significant difference between the water activities of different types of honeys could be found when the honey was crystallized.

A study of the predominant sugar-tolerant yeasts infecting 163 samples of normal Canadian honey led to the recognition of eight different species, comprising the genera *Zygosaccharomyces*, *Schizosaccharomyces* and *Torula*. The frequency of their occurrence varied greatly, one type, *Z. richteri*, being by far the most commonly encountered. The yeast predominating originally is not necessarily the most abundant type after fermentation. Analysis of samples fermenting within 14 months showed species of *Zygosaccharomyces* only to be most abundant, while *Z. richteri*, in addition to being the predominant type infecting a large majority of samples, was able, even in certain cases where it was originally outnumbered, to develop and apparently assume the leading role in fermentation (Lochhead and Farrell, 1931).

From the fermentation of honey, alcoholic beverages can be obtained which include: sherry type wine, sparkling wine, fruit-honey wine and different types of mead. These products have different flavors depending on the floral source of the honey, the yeast used in the fermentation and the presence of additives. The most common are metheglin (mead containing spices or herbs), melomel (mead with fruit juices), hippocras (pyment with herbs and spices) and sack mead (produced with a superior concentration of honey) (Iglesias et al., 2014). Pyment is a type of honey mead made with grapes or grape juice.

The honey fermentation process is used in the making of mead, an alcoholic drink with eight to 18% of ethanol (v/v). "To make mead one dilutes honey with water. A dry mead (one without residual sugar) would start with a 20-22 percent sugar solution. To make a sweet mead, one uses a less dilute honey or adds honey upon the completion of the fermentation. During the fermentation,

the 'must' may be attacked by a great variety of microorganisms that can give it a bad flavor. To prevent this, the mead maker is advised to use tablets that release sulfur dioxide into the system at the rate of about 50 parts per million. The sulfur dioxide is added when the honey is diluted; the yeast is added and the fermentation started about 12 hours later. A second sulfur dioxide treatment may be helpful when the mead is bottled. For further protection, the fermentation should be conducted in a closed vessel such as a barrel, carboy or stainless steel tank. Five and ten-gallon glass carboys are favored, as they are easily cleaned and stored. If a few drops of an antifoam are added, the jug may be filled to the top of the neck; otherwise about one quarter of the space (a headspace) is left for the foaming action caused by the yeast. A fermentation valve gives added protection," (Morse and Hooper, 1985a).

Yeast cells need vitamins, minerals and other growth substances. Honey contains these factors, but when it is diluted they are diluted too; thus, the addition of yeast food is necessary for a fast fermentation. It has been popular to use fruit juice in some recipes, apple being the favorite. If one uses 10-25% fruit juice by volume, no additional yeast food is required (using a fruit juice is helpful as it adds acid too). It is popular in many mead-making areas to boil the honey-water mixture. This precipitates the proteins that are present in honey and has the effect of making a clear beverage, which is more pleasant to the eye, and it will remain clear for many years. If the honey-water mixture is not boiled, a precipitate will form throughout the life of the beverage and will give it a cloudy appearance, but this precipitate has no adverse effect on the flavor. If the mixture is boiled (the usual time is 20-30 minutes) the nutrients are added after it has cooled (Morse and Hooperm, 1985a).

Mead production, in general terms, involves the addition of nutrients to initial diluted honey, pasteurization, yeast inoculation, fermentation and removal of impurities. Undesirable events along the process have been reported, among them: delayed or arrested fermentations, modified and unpleasant sensory and quality parameters of the final product. These problems have been linked to the inability of yeasts to accomplish their role in extreme growth conditions. Emphasis has also been placed on the long fermentation times required, ranging from weeks to months, particularly when traditional procedures are applied and when the honey concentration is low. A series of alterations to the must and technological changes have been proposed in order to optimize the mead production process (Iglesias et al., 2014).

When mead is produced in a traditional way, the fermentative process may be complicated by several problems among which delayed or arrested fermentations, development of unpleasant aromas and production of meads with low quality. These are commonly due to the stressful and unfavorable growth conditions to which yeasts have to respond and adapt (Iglesias et al., 2014).

The fermentation process is also used in the making of honey vinegar, which is a two-step process. First, yeast is added to a honey-water mixture to convert the sugar into alcohol. Then 'mother of vinegar', a bacterium that converts the alcohol into acetic acid, which gives vinegar its flavor and preserving qualities, is added. Oxygen must be excluded from the alcohol fermentation, and added for

the acetic acid fermentation. To make honey vinegar, add 1½ lbs of honey to one gallon of water. The mixture should be boiled for one to three minutes; this causes the protein to precipitate. The boiling is not absolutely necessary, but if it is not done, the final product will be cloudy, which will not affect its taste but does affect its visual appeal. After it cools, some nutrients must be added to the boiled honey-water mixture to assist in the yeast fermentation: it is best to add two grams of ammonium phosphate and two grams of tartaric acid per gallon of water. Both of these chemicals are readily available from a drugstore or pharmacist. An alternative to buying nutrients from a drugstore is to use those that are sold in wine shops for the making of honey wine. Still another alternative is to add about 20% fruit juice by volume, and the favorite juice to add for making both mead and honey vinegar is apple juice. The yeast used in the first fermentation should be a good wine-type yeast. Bread yeast will work but will give the vinegar a 'bready' flavor. Wine yeasts are readily available from shops that cater to home winemakers, but it is more difficult to find a culture of mother-of-vinegar (Morse and Hooper, 1985b). BC

References

Gleiter, R.A., H. Horn and H.-D. Isengard 2006. *Influence of type and state of crystallization on the water activity of honey.* Food Chem. 96: 441-445.

Iglesias, A., A. Pascoal, A.B. Choupina, C.A. Carvalho, X. Feás and L.M. Estevinho 2014. Developments in the fermentation process and quality improvement strategies for mead production. Molecules 19: 12577-12590.

Lochhead, A.G. and L. Farrell 1931. The types of osmophilic yeasts found in normal honey and their relation to fermentation. Canad. J. Res. 5: 665-672.

Morse, R.A. and T. Hooper 1985a. *Mead, In: The Illustrated Encyclopedia of Beekeeping, E.P. Dutton, Inc., New York, NY,* pg. 251-252.

Morse, R.A. and T. Hooper 1985b. *Honey Vinegar, In: The Illustrated Encyclopedia of Beekeeping*, E.P. Dutton, Inc., New York, NY, pg. 209-210.

Snowdon, J.A. and D.O. Cliver 1996. *Microorganisms in honey*. Int. J. Food Microbiol. 31: 1-26.

Clarence Collison is an Emeritus Professor of Entomology and Department Head Emeritus of Entomology and Plant Pathology at Mississippi State University, Mississippi State, MS.



INSURANCE SERVICES

APICULTURE INSURANCE PILOT PROGRAM A Specialized Program for Beekeepers

Available Nationwide

We are Proud Members & Sponsors of:

- * American Beekeeping Federation
- * California State Beekeepers Association
- * Idaho Honey Industry Association
- * Minnesota Honey Producers Association
- * North Dakota Beekeepers Association
- *Tennessee State Beekeepers Association
- st Washington State Beekeepers Association

- * American Honey Producers Association
- * Florida State Beekeepers Association
- * Michigan Commercial Beekeepers Association
- * Montana State Beekeepers Association
- * South Dakota Beekeepers Association
- * Texas Beekeepers Association
- * Wisconsin Honey Producers Association, Inc.

Kevin Rader: Buzzus@beekeepingins.com

www.beekeepingins.com



Subscription FAQs

1. What is the difference between the print and digital magazine choices?

PRINT ONLY: Hard copy mailed to your address each month

DIGITAL ONLY: Can be accessed and downloaded through our website on your computer, tablet or phone

DIGITAL AND PRINT: hard copy mailed to you each month AND access to digital version plus digital back issues

2. When will my first issue arrive? Bee Culture Magazine is published monthly. Please allow up to 6-8 weeks for delivery of your first issue. International subscriptions will take longer.

3. When should I renew my subscription?

Look at the mailing label on the back cover to see how many issues you have left!

We recommend renewing if you have 3 or fewer issues remaining.

- 4. Address change or cancellation? Please email info@beeculture.com with your request.
- 5. How do I subscribe?
 Send a check along with this ad to:
 Bee Culture Magazine
 623 West Liberty Street
 Medina, OH 44256

-or-Subscribe any time online at www.beeculture.com

-or-Scan the code!



	Prices Valid Ullough July 31, 2024					
Email Address* *Required for Digital Subscriptions	Prices valid through July 31, 2024					
Phone Number						
City	State Zip					
Address						
Name (Print)						
	 \$34 12 issues PRINT ONLY Edition \$62 24 issues PRINT ONLY Edition \$86 36 issues PRINT ONLY Edition 					
J.S. SUBSCRIPTION RENEWAL	Select your choice: □ \$24 12 issues DIGITAL ONLY Edition □ \$44 12 issues DIGITAL AND PRINT Edition: □ \$70 24 issues DIGITAL AND PRINT Edition:					

.S. EW JBSCRIPTION	7	GITAL AND PRINT Editions GITAL AND PRINT Editions INT ONLY Edition INT ONLY Edition
Name (Print) Address		THE PART CARTES
City	State	Zip
Phone Number		
Email Address* *Required for Digital Subscriptions	Price	es valid through July 31, 2024
ANIADA ANID		

CANADA AND INTERNATIONAL SUBSCRIPTIONS

Select your choice:

- □ **\$24** 12 issues **DIGITAL ONLY** Edition
- □ **\$79** 12 issues **DIGITAL AND PRINT** Editions
- □ **\$158** 24 issues **DIGITAL AND PRINT** Editions

Prices valid through July 31, 2024

- □ **\$74** 12 issues **PRINT ONLY** Edition
- □ **\$148** 24 issues **PRINT ONLY** Edition
- □ **\$222** 36 issues **PRINT ONLY** Edition

	- \$ZZZ 30 issues PK	INT ONLY Edition	
Name (Print)			
Address			
City	State	Zip	
Phone Number			
Email Address* *Paguired for Digital Subscriptions			

Global Patties

You will too



Keep your hives strong and healthy with less effort and low cost Reduce winter loss and see faster spring build-up Help your bees thrive despite drought and stress from mites and disease

Two North American Factory Locations

Plus depots across the U.S. and Canada to Serve You Best

BAY 2 - 8 East Lake Way NE, Airdrie Alberta T4A 2J3 Phone: 1-403-948-6084 - Fax: 1-403-948-6901

> 150 Parkmont West, Butte Montana 59701 Ph: 1-406-494-4488 - Fax: 1-406-494-3511

Call Us Toll Free in North America at 1-866-948-6084

We make protein and pollen patties to your specifications using only fresh, high quality, proven ingredients. Satisfaction guaranteed.

Be sure to visit our website

www.globalpatties.com

For our locations, news, ideas, specials, and much more...

Your bees will thank you

Hams Don't Lie

Stephen Bishop

Desperate times call for desperate measures. I've left my car windows down, painted an outbuilding and even hung up a few garments on the old clothesline—just to tempt the atmosphere into relinquishing a few rain drops. The whole countryside looks drab, like someone siphoned the chlorophyll out of the pastures and hayfields. As I write this, it's late October and we haven't had any substantial rain since early September. By the time you read this, however, the pendulum will have probably shifted and we'll be boarding an ark. It seems like it's always one extreme or the other.

Just this week, the folks who monitor and declare drought stages have finally found it within themselves to bestow us with the official "severe drought" designation. "Abnormally dry," they said for months. There will be no Fall flow this year, not that that's abnormal. Occasionally, when I was a beginning beekeeper, I heard old timers mention Fall flows and hives filled with goldenrod and aster honey. We still get the smelly socks aroma from traces of aster nectar, but a hive bursting with Fall honey is about as rare as a raindrop these days. In the years I've been keeping bees, I don't think I've ever had a Fall flow that fills supers. The only thing flowing is money out of my bank account to pay for large quantities of sugar.

It was thirteen years ago that I started beekeeping and ten years ago that we bought the old farmhouse. My wife's grandfather, who was born in the house, is eighty-five and likes to tell stories about the olden days when the family had hog killings in January, bled carcasses on the branch of a mammoth barnyard oak, and hung hams in the smokehouse. Eventually, they quit raising hogs because they were losing too many hams in the Winter due to warm spells.

Hams don't lie, I suppose, and neither do honey supers. The climate is changing. And the landscape is too. Housing developments are spreading faster than kudzu, and as much as I can't begrudge people a place to live (I guess everyone can't live in a house built in 1897), I don't like it much either, just like I don't like 85°F days at the end of October. Don't get me wrong, I'll take an 85°F day in July without any belly-aching, but something doesn't seem right about it on the day before Halloween. You shouldn't have to worry about all the chocolate candy melting in your child's jack-o'-lantern pail as they trick-or-treat.

Sometimes I wish I could have seen the countryside in its prime, back when it was dotted with farmsteads, not sprawling developments named after farms. Having tried my fair share of farming schemes, I'm not naive enough to believe it was a better or easier time, but I'd like to think it was a slower time when things didn't change quite so fast. Or maybe change has stayed the same, and I'm just getting older and time is speeding up. Either way I don't like it. I wish it would stop.

Anyway, as a final desperate measure, I've decided to purchase Apiculture Insurance. Here is how the crop insurance agent explained it: you basically pick which months in the coming year you think it won't rain enough to meet 70% of your county average rainfall for those months. If you're right, you get a payment to help cover costs of feeding bees. Best I can tell, it's kind of like gambling with Mother Nature. I'm kicking myself that I didn't buy it last year—and, knowing my luck, I'll probably be kicking myself that I did buy it next year.



WE ARE STRONGER TOGETHER

John Miller

American beekeeping is fragmented; and has been for at least 50 years. Strong personalities and priorities compete for scarce funds, scarce participation and scarce leadership. I have learned that no group has all the good ideas. In our fragmented state, hobbyists, honey packers, commercial beekeepers, queen and package producers view each other with suspicion. This should not be. Our shared enjoyment over a well-kept, productive hive and the product of these hives – the pollinated crops, the fragrant jar of honey – we all enjoy.

We could do better. Soon, our priorities will re-focus. It won't be a priority to undermine the volunteer we disagree with. The priority will no longer be which group knee-caps the other group. It will no longer be which group really represents beekeeping. *Tropilaelaps* will re-focus our attention; re-prioritize the universal goal of keeping our colonies alive.

Listen to Aubrey Bettencort, immediate past-chair of the Almond Alliance, "The difference between almonds and all other agriculture is that we work together, versus the less successful groups that cannot or will not agree on anything." Bullseye, Aubrey.

The almond industry is populated with more than its share of strong personalities. Is the almond industry competitive? You bet it is. Is it fragmented? Not at all. The almond industry has plenty of challenges: an openly hostile California business environment, specious environmental claims (water wasters). The industry exports 70% of its crop overseas;

Photo by Shoeib Abolhassani on Unsplash

grappling with deliberately inept California ports, currency fluctuations, tariff mischief by both red and blue administrations. High operating costs, regulatory compliance, pollination costs, irregular water supplies – the challenges list is long. Yet all almond sectors pull together, rowing in the same direction.

The Federation and Honey Producers should unite with Apiary Inspectors of America, regional beekeeping associations, county and state beekeeping organizations, Honey Bee Health Coalition, American Bee Research Conference, the bee breeders - all of us - petitioning USDA, our Congress to fund additional agency resources to prevent the introduction of Tropilaelaps mercedesae into North America. It's a food security issue. It's a beekeeping survival issue. The day is here to apply the cutting-edge technology available in universities and private sector agriculture to save American beekeeping. It's going to be expensive; but preventative measures are infinitely less expensive than redemptive measures.

The Tropigeddon threat eclipses the less successful groups that cannot or will not agree on anything.' Which priority is *the* priority? Tropigeddon is **the** priority for American beekeeping.

The beekeeping industry has access to brilliant bee researchers. Beekeepers don't fund bee research very well. A united beekeeping industry must, with one voice, pull together a message – the same priority to USDA and Congress, and to the affiliated industries dependent on insect pollination – provided by the global

champion of pollination and honey production, our honey bee.

It's April. Everyone is terribly busy. We are always terribly busy. This is a terrible time of year to ask Congress, USDA, affiliated production agriculture for support. This is a great time of year to donate a buck a hive to bee research. The only time of year worse than now to do these acts, these deliberate acts in support of our livelihood – is the first ten minutes after you learn Tropigeddon has arrived.

For those of us of a certain age do you recall where you were the moment you discovered the first Varroa mite you'd ever seen - in one of your colonies? Do you? I do. I remember the beevard. I remember the time of year, Spring; we were making up divides - and I remember sort of drifting into a fog of, "Oh my God, what is going to happen to my outfit?" That was about 35 years ago. It's been a miserable slog. Ms. Varroa and her children have killed more hives and broken more outfits than any other parasite or disease in the history of beekeeping. Until now.

A buck a hive in a 10,000-hive outfit is about $1/10^{th}$ what will be spent on feed syrup in 2024. \$10,000 will buy about 400 queens, about 500 rims; maybe 600 pallets.

Lastly, again, for those of us of a certain age – we encouraged and welcomed our child into beekeeping. We sold them our life's work, confident in their ability. I look now at my grandchildren. Do I encourage grandchildren to learn the art, and later the business of beekeeping? I hope I'm wrong to discourage them. Very wrong.













New(ish) Beekeeper Column

Background

For the past two years I have been a partner mentor with four or five other beekeepers that have provided on-site, hands-on instruction to beginning or potential beekeepers.

The new beekeepers are encouraged to maintain one hive at either of two participating farm locations through the ten month course. For more than thirty years, the Southeast Michigan Beekeepers Association (SEMBA) has managed this bee school which can concurrently handle up to thirty students at each location. Throughout the duration of the course, which meets on average once a month, one of the more frequently asked questions is related to, "When, what and how often do we need to feed our bees?"

Feeding bees some form of granulated sugar might seem counterproductive to the new beekeeper. In other words, why spend money on a food source for the bees that are supposed to be producing that food source, honey? Consider the fact that while granulated sugar can be purchased for around 70 cents a pound, or less if in larger quantities, you can often sell honey for more than \$8.00 a pound. So when there is a dearth, the lack of a nectar flow, or a long, hard Winter, it may be wise to feed the bees during those "emergency" times to keep your bees healthy and at their productive peak.

As with most things in beekeeping, there is not one specific answer to the question about feeding bees. While feeding bees may seem controversial for some, there are times when feeding may be the last resort to save an otherwise starving hive. I will endeavor to provide some ideas and options that have worked for me over the past fifteen years as well as to offer some suggestions that I know are used by other area beekeepers.

Winter Feeding

There are several reasons when feeding prior to or through the Winter may be required. If strong hives enter the Winter season with a heavy population of bees there might not be an adequate supply of stored honey to get them through the Winter. This may be due to the beekeeper taking too much honey from the hive, a late Summer collection of a swarm, a poor nectar flow in the Fall or if the hive went through a robbing event. In any of these cases, heavy population, robbing or a dearth due to weather variations, feeding may be just enough to get that hive through to the next season. I like to wait until just before, during or after the Christmas holidays to add a granulated sugar feeder to my hives on one of those infrequent warm, sunny Winter days.

I wait until around the holidays to add that type of feeder to my hives since the sugar in its refined state is harder for the bees to digest than a syrup solution. If cane sugar is added too soon in the Fall and the bees take a liking to it sooner than expected, it can cause a dysentery outbreak among the bees. This is evidenced by streaks of orange-brown bee poop all over the outside of the hive and particularly near any entrances. A nosema outbreak

Off the Wahl Beekeeping

FEEDING YOUR BEES

Richard Wahl

will also show these characteristic orange-brown streaks but will be accompanied by bee's inability to fly with many dead or dying bees near hive entrances and a lot of bee poop on inside combs and frames.



Baking parchment paper over ½ inch wire mesh with Winter feeder set above top deep frames. Note how bees work from one chewed through area.

My sugar feeder consists of a half inch wire mesh (called hardware cloth) with one inch bent up sides stapled to a three inch spacer frame, the same size as my deeps, with the wire about ¼ inch above the bottom edge of the frame. The ¼ inch space leaves enough room for the bees to move around on the top of frames just below the feeder wire which holds a sheet of baking parchment paper also folded up about an inch on each side. I have found that the waxed cookie sheet baking paper is just a bit harder for the bees to chew through than newspaper. A knife slit in several places gives the bees a chew through starting point. With newspaper the bees chew most of it very quickly and much of the sugar falls through to the frames and bottom of the hive and goes unused.

Since bees tend to move upward as they go through their honey stores, there is much less waste if the sugar can be contained above. The sugar above also serves as a moisture absorbent and collects much of the condensation that would otherwise drip down on the bees. If there is still sugar left when I do my first thorough hive inspection of all the frames, just after the first Spring dandelion heavy bloom, I collect any remaining sugar clumps and store them in a five gallon covered pail to reuse next season. A frame of this size will easily hold four to five pounds of sugar poured onto the waxed baking parchment paper.

It took me four or five years to move to the granulated sugar Winter feeding as before that I was making hard candy boards. A candy board looks like an inverted telescoping outer cover that measures the same size as the hive super which eliminates the overlapped telescoping. In the center, a piece of 2x4 is glued with a two inch hole through the 2x4 and the candy board floor. This hole serves as an air vent while the 2x4 serves as a raised area so the candied sugar will not run out when poured while in its liquid phase. A water tight glue is used to hold everything together. I spent a few minutes with the candy board filled with water to be sure there are no leaks before removing the water and pouring in the candied sugar solution.



An empty hard candy board feeder.

On my first attempt using this method, I brought about five pounds of sugar in a cup of water to a rolling boil in a too small ten quart pot. Since the constantly stirred rolling boil needs to reach a temperature of around 250°F (121°C) in my area (temperature depends on your land elevation), I could not reach that temperature without the sugar slurry bubbling over the top of the pot. I had to call for my wife's help to pour half the mix into another pot which she continued to heat and stir as my half of the cloudy mix became clear when reaching the desired hard candy temperature. At that point it was allowed to cool to between 180° and 200° and then was poured into the candy board. My wife's half in the second pot soon reached the desired temp and was also poured into the candy board. After letting it cool and solidify over night the candy board was placed on a hive (with candy side down). The first year I used this, I did not get the candy board on my double deep hive until mid-February. By the time dandelions were out in force, signaling time for a full Spring inspection, the bees had licked the hard candy board over a ten frame deep spotless and completely clean. I think it is obvious why using the granulated sugar is much easier than the hard candy method which requires the cooking stage.

Another method used by some beekeepers is to add just enough water to sugar to make it stick together and harden in a mold. A typical recipe for this is five pounds of sugar mixed with a cup of water. A small portion of powdered bee feed can also be added to this mix to supplement any protein needs. It is not uncommon to see recipes call for a tablespoon of vinegar added as a preservative to preclude spoilage or molding. There are

various recipes suggested by reputable bee sources on the internet.

I know of some beekeepers who also like to use fondant as a supplemental food source. It is believed that fondant is softer and easier for the bees to digest as the sucrose sugar turned into fondant has already been broken down into the more basic glucose and fructose components closer to being like the flower nectars. Making bee fondant out of sugar requires some cooking steps. Once again, various recipes can be found online under making fondant for bees. If store bought fondant is used, be sure it consists only of cane sugar or corn syrup and does not have extraneous additives as those additives can be detrimental to the bees.

In the case of dampened sugar molds or fondant made into patties for bees, some type of spacer will be needed to provide enough room for those patties or sugar cakes to rest on the top of the frames below the inner cover without blocking the inner cover center vent hole. Pick whichever method you are most comfortable with and feed your bees to get through the Winter. I have found that bees only resort to these added supplements if their own honey stores have been exhausted or are unreachable as the bees move upward through their hives. A most disappointing Spring inspection is to find dead bees with their heads stuck in empty comb cells and find that the hive has starved.

Spring Feeding

I have a dozen full grown maple trees in my yard and there is one that is always first to have its buds pop open. On a warm, sunny day, usually the first week in March, standing under that tree is like being in the middle of a beehive. To the uninitiated, the buzz of the bees collecting nectar can be disturbing. I use this signal as a time to check my Winter sugar feeders and to add more sugar if needed and also a pollen patty to the feeders. This is when the queen is beginning to lay more eggs and the hive is coming alive for the following Summer. It is also the time when there will be few other pollen or nectar sources until the heavier dandelion bloom which occurs around the last week in April or first week of May, nearly two months later.

This period is when bees are most likely to starve if there are not enough honey stores or food supplements provided by me, the beekeeper. What I usually find is that ½ of my hives have totally used up the Winter sugar supply. An additional ½ will have partially consumed the sugar, while the remaining ½ will not have touched the supplemental sugar. The same seems to be true with the pollen patties, but not necessarily matching the use of the cane sugar. This could be the result of some hives having an adequate supply of pollen and/or stored honey or possibly a greater number or more efficient group of bees collecting the early available pollen and/or having a greater amount of stored honey.

Once the dandelions are in full bloom, when I complete my first deep hive inspections, I remove any remaining supplemental sugar which is now often in clumps due to its moisture absorption through the Winter. Any unused pollen patties are also removed, but if bees are using them, they are transferred to the tops of the frames. Use of the baking parchment paper allows me to collect and store unused sugar in a covered, five gallon bucket until next season.





Only if there is a dearth occurring will I supplement hives with sugar syrup. A dearth occurs when there is more than two to three weeks of no rain. After two or three weeks, the plants may be producing flowers, but they are not producing much nectar or pollen as they are supporting new growth, root development and nectar or pollen production is the first thing to be curtailed. If I decide to split a hive and the split has limited honey or pollen stores I will provide the hive with a sugar syrup mix and a partial pollen patty.

In the Spring, a one to one parts water to sugar is recommended. The one to one mix by volume most nearly equates to the nectar the bees would otherwise be collecting from flowers. I use a funnel to pour four to eight cups of sugar in a rinsed out plastic milk jug then add the same amount of warm water. A good shake of the capped jug three or four times at ten to fifteen minute



A quart jar Boardman feeder.

intervals is enough to dissolve the sugar which can then be poured into any type of feeder the beekeeper prefers. I like to use the black frame feeders with any ten frame deep splits and the quart jar Boardman feeders on any five frame nucleus (nuc) splits.

Bees in a split with several frames of soon to emerge brood can easily consume the gallon frame feeder or quart jar feeder in a week if there is no external nectar flow going on. If there is a nectar flow the bees will normally collect from nature instead of using the supplied sugar syrup.

Summer Feeding

For Summer feeding of captured swarms, full size or five frame nuc splits, I use the same sugar syrup mix as for Spring feeding. If there is a concern for spoilage or mold, most recommendations I have read say to add a tablespoon of vinegar per gallon of mix. Exact proportions are not critical for the sugar syrup mix, but should be relatively close. A few days prior to placing honey supers on the hive, any feeders should have been removed. This precludes bees moving any sugar syrup stores into the honey supers. You want the honey that is collected to be made from nectar sources and not from the sugar syrup you have provided. If there is a good nectar flow on, I like to add two honey supers for the bees to work in. When there are only one or two partial or empty frames left that are not being used in the top or single deep for brood or nectar storage or in a nearly filled honey super, it is time to add the next honey super.

Fall Feeding

In our area of southeast Michigan, the bloom of the Fall purple aster and goldenrod comes to an end sometime in late September or early October, depending on the weather. This occurs just as the first nightly frosts begin and is my signal to consider Fall feeding. If there has been a Fall dearth as a result of a dry spell, I may begin feeding the Fall sugar syrup mix in a two parts sugar to one part water ratio a bit sooner. The heavier sugar to water ratio provides a greater sucrose content and requires less effort by the bees to remove excess water.

If it has been a wet Fall, knowing the Fall flowers are providing adequate nectar, I may wait a bit longer before



The black frame feeder holds one gallon and replaces one deep frame. Wood discs float in each feeder hole to avoid bees drowning.

putting on feeders. For the Fall season, I like the gallon or half gallon buckets that have a small screened hole in the top set inverted over the inner cover hole. When flipping the bucket to inverted, do not do so over the hive as there will be a small amount of seepage from the screened hole in the cover until a vacuum has formed in the bucket, and be sure the cover is on securely. Surround this with an empty super with the standard outer cover and only the bees in the hive can get to the feeder.

More often than not I will be removing emptied honey supers from on top of inner covers that I had previously placed there for the bees to clean out. In most cases the hive bees will clean out emptied honey supers placed in this manner as they are not perceived to be a part of the hive. In the event bees do start replacing nectar in a honey super simply move it to a different hive for cleanout.

Once temperatures consistently fall below freezing at night, it is time to stop with sugar syrup and wait to de-



A bucket feeder on top of inner cover that will be surrounded by an empty super with an outer cover on top.

termine when to place Winter feeders on the hives, which brings us full circle to the beginning of this article. Like most things in beekeeping, feeding is not an exact science. The one thing I can say is that feeding has saved some of my hives during our variable Michigan Winters, while early in my beekeeping experience a lack of feeding had, on occasion, resulted in a hive sadly starving. Keep good notes and adjust your feeding regimen to your needs. Feed judiciously as needed and it will become a crucial step in becoming a sustainable beekeeper.

Minding Your Bees And Cues

Why do bees hum? Because they can't remember the words. Why do bees fly? Bees have a number of reasons to take flight beyond the mundane nectar run. Their flight behaviors are diverse and complicated, but learning to read their flying behaviors allows one to collect all kinds of information about their colonies before they even crack the lid.

Honey bees first fly for orientation. Orientation flights are dangerous: there are apivorous birds lurking, and reasonable odds of getting lost, though clearly the success of the species is indebted to their talent for finding their way from faraway fields back to the small, particular dark mouth of the hive.

Workers, drones and queens all take orientation flights. First flight age ranges vary based on the caste.

Figure 1. Workers on the face of a hive everting their Nasonov glands. Look at their last abdominal segment that is bent, exposing the gland. Photo credit: Rebecca Masterman



First Flights Becky Masterman & Bridget Mendel

Workers start orientation flights at an average of 25 days old, but with a wide range four to 65 days (Winston & Punnett, 1982), drones tend to take their first flights between six to nine days old (Reyes et al., 2019) and queens take one to two orientation flights prior to mating flights at five to seven days old (Koeniger & Koeniger, 2007).

Orienting bees are guided to home by a lemony scented pheromone, which can definitely complicate things for new flyers if your hives are set up in a row and multiple orientation flights are happening concurrently. Beekeepers can see bees positioned on landing boards and the hive bodies releasing and fanning

this attractant pheromone (Figure 1.) If you get close enough, you can smell it too. It is named after Nikolai Viktorovich Nasonov, who in 1882, identified the dorsally located gland that releases the chemical.

Tons of bees flying in front of the hive can summon fears of robbing or swarming, but if you look closely through the often afternoon-timed mass, and see workers stationed at entrances with opened Nasonov glands and fanning wings, it means they are not leaving or robbing, but orienting home.

Initial orientation flights, usually about three in number and sometimes referred to as 'play flights' in older literature, are short and close to the hive. There can be a rush of flight activity outside the hive only lasting a few minutes. You will also notice workers walking up the front of the hive and launching backwards, and flying in arcs, a strategy that makes sure they keep their eyes on the hive's face (Figure 2).

Without help, beekeepers can't visualize the long-

range orientation flights where bees fly out of visual contact with their nest. Using harmonic radar technology, researchers have collected this information and provided a glimpse of the work done by pre-foragers to learn the terrain on these longer duration flights (Degan et al., 2015). In long-range flights, workers left sight of their nest and visited different directions on each journey. Interestingly, they did not need to explore all compass directions prior to the onset of foraging, likely due to their use of the sun in navigation. One study counted between one to 18 total orientation flights and measured longrange orientation flight distances to almost 700 m (Capaldi et al., 2000)

Honey bees orient to the sun and use polarized light information when navigating the landscape (Evangelista et al., 2014). A simplification of orientation flights is to think of the bees making memories of what their home looks like as well as learning short and longer-range landmarks in relation to their nest location. These landmark memories in relation to the sun's compass create a spatial memory map that allows bees to orient themselves and return to the hive when taking subsequent foraging trips in new directions (Menzel et al., 2012).

Workers, drones and queens make errors on orientation flights. The bees drift into other hives and mistakenly join other colonies. Younger workers and drones tend to drift more than older bees, and interestingly, drifting decreases in the late Summer and Fall (Free, 1958). Research on drifting reports that workers will accidentally join other colonies in early orientation flights, with one early study noting the drift rate at five to 10% (Becker, 1958). Drifting increases when hives are the same color and lined up in a row. Different directions, increased spacing, colors and designs can decrease this drift (Degen, 2015) #decreasethedrift.

Drones are notorious for drifting, and researchers have the numbers to back up their reputation. Drone

BEE CULTURE April 2024



Figure 2. Workers walking up the face of a hive, launching backwards and flying in arcs while facing the hive in early orientation flights. Other workers are releasing Nasonov pheromone to orient the newly flying bees. Photo credit: Rebecca Masterman

drifting begins at six to seven days old and the proportion of drifted drones reached 50-60% by the time the drones in the study were 15 days old. This level remained constant. Twenty-one percent of drones were observed to drift more than once (Currie & Jay, 1991). While we recognize the importance of the genetic contribution of drones, we found this directional data amusing.

Why do queens only drift once? Because it's a deadly mistake. In a study set up to learn about how often queens drift in commercial beekeeping operations, seven of 160 (4.4%) queens drifted on their maiden flights, with none of them drifting after a successful orientation flight (Perez-Sato et al., 2008). The same study found that a higher number of bees at the hive landing was related to a decrease in drifting. This study reminds us of the importance of leaving colonies alone during the requeening process.

Honey bee orientation flights involve time, energy, risk and memory making by honey bees. Here are a few orientation flight takeaways:

- Your bees invest energy into learning where they live by taking multiple orientation flights. When you move a colony, the bees will need to reinvest this energy into learning their new surroundings. If you move a colony during the day and lose your foraging force, your bees will need to transition in-house bees to foraging tasks, and foraging will be delayed by orientation.
- Drifting of orienting bees happens.
 Help your bees and avoid placing
 your hives in a single row, in the
 same color equipment, and with
 all the entrances facing the same
 direction #decreasethedrift.
- Queens have limited days to perform orientation and then mating flights. If you know your colonies are requeening, do not disturb them and risk interrupting this process.
- Drones have trouble finding their way home and often end up joining another colony. Your mite management strategy should take this drifting into consideration to prevent the spread of *varroa*.

References and Resources

Becker, L. (1958). Untersuchungen über das Heimfindevermögen der Bienen. Zeitschrift für vergleichende. Physiologie, 41, 1-25.

Capaldi, E., Smith, A., Osborne, J. et al. (2000). Ontogeny of orientation flight in the honey bee revealed by harmonic radar. Nature 403, 537–540. https://doi.org/10.1038/35000564

Degen, L., Kirbach A, Reiter, L., Lehmann, K., Norton, P., Storms, M., Koblofsky, M. Winter, S.,Georgieva, P. Nguyen, H. Chamkhi, H. Greggers, U. Menzel, R. (2015) Exploratory behaviour of honey bees during orientation flights, Animal Behaviour, Volume 102, Pages 45-57, ISSN 0003-3472, https://doi.org/10.1016/j.anbehav.2014.12.030.

Evangelista C., Kraft P., Dacke M., Labhart T. and Srinivasan M. V.

Becky Masterman earned a PhD in entomology studying honey bee hygienic behavior at the University of Minnesota and is currently a cohost for the Beekeeping Today Podcast. Bridget Mendel joined the Bee Squad in 2013 and led the program from 2020 to 2023. Bridget holds a B.A. from Northwestern University and an M.F.A. from the University of Minnesota. Photos of Becky (left) and Bridget (right) looking for their respective hives. If you would like to contact the authors with your own #decreasethedrift campaign or other thoughts, please send an email to mindingyourbeesandcues@gmail.com

(2014) Honey bee navigation: critically examining the role of the polarization compass Phil. Trans. R. Soc. B3692013003720130037 http://doi.org/10.1098/rstb.2013.0037

Free J.(1958) The drifting of honey bees. The Journal of Agricultural Science. 51(3):294-306. doi:10.1017/S0021859600035103

Gabka, J. (2018) Drifting of honey bee queens returning from flights ABING-DON: Taylor & Francis. Journal of Apicultural Research, Vol.57 (4), p.580-585
Koeniger, N.and Koeniger, G. (2000). Reproductive isolation among species of the genus apis. Apidologie, 31, 313–339.

Menzel, R., Fuchs, J., Kirbach, A., Lehmann, K., Greggers, U. (2012). Navigation and Communication in Honey Bees. In: Galizia, C., Eisenhardt, D., Giurfa, M. (eds) Honey bee Neurobiology and Behavior. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-2099-2

Reyes, M., Crauser, D., Prado, A., Le Conte, Y. (2019) *Flight activity of honey bee* (Apis mellifera) *drones* Paris: Springer Paris Apidologie, Vol. 50 (5), p. 669-680

R W Currie & S C Jay (1991) Drifting behaviour of drone honey bees (Apis mellifera L.) in commercial apiaries, Journal of Apicultural Research, 30:2, 61-68, DOI:10.1080/00218839.1991. 11101235

Perez-Sato, J., Hughes, W., Couvillon, M. et al. (2008) Effects of hive spacing, entrance orientation, and worker activity on nest relocation by honey bee queens. Apidologie 39, 708–713. https://doi-org.ezp2.lib.umn.edu/10.1051/apido:2008056

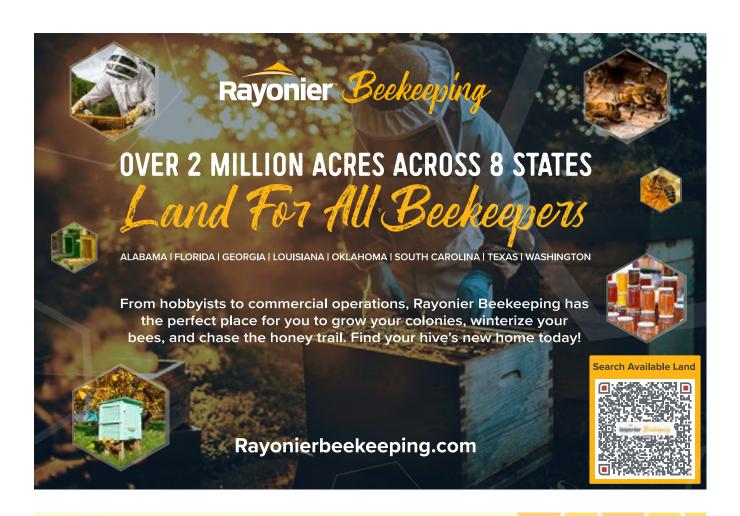
Winston, M. and Punnett, E. (1982) Factors determining temporal division of labor in honey bees, Ottawa, Canada: NRC Research Press, Canadian journal of zoology, Vol.60 (11), p.2947-2951

UMN Bee Lab Orientation flight video https://www.youtube.com/ watch?v=Ouj1HSy2Ttk

https://en.wikipedia.org/wiki/Nikolai_Nasonov









STILL FAMILY OWNED AND OPERATED SINCE 1976
MANUFACTURER OF QUALITY WOODENWARE

Overstock Sale! Budget grade boxes are on sale while supplies last!



Hive bodies 10 and 8 frame Start at \$15.00 each



Supers 10 and 8 frame Start at \$14.00 each

VISIT US AT OUR NEW WEBSITE AND ENJOY FREE SHIPPING ON MOST ORDERS OVER \$150!

496 YELLOW BANKS RD
N. WILKESBORD, NC 28659
OPEN 8AM-4:30PM, MONDAY THRU FRIDAY

WWW.MILLERBEESUPPLY.COM





BAIT HIVE - FREEBIES

Greg Carey

Many beekeepers think of the bait hive (swarm trap) as a means to get free bees. If you do a search on "bait hives for sale" you will see that it is anything but free. You can buy a three pound package of bees for less than you can buy a swarm trap. That being said, the bait hive is a good way to randomly plus up your colony count. The more swarms you catch, the more the cost is spread out. I recommend you set out more than one bait hive. Of course, you may need to use your friends' trees to do this.

My experience with bait hives has been so-so. I have caught a few swarms with them, but it has been sporadic. I have a friend, on the other hand, who found a sweet spot and catches swarms regularly. His swarm trap was on the May 2022 cover of this magazine. You'll notice that it is just a hive body on the top of a deer stand ladder. Very nice!

Those who know me know that I enjoy cutting and nailing together wooden beekeeping items as much as I enjoy working with the bees. They also know that I am a scrounger who picks up a rusty lock washer from the roadside and puts it into a drawer to be saved and put back into service at some future date. I like freebies just as much as I like free bees. You might call me cheap.

A good thing is that many companies and mall stores which receive items in crates and on pallets will give you that wood just for hauling it away. I have done my share of this, and many of my projects (candy boards, Imirie shims, bottom boards, etc.) are completed with recycling these donated materials.

My first bait hives were made of a few strips of pallet wood with discarded corrugated plastic signs wrapped around them. I have caught bees in these traps. I liked the fact that they are very light but was not happy with the number of coats of paint needed to make them dark inside. I am also suspicious that the plastic walls are not as attractive to the bees as wooden walls are.

Using the same basic design, I decided to start making my bait hives from plywood. Then a friend asks if I had any use for a couple of sheets of chipboard that he had left over from a home improvement project. I had it unloaded and in my garage before he could finish asking. You will notice that I pre-drill 1/8" screw holes to prevent splitting.

Bait Hive Measurements/Components

Sides/2 = 19% wide x 18" high

Front + Back = $8\frac{1}{2}$ " wide x 18" high

Bottom = $8\frac{1}{2}$ " wide $20\frac{\%}{8}$ " long

1/2" inside braces on all butt joints

Hanger = 3" wide $19\frac{1}{2}$ " long

3" sq double top 21/4" hole

Cover cord hole (1/8") 61/2" down from top center

Nylon cord cover strap 20" long

Two holes for offsets ($\frac{1}{8}$ ") one $8\frac{1}{4}$ " + one $17\frac{5}{8}$ " down from top center

Offsets/2 = 4" x $1\frac{1}{4}$ " x $1\frac{1}{2}$ "

Offsets side body placements = 2½" down and 12" down centered

Outer Cover ID 1/4" > box OD

Entrance 1½" circle ~2½" from bottom Screen ½" hardware cloth inside ¼" staples outside Closure 3"x 3" #8 wire cover

Rope = ~15' long **Volume** = 1.4 cu ft



One of the chipboard sheets yielded about four hive bodies like this one cut to the previous measurements. The hanger and offsets are scrap pieces from the pallet wood stack.

I use a good waterproof exterior wood glue on all butt joints with ½" braces nail gunned together with a strip across the top to act as a frame rest. The front, back and bottom are nailed to the outside edges of the two side pieces which set the proper distance for the frame top bar fit. If you use material with different thicknesses, the only dimensions that would change are the length of the bottom and cover pieces.





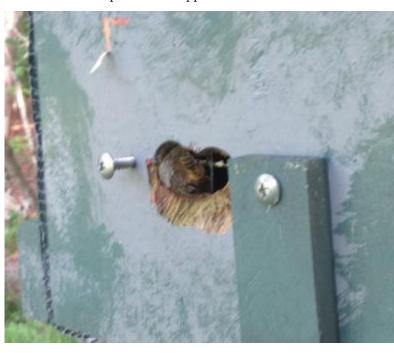
The front piece gets an entrance cut two to three inches up from bottom with a $1\frac{1}{2}$ " hole saw. You may wish to use two lateral $\frac{3}{4}$ " holes overlapped for a wider, less high entrance. The entrance has $\frac{1}{2}$ " hardware cloth inside.



The outside is circled by staples. These precautions are used to deter squirrels and other varmints.



You may say that this is just overkill and busy work. It may be. I'm small time and don't have a lot of data. I do have this data point that supports the effort.



In addition to catching bees and having squirrels and possibly other varmints trying to get in, you can expect to have paper wasps and mud dauber wasps building nests in your bait hives.

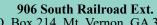
I currently use a standard nuc style outer cover (no inner cover), but a migratory cover should be easier to put together and needs less material. The migratory cover probably could be used without the hanger offset. But in addition to allowing the cover room to be put in place, the offsets allow me to wrap the rope between the hanger and hive body for tying it to the tree without wrapping the entire hive.

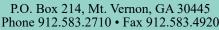




SAVE EXPENSE PICK-UP WITH PICK-UP WITH

HARDEMAN APIARIES







2024 SPRING PRICES

ITALIAN QUEENS & PACKAGES

QUE	ENS	PKGS.	<u>1-9</u>	<u>10-24</u>	<u>25-99</u>	<u>100-UP</u>
1-9	.\$23.75	#3	103.75	101.75	99.75	97.75
10-24	\$22.25	#4	119.25	116.75	115.25	113.25
25 I ID	\$22.00	NO NIJES TH	IC CEACON			

RUSSIAN HYBRID QUEENS & PACKAGES

<u>QUEENS</u>	PKGS.	<u>1-9</u>	<u>10-24</u>	<u>25-99</u>	<u>100-UP</u>
1-9\$26.25	#3	106.75	104.75	102.75	100.75
10-24\$24.50	#4	122.25	120.25	118.25	116.25
25-UP\$24.25	NO NUCS T	HIS SEASON			
CL ID #0.70		14.DIZ #0.50			
CLIP\$2.50		MARK\$2.50			

WE WILL START TAKING ORDERS IN DECEMBER

Pick-ups are welcome. Yearly inspected by The Department of Agriculture. Package and Queen prices do not include postage. All shipments must be paid in full before we ship. No payment may cause delays in your shipping. All postal claims are to be made by customer. Hardeman Apiaries are not responsible. We accept all major credit cards.

We will not ship packages to zone five and up, no exceptions. Postal service will not insure packages past zone four. Zone five and up package customers should try your local bee clubs to see if they may be picking up packages. Queens can be shipped to most United States customers. These can't be insured by the Post Office or UPS.

The three inch double top on the hanger has the wood grain at 90 degrees from the hanger grain to increase the loop's strength. The loop acts as a handle for carrying the hive or for hanging the swarm trap onto a stout limb. The hive can also be hung using the 15-foot rope or a regular cargo strap. The rope has three purposes. It helps approximate the proper height for hanging the bait hive. It allows you to climb up and get into position before lifting or lowering the hive. It provides a means of securing the hive in place on the tree. Just be careful when you're up a tree.



The bait hive is best placed at the north edge of a clearing facing south. This swarm trap is occupied (you will see bees bringing in pollen) and ready to be moved to a hive stand. It has a solid closure on the entrance. I now use #8 hardware cloth to close the entrance during moves to provide ventilation. This may not be necessary since I fairly quickly get them to the hive stand, and the moves are done at night.



I usually give them a day or two to orient to the new location before taking them out of the bait hive and putting them into a standard hive or nuc.

This one had a good queen as seen here.



There's not much better than seeing a good egg pattern in cells that are not completely drawn out.

In preparing the bait hive for hanging, I fill all the cracks and crevices on the inside with propolis and paint the insides with beeswax to enhance the odor for the scouts. While putting this article together and looking at these photos of the occupied trap on the hive stand, it occurred to me that I could put a colony into a newly built bait hive for a couple of brood cycles for greater attractiveness to the scout bees. Once the thought came, I realized that I had more than one data point on this as friends had told me of swarms moving into their used equipment that was stacked under sheds.

Swarm season is almost upon us. I am hoping that this information will be useful to you when building your bait hive. But whether you choose to buy a bait hive from a supplier or build your own, you will likely need to odor it up in some way. You can use what's mentioned, or frames with brood comb (wax moth attractant), purchased attractants, and/or essential oils.

I once left a swarm trap in a tree for three years before it attracted bees. Were they free bees? We know they were not, but building your own bait hive from scrap materials can reduce the costs. I consider the first catch as payment for the bait hive and all subsequent catches are freebies.

I highly recommend reading the works or watching videos of Dr. Seeley's research on the subject of swarm behavior. Here is the link to one which I just watched again: https://youtu.be/JnnjY823e-w. I think you will enjoy it. Beekeeping, more than bugs in a box.





Swarm Catching

Thoughts and Tips for Success

It's that time of year again. The days are getting longer and temperatures are getting warmer. Flowers are popping up all over and the bees are thinking about reproductive swarming. For beekeepers, this is an opportunity to add new colonies to our apiaries with minimal financial expense. There are lots of ways to go about catching swarms so rather than attempt to cover them all in an article, we'll just look at some universal ideas that apply to most swarm catching situations.

Passive Approach

The easiest way is to set up a bait hive, or swarm trap, and wait for a swarm to come to you. According to research, the ideal cavity sought out by a swarm is considered to be about 45 liters in size (about the size of a deep hive body), located in the shade, with a small entrance (two to five square inches) that faces south, and elevated roughly 15-20 feet off the ground. However, it is not uncommon for swarming bees to move into stacks of empty hive bodies and supers that form a cavity much larger than 45 liters, with no entrance reducer and numerous entrances facing various directions, while sitting in full sun, and elevated just inches from the ground; so I don't get too hung up on

Ross Conrad

the ideal swarm cavity as suggested by scientific research.

The attractiveness of any swarm trap and bait hive is improved with the use of a lure. Swarm lures, typically composed of bee pheromones, are available from many supply companies. Alternatively, bait hives stocked with frames of foundation or drawn comb emit the scent of beeswax that may attract scout bees looking for a suitable cavity for their swarming colony. Just be sure to pretreat any frames of drawn comb with the non-toxic wax moth control Certan (B-402), or if no swarm has moved in, remove the comb and protect it before it gets too late in the season to prevent wax moth larvae damage.

Location, Location

One of the best places to locate swarm traps and bait hives is within a few hundred yards of an existing beeyard to take advantage of any swarms emanating from that apiary. It doesn't matter if it is your apiary or not. One of the defining characteristics of beekeeping is that we are dealing with semi-wild creatures. Once a swarm emerges from a hive it becomes fair game to the first person who spots it and can capture it.

The most convenient place to locate a swarm trap is in a place that you frequent regularly, especially if the trap is not located in the final resting place you have in mind for your hive. This way you will notice the swarm early in the process after the bees have moved in, and relocating the developing colony to its permanent home before it grows too large and weighs too much is more easily accomplished. This is particularly important if a bait hive is located at a significant height off the ground.

Swarm Catching Equipment

A more active approach is to attempt to capture swarms manually. Almost any container can be used to catch a swarm. However, when possible I find it preferable to use a hive body filled with frames of comb or foundation. This eliminates the need to transfer the swarm from a

swarm capturing container such as a cardboard box, plastic bucket or paper bag and into a permanent hive. Stapling the hive components together helps keep the hive from coming apart when moving a captured swarm. I prefer however, to strap my hives together rather than use staples to avoid the damage that staples cause to the woodenware.

As exciting as it is to try to catch a swarm of bees, it is even more exciting when the swarm stays in the hive they have been introduced to. To increase the chances of the swarm staying put, it helps to move and interfere with the new colony as little as possible during the capturing process and minimize disturbing the colony for the first week or so after capture. If the location where the swarm is initially captured is outside of an electric fence, I will carry it back to the apiary where the fence will protect the bees from bears. I only seal up the entrance with a screen and load a captured swarm into a vehicle to transport it to its permanent home when it is not within walking distance of one of my existing beeyards. Then, I prefer to wait about a week to give the bees plenty of time to settle in and allow the queen to start laying eggs before inspecting the new colony. Too much movement or hive manipulation early in the process can cause the bees to abandon the cavity you are providing rather than use it to create their new home. Instead of opening up the hive if you are impatient and curious, simply observe the colony's entrance during warm and dry weather to see if foragers are coming and going and that will tell you if the swarm has settled in or has abandoned the hive.

To Maximize Chances of Success, Time is of the Essence

A critical aspect of successful swarm capture is your timing. Swarming bees almost always bivouac somewhere nearby, shortly after they emerge from the parent hive. Once they land nearby, a swarm should be allowed at least 15-20 minutes to settle down and organize their

cluster. To conserve food resources, the bees forming the exterior of the cluster will allow their body temperature to drop below that required for flight. Attempt to capture the swarm too early before they have settled into a cluster and cooled off, and all the bees will simply take to the air and either return to their old hive or to the place the swarm originally settled.

After the swarm has formed a cluster around the queen, the scouts fly out in search of a new cavity for the colony to call home. Once a suitable nest site is located and the majority of the scouts agree on its suitability, the scouts emit piping sounds that signal the rest of the bees in the cluster to raise their body temperature and prepare to take flight. If you hear piping sounds emanating from a cluster of swarming bees, it is too late to try to capture them easily. They have already found a new home and the swarm can be expected to

leave shortly for the new nesting site. The only way to potentially prevent a piping swarm from leaving is to place the swarm in a hive equipped with a queen excluder that prevents the queen from departing with the swarm.

Follow the Queen

Another critical aspect of swarm capture is being sure to catch the queen. This is another reason to allow the majority of swarming bees to get settled and cool down prior to attempting to hive them. If a swarm is hanging from an accessible branch, simply bumping or shaking the branch in the direction of the container you want to capture them in, will cause the bees at the base of the swarm clinging to the branch to lose their grip resulting in the entire cluster dropping into any container placed directly below them. This is because the cool bees that make up

the exterior of the cluster, and are not at flight temperature, will prevent the warmer bees surrounding the queen on the inside of the cluster from being able to easily take to the air as the cluster falls. This increases the chances that the queen, along with the vast majority of the bees, will drop into your swarm capturing container. Quickly, but gently, sealing up the container after the swarm drops into it will help keep many of the bees from leaving and they will instead start investigating the inside of the cavity and hopefully get comfortable enough to want to stay.

Gathering Stragglers

When attempting to capture a swarm, there will inevitably be stragglers. Some will take to the air during the initial capturing process, some will leave the container after the swarm has been placed into, or never make it into the container to begin with and fall onto the ground nearby.

The greatest chance of success in swarm capture happens when minimal disturbance of the cluster occurs and the entire swarm can be gently placed directly into a hive.









April showers bring May flowers and swarms! Don't pass up this opportunity to increase your hive numbers with minimal expense.

By leaving a small entrance opening on the swarm capturing container and patiently waiting for the stray bees to follow the scent of the queen, or the Nasonov gland pheromone of the workers, eventually most of the stragglers will make their way into the container being use to capture the swarm.

After shaking the swarm cluster off a branch, or scooping the majority of the bees off the wall of a building, etc., the process of gathering the stray bees can be sped up by blowing smoke onto the place where the swarm originally settled. The smoke will cover the smell of the pheromones left behind at that location and increase the speed that the bees will rediscover the scent of their queen and follow the rest of the colony into the swarm capturing container, provided of course that you managed to

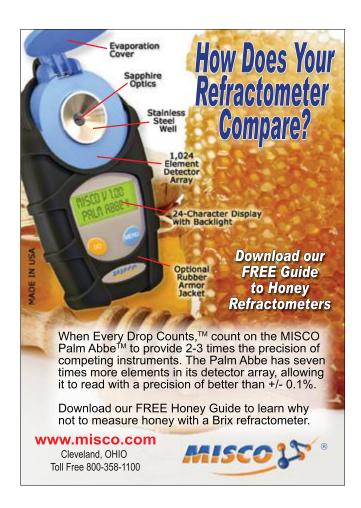
gather the queen up with the bulk of the swarm in the first place.

Taking Full Advantage of the Bees Natural Tendencies

Don't forget that unless the swarm is extremely small, or has been clustered outside their hive for several days and has used up much of the honey they took with them, it is primed to start producing substantial amounts of comb quickly. Take advantage of this fact by being sure that their new home is stocked primarily, if not completely, with frames of foundation in order to get fresh new comb built.

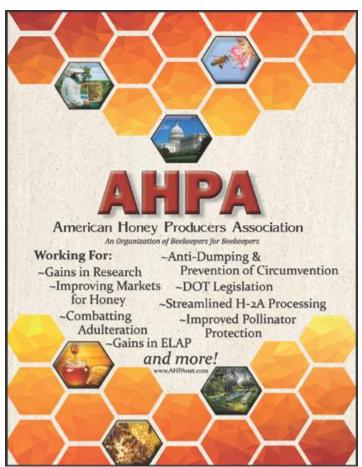
Some people hypothesize that regularly capturing swarms leads to apiaries filled with bees that are genetically predisposed to swarming. In reality, honey bees are already predisposed to swarm although some are genetically predisposed more than others. Additionally, when the colony is healthy and populous, the hive can get so full it becomes congested causing the bees to want to swarm. If capturing swarming bees genetically predisposes them to swarm in the future, then perhaps it also selects for colonies healthy enough to swarm in the first place. I am not one to overly worry about swarming bees since the natural brood break created through swarming is one of the ways colonies naturally manage varroa mite loads and stay healthy, and healthy bees are much more important to me than whether they swarm or not. BC

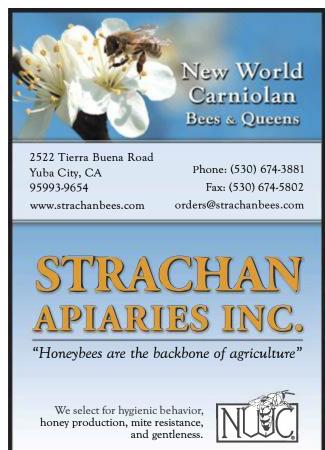
Ross Conrad is author of Natural Beekeeping and the Land of Milk and Honey: A history of beekeeping in Vermont. Ross will be teaching a two-day intensive Beekeeping for Beginners class May 18-19, 2024 in Lincoln, Vermont. For more information visit dancingbeegardens.com











Roberts Bee Company

Over 100 Years of Commercial Package Shipping and Queen Raising Experience.
All packages come from Hives stored in the Jesup, Ga area year-round.
Young, Fresh, Healthy Honeybees and Queens.
No old bees off pollination from California



Call for Pricing and Availability

HandRApiaries.com RobertsBeeCompany.com

2700 S. Macon St. Jesup, Ga 31545 Ph. (912) 427-7311

Bees and Women

Mrs. Anna Lucy Frey

Nina Bagley

Miss Anna Lucy Marvin was born in Oshkosh, Wisconsin on February 25, 1862. Her father, Stephen Marvin, was born in New York. His family was English. They came to America from England in the 1700s. Her mother, Lucy Shelby, and her family were also English. She was born in Ohio. She married Steven Marvin in 1858, and they had five children in fifteen years. Anna was the oldest of the five children. Her father was a farmer in Wisconsin. When Anna was eight, her family moved to Newaygo County, Michigan where her father would buy a farm. Soon after the timber rush, farming fertile land in the county would take its place. The name Newaygo is derived from an Indian named Nahway-gon, who had a reputation for bravery and strength.

The railroad would reach Newaygo in 1872, connecting with metropolitan Grand Rapids, Chicago and Detroit. Newaygo is one of the oldest villages in Northern Michigan.

Anna met a young man named Simeon Wilbur Frey in Newaygo's village around 1873. Simeon's father, Thomas, was born in Crawford, Pennsylvania, and came from German descendants and members of the Evangelical Association Church, which came into being around 1803 when a group of German-speaking Methodists were refused recognition by the Methodist Episcopal Church. Simeon Frey's father, grandfather, great-grandfather and great-great-grandfather were all methodist ministers who were circuit riders that blanketed the state. Since preachers often officiated in English and German, Evangelicals proved to be a potent force in attracting Germans to the state of Wisconsin. Like Anna's father, Thomas Frey moved his family to Newaygo in 1870. Simeon was ten years old, and his father, a farmer, was looking for fertile land to farm. He settled on a farm near Anna's family farm.

In the Summer of 1884, Anna Lucy Marvin married Simeon Wilbur Frey on August 18th in Newaygo, Michigan. Simeon was twenty-four, and Anna was twenty-two. She took her husband's name and went by Mrs. S. Wilbur Frey. Shortly after her marriage, her husband and father-in-law introduced her to the bees. The two kept thirty bee colonies in box hives. In those days, the bees were all black and were sure to swarm from May until August.

Mrs. Frey gave birth to her first son, Harold, in May 1885.

Two years after Mrs. and Mr. Frey's marriage, a friend bought a colony of bees with crosswise frames in an old Langstroth hive. He increased his colonies and sold his comb honey at fifteen cents a section. This caught Mrs. Frey's attention. She went to see her friend's different hive, and the following Spring, 1887, she and her husband bought fifteen new Langstroth hives. Little did she know that she would someday be Michigan's "finest" honeycomb producer.

The Spring of 1888 was bittersweet. She had a daughter, Daisy, and was pleased to have a baby girl. She was the sweet part of Spring. The bees were the bitter part of Spring. They saw dead bees and dirty combs when they opened the new hives. How disappointed the two must have been! They were realizing their mistake of not giving enough Winter protection except for an oilcloth over the brood nest. With no added Winter protection, their bees died.

A bee catalog came to them from Kendallville, Indiana. It explained how they could protect the hives by using chaff hives. The chaff was a hive encased by another box, which allowed the beekeeper to stuff wood chipping or straw into the gap between the hives. It would telescope down over the hive, with extra-long sides. The long sides allowed an added box to be inserted over the



hive that could hold straw or wood chips as insulation.

Her father-in-law disagreed with her latest ideas; when he saw his son and daughter-in-law preparing to Winter the bees in the new hives, he kindly asked them not to pack his part of the apiary as he did not want his colonies to die. I get it: beekeepers can be set in their ways, but he would have been better off if he had listened to his daughter-in-law. The chaff colonies lived while those in over half of the unpacked hives died.

Mrs. Frey would give birth to her last child, Harry, on August 31st, 1902, seventeen years after her first son, Harold. Having children during bee season kept her busy. But these things did not bother her much. She liked to hustle and watch the bees hustle, and if sweets were involved, the children and bees were happy.

Mrs. Frey, over the years, improved her methods and equipment, and by wintering with chaff cushions over the brood nest, the bees survived the Michigan Winters.

In 1910, Mrs. S. Wilbur Frey, with twenty-two years of experience, managed from two to four apiaries, producing from five hundred to sixteen hundred sections worth of comb honey yearly. She would do most of the work herself with the aid of her grandsons, when necessary, and with a helper to do the heavy lifting. In 1912, Mrs. Frey sold one hundred of her colonies and a hundred and sixty-dollars' worth of comb honey.

In 1913, she built her colonies to one hundred and twenty. In 1914, she had to fight foulbrood in most of her yards. She lost hives, but by 1915, she had wintered over one hundred and seventy colonies. The president of the Michigan association considered Mrs. Frey "one of the best comb honey producers in the state" (Gleanings in Bee Culture, May 1917).

Mrs. Frey describes an afternoon swarm:

During the months of June and July, it was a common occurrence to see all hands, including women and children, with bells, horns, tin pans and guns endeavoring to stop a runaway swarm while the dog ran in every direction, leaping and barking, wondering what all the excitement was about. But even with all this fuss, the bees sometimes escaped to the woods. Drones were very numerous, and we often dropped our work and ran out in haste only to find the uproar caused by these big noisy fellows out for an afternoon play.

-May 1917, Gleanings in Bee Culture

Mrs. Frey would get buckets of white honey. There was an abundance of raspberries, fireweed, willow and herbs. There was basswood in the forest and plenty of white clover in the pastures and along the roadsides. Mrs. Frey produced a thousand pounds of extracted honey vearly in addition to her honeycomb. from her unsalable combs and trimmings. From the extracted honey, she would get around sixty pounds of beeswax. At the local auction, she would sell over seventy dollars' worth of second-grade comb and extracted honey at reasonable prices. Mrs. Frey had three out apiaries just for comb honey.

"I congratulate Mrs. S. Wilbur Frey, for she tells us ... that she has always succeeded in getting a good crop of honey, and this after thirty-two years at the business. Not many beekeepers can say as much," (J. E. Crane; Gleanings in Bee Culture, May 1917, pg 359).

Over the years, she had figured out how to use the hive products to make a profit. Mrs. Frey authored a few articles in Gleanings in Bee Culture during the 1900s on how to prevent swarming, with methods she had to prevent the bees from swarming. Her articles were about when to re-queen a hive and how to use the chaff hive for a Winter installation.

Words from Mrs. Frey:

One of my out-apiaries is eight miles from home, and one is three miles away. I have always used horses when traveling, but we have an auto truck that I shall use this season. This will shorten the day's work materially; besides, there will be no horses to feed and care for while I am in the yard. With a boy to help me, I can uncover a hive, remove the supers, find the gueen, replace the supers and cover the hive again at the rate of one hive every seven minutes. I seldom find the queen the first time over the combs.

—Gleanings in Bee Culture, April 1917

Mrs. Frey was sixty-two, and reflecting on her life, she had worked bees for forty-two years, raised a family, was a loving wife and had several grandchildren. She recognized it was time to slow down on bee work. She would pass down her knowledge of bees to her children and grandchildren.

When she was three years old, her granddaughter Beatrice Cain



folded sections, put them in the supers and took the paper out between the foundation. She was called the "queen of the shop."

Mrs. Frey's husband, Simeon, passed away at home on the family farm on March 22nd, 1948. He was eighty-seven years old. Mrs. S. Wilbur Frey died from a broken heart seven months later, on September 9th, 1948. She was eighty-six. Mrs. S. Wilbur Frey and her husband, Simeon, had known each other for seventy-five years. They were a team, married for sixty-three years.

To make a prairie, it takes a clover and one bee.

One clover and a bee, And Revery. The revery alone will do, If bees are few. —Emily Dickinson

Ohio Queen Bee Nina Bagley Columbus, Ohio



gia Island Queens Olivarez Honey Bees/Big Island Queens is seeking motivated beekeepers to join our Hawaii team! Experience preferred. Self-motivator and ability to work in

a team environment a plus. Positions are full time, salary based on experience. Great Benefits Package. Prior work history and references required. Advancement opportunities available. Submit resume to info@ohbees.com or Olivarez Honey Bees Inc/Big Island Oueens. P O Box 847 Orland Ca 95963, Fax: 530-865-5570, Phone 530-865-0298



Raise your hand if you have ever accidentally killed your queen. Okay, you can put your hands down now. Our chance of killing our queen goes up considerably the longer we keep bees. I recall, very well, two times I accidentally killed my queen. The first queen that I killed was a rather expensive breeder queen that I purchased from Joe Latshaw. Joe taught me how to raise queens and so he gave me a good deal on a breeder queen because she had a hind leg missing. She was still laying well and so I prepared a five frame nuc with young bees to ensure she would be accepted. She had a bright number tag on her thorax. A week after I installed her, I went back to inspect and found her walking around and laying well. I placed the top on and was excited about raising more queens from her. A week later I returned and opened the nuc and at first, I was shocked and thought her number tag had fallen off because there it was on the top edge of the box between the box and the lid. Sadly, upon closer examination, there was a flattened breeder queen along with that number. Somehow, she had managed to walk up on the frame I had just placed back into the nuc and made her way onto the top edge of the box, and I failed to look closely before placing the lid on. Rookie mistake indeed.

The second time was equally as sad, though not as expensive. It was my first time using a marking pen. I started pressing the tip of the marking pen to prime the paint to work its way down and wow it did. As soon as I touched her thorax with the pen the paint flowed so quickly out of the pen and soaked her entirely. I was hopeful that it would not kill her, but it did. Now, you may be thinking that you would never kill your queen and I hope you don't. But unfortunately, I wonder if when we surprisingly find our hive queenless, if sometimes





we aren't to blame. Perhaps during our inspection, in manipulating the frames, we accidentally smash the queen.

These two events quickly taught me to implement several techniques to protect my queens when I'm doing an inspection. Perhaps you'll find these techniques valuable to protect your queen.

KEEP YOUR EYES ON THE QUEEN

When I am performing a thorough hive inspection, I will first attempt to locate the queen as I inspect each frame starting with the top box. As soon as I find her, I confine her either in a push in queen cage on the frame she is on, or I will pick her up and confine her in a queen shipping

cage. With my queen safely stowed I can more easily manipulate frames without concern of injuring or killing my queen. For many years I would remove the frame the queen was on and place it on a frame hanger or lean it against the hive. However, a few times she managed to walk off the frame, so I stopped this practice.

Upon completion of the inspection the next step is to release the queen back into the hive. This can be done by lifting the push in cage and freeing her or by allowing her to walk out of the queen cage on to a frame of brood.

When you notice the queen on a frame when doing an inspection and you do not need to confine her, be very careful in placing the frame

How to Protect and Keep

back into the hive. Keep eyes on her as you lower her frame back into the hive. It is best to allow space between frames so that she is not accidentally rolled or crushed against the adjacent frames. If she is near the top or near the side bars of the frame, wait until she is more in the middle of the frame.

MARK YOUR QUEEN

There are so many benefits of having a marked queen. The obvious benefit is that she is much easier to pick out of a crowd of thousands of other bees. Since the beekeeper can more quickly spot the queen, this will reduce the amount of frame manipulation required to find her, thus reducing the chance for the queen to be smashed or fall from a frame during the inspection. There have been a few times that I've inspected every frame two or three times trying to find an elusive queen. By this time, the bees are very tired of me.

Marking a queen does present a risk as it requires a specific skill set for the beekeeper to properly handle the queen in order not to injure or kill the queen while marking her. Practicing marking techniques on drones first is a great way to become familiar with holding a bee. Because drones do not have stingers you can practice over and over. Choose a color other than the current queen color for the year so you will not think your drone is your queen in a future inspection.

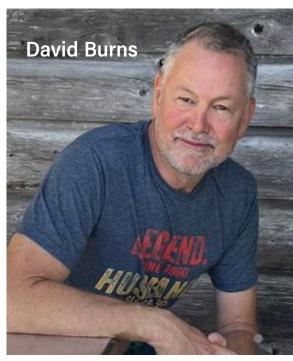
A common way to mark a queen is picking her up by her thorax. Always avoid squeezing her abdomen. Another way is picking up the queen by her back wings, then pinch her two back legs on one side between your thumb and (index) forefinger. This prevents her from spinning and losing a leg. Now by holding either her thorax or two back legs on one side she is immobile and you can apply the paint.





When using a marking pen, to avoid too much paint at once, hold the queen high enough so that the tip is facing up to reach her thorax. This prevents gravity from causing too much paint from flowing out from the tip.

With just a few simple techniques we can protect our queens from being mishandled during inspections. If you'd like to see my video on protecting your queen, visit: https://www.honeybeesonline.com/davids-youtube-channel.BG



Your Queen Her Alive

A new research article was recently published about SuperD-FM-HoneyBeeTM probiotics (Anderson, K.E., Allen, N.O., Copeland, D.C. et al. A longitudinal field study of commercial honey bees shows that non-native probiotics do not rescue antibiotic treatment, and are generally not beneficial. Sci Rep 14, 1954 (2024)). The title of the article suggests that the SuperDFM-HoneyBee™ probiotic is generally not beneficial. A person has the right to their opinion. However, the data in this article paints a different picture - and critical data appears to have been deliberately excluded. This is a story of true regret. It's a pity that important information is missing.

The setup of the study

The setup of the study was well thought out and ensured its success. Study location is a mountain forest area in California. Beescape, a web-based tool developed by Penn State University to evaluate apiary locations, gives the site a good rating for floral resources in the Spring and Summer. However, it indicates that this site receives no rainfall from June to October.

In the first part of the study, sixty-one or more honey bee colonies (there are inconsistencies in the exact number of colonies and the exclusion of some colonies for unknown reasons) were split into three groups. Colonies received either SuperDFM-HoneyBee™ (probiotic A), or ProDFM (probiotic B), or powdered sugar (control, C), once a month for five months (July, August, September, October and November 2020) (Supplemental Information Table S1c, Table S1d). ProDFM is a SuperDFM imitation made by Mann Lake Ltd.

In the second part of the study, in December 2020, the three groups were further divided. Some hives were given antibiotics (Tylosin or Oxytetracycline), followed once by probiotics. The bees were then sampled for microbiome analysis. The study authors observed marked microbiome disruption following administration of antibiotics. The data collected after the antibiotic treatment do not show an effect of the probiotic.

One limitation of the study is that the groups were very small, making it impossible to detect treatment effects. Splitting treatment groups

Understanding New Research on Probiotics for Beekeepers

Vera Strogolova

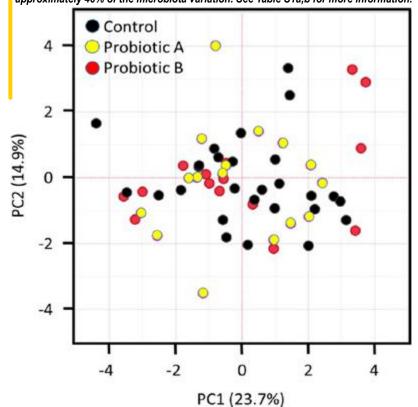
made the group sizes so small, that some groups ended up with only two colonies. This prevented the results from reaching statistical significance. For example, black queen cell virus (BQCV) levels were higher in colonies treated with antibiotics, but not enough control colonies were used to draw a definite conclusion.

The effect on microbiome

The researchers sequenced bacteria in 240 individual hindguts to characterize the overall gut microbiome. Figures 1, 2, 3 and 4 in the article show changes in the gut microbiota as a result of antibiotic treatment. In contrast, in the main part of the article there are **no figures showing the effects of probiotic treatment**. Any data on probiotic treatment are either missing or hidden in twenty-two supplemental tables and figures. We must look at these **Supplementary Tables and Figures** to understand the study's findings.

Figure S1 below shows that long-term probiotic treatment had no effect on the microbiome: the black dots are the microbiomes of bees from control colonies. The yellow dots are the microbiomes of bees from colonies fed SuperDFM-HoneyBeeTM for five months (for some unknown reason, the text says six months). Red dots are microbiomes of bees from colonies that received ProDFM. Although the black, yellow and red dots are not identical,

Figure S1. Extended probiotic treatment has no effect on the size or structure of the gut microbiome (MANOVA result: Pillai's Trace = 0.18, F_{32,84} = 1.12, p = 0.33). Colonies were sampled on Dec 2, 2020 following six months of probiotic treatment. Each dot represents an individual worker gut microbiota from a single colony treated with either Probiotic A (n = 16), Probiotic B (n = 16) or from powdered sugar, control colonies (n = 27). Distilled with principle components (PC) analysis, the bi-plot of PC1 and PC2 explains approximately 40% of the microbiota variation. See Table S1a,b for more information.



Mid Str (Table S1a)					
Control	Probiotic A	Probiotic B			
6.5	6.25	8.25			
7.5	8	6			
8	10.5	5.5			
6	8.5	9.5			
5.75	10	6.75			
9	5.5	6.25			
13	6	10			
5.25	8.75	9			
7.5	10	11.5			
5.5	6.5	5.25			
6.25	8.25	9			
6.75	9.5	9			
8.75	8.25	7.5			
9.5	7.5	7.5			
8.75	7.25	7.25			
5	5.5	8			
7.5	12	6.5			
6.75	12.25	8.5			
6	9.5	6.5			
9.5	8	8.5			
5.25					

their scattered distributions overlap, and no shifts are observed in the core components of the microbiome.

This result is exactly what one would expect and hope for. Probiotic treatment should never alter or disrupt the host microbiome. International Scientific Association on Probiotics and Prebiotics summarized this guidance for the probiotics industry: "A common misconception is that to be effective, a probiotic must impact the composition of your gut microbiota. Probiotics typically do not take up residence in your gut and may not evoke any detectable change in the microbes that are normally present. As they pass through the gut, probiotic (and the substances they produce) interact with immune cells, gut cells, dietary components in the gut and the microbes that live in our gut, and that's how they exert their benefits."

What can we learn about the strength and survival of colonies?

Colony strength and survival are very important to beekeepers. One of the study's authors is Mr. Randy Oliver of **ScientificBeekeeping.com**.

According to his talk in early 2021, the colonies emerged from the Summer drought weaker than at the beginning of the Summer. Unfortunately, Mr. Oliver did not publish the raw data, making peer review impossible. The article does not discuss the effect of the probiotic on vigor of bee colonies, frames of bees or brood pattern. These parameters require more attention from researchers. Table S1a "Mid Str" lists raw data corresponding to colony strength in December, following five months of probiotic supplementation. From Table S1a it can be inferred that the colonies with probiotic A were 15% stronger than control colonies. However, for some unknown reason, these interesting observations were not discussed by the authors.

The main research question remains: Are probiotics effective?

Researchers have used molecular methods to detect diseases. The colonies were sampled on December $2^{\rm nd}$, December $17^{\rm th}$, December $26^{\rm th}$ and January $9^{\rm th}$. Antibiotics were administered on December $7^{\rm th}$ and December $14^{\rm th}$. Thus, testing has focused on outcomes **after** antibiotic use and recovery. There is a missed opportunity to analyze the effects of probiotics *before* using the antibiotics.

Why, if the study was focused on the effects of probiotic treatment, were the colonies not sampled until December $2^{\rm nd}$? As a result, no health, pathogen or microbiome data were collected before or during the five-month probiotic supplementation. It is a pity that this long period (almost six months) was overlooked. This leaves so many questions unanswered. What was the colony strength before and after probiotics? What were the pathogen levels in July, August and September? The missing information could be valuable in truly answering the question of the effectiveness of probiotics. This is a serious flaw in the study and casts doubt on its conclusions.

In conclusion, we have learned that probiotics do not in any way disrupt the natural balance of the honey bee's gut. Reading this study raises are serious questions about the impartiality of the authors and the missing data. I hope the authors of the study will address these by sharing more of the data from the study. For example, their data on colony strength indicates that the probiotics were working, which contradicts the title of the manuscript.

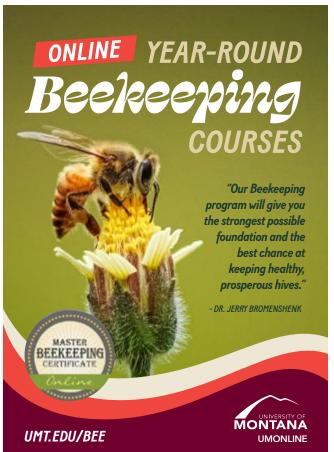
References

Anderson, K.E., Allen, N.O., Copeland, D.C. et al. A longitudinal field study of commercial honey bees shows that non-native probiotics do not rescue antibiotic treatment, and are generally not beneficial. Sci Rep 14, 1954 (2024). https://doi.org/10.1038/s41598-024-52118-z

Beescape: https://beescape.psu.edu/

ISAPPscience.org https://isappscience.org/wp-content/uploads/2023/04/Dispelling-Probiotic-Myths.pdf International Scientific Association for Probioics and Prebiotics. 2018















Check your mailing labels! Next to your renew code are your remaining issues left. We suggest renewing if you have 3 or fewer!

www.BeeCulture.com



The Ins and Outs of Mentoring Part 1 Lisa Boesen

Socrates – Plato – Aristotle. Audrey Hepburn and Elizabeth Taylor. Warren Buffet and Bill Gates. What do these pairs have in common? They are considered great mentoring relationships in their various fields of study. But what is mentoring and what makes a great mentoring relationship?

Gone are the days of lingering in a lyceum and contemplating the thoughts of the universe. The world is complex and multi-faceted, and science changes faster than the speed at which I am writing and editing this article. As with many clubs, our club wants our members to be mentors. There are many ways to accomplish this: from a formal program with annual recognition, mentee/mentor matching services and training mentors, to just hoping for the best that someone will come forward. I think many clubs end up in the latter category.

As a former Human Resources and Organizational Development professional, mentoring in the professional world is a bit different than the intense skill development world of beekeeping. Much of that is because beekeeping requires hard, technical and observational skills that have a steep learning curve. There are some flow charts of what to do but the decision trees for bee management can be complex. For me, since the study of bees is evolving with us, learning beekeeping is more a skill that requires research-based skill development rather than soft skills development such as working with others, leading teams, setting personal goals and determining business strategies.

In addition, in beekeeping, our global goal is to help beekeepers, backyard or otherwise, master the art and science to be successful. Over a two to three-year period, the hope is the new beekeeper becomes more independent, understands resources and manages hives likened to animal husbandry, i.e. responsibility for the bee colony, the beekeeping commu-

nity, and yes, the general community (neighbors, etc.). That's a lot to learn and digest, especially in areas of the country where the "bee season" is short.

The generally philosophical essence of mentoring is the mentor working at the mentee's pace and asking questions to encourage thinking and decision-making. Rarely does mentoring require teaching from a technical manual. On the contrary, it is imparting an intellectual skill or wisdom by discovering where the mentee is at. To put this in perspective, in our world of beekeeping, mentoring is not doing the hive check without questioning the mentee. At a minimum - what do you see? Checking hives without questioning might be better called "hive management for hire."

Our club receives quite a few requests for a mentor. For me, after an initial year of failing, because I didn't do my homework, I decided to work with a mentor. My mentor said he would only work with me if I committed to the process for at least 18 months – to get me through the second year of beekeeping, which we all know is when beekeeping truly begins.

In many ways, beekeeping mentoring is part training, consulting, coaching *and* mentoring. But, since the term mentor is used in the beekeeping world, let's use that term so as not to confuse and add one more term, like beekeeping training specialist, to the mix.

This is a two-part series so let's start with the mentee.

WHAT SHOULD I LOOK FOR IN A MENTOR? Know Thyself

First, as a mentee, ask yourself, "What is my goal in mentoring? What do I want to accomplish?"

Next, take pause and consider more self-exploratory questions. Mentoring is not an easy fix – it is a relationship.

- Where are you starting from in beekeeping?
- Have you taken a class?
- Have you tried beekeeping and failed?
- Do you want someone to observe your skills or just do the work for you?
- Do you want someone to walk you through problem-solving questions

 even though it can be quite embarrassing when you can't answer or don't know the correct response?

 That happens a lot. It's normal and fine.
- Do you have a checklist of new skills you want to accomplish for the year of beekeeping you are in?
- Do you want someone to ask questions and check your knowledge?
- Do you truly want to learn about honey bee management or do you really just want someone to check your hives?

Be honest.

Round Two of Self-Questioning

- Do you want to be a small business or a backyard beekeeper?
- What is your management philosophy in keeping bees?
- Most importantly, what inspired you to keep bees and does it align with honey bee management?
- Many people want to help the environment and pollinators, thinking honey bee management is the answer, but it is not.

Fit

In the professional world of working together and mentoring, there is or was something called the person-person "fit". Many organizations provide internal programs for matching, but checking boxes of skills and experience does not a mentor match make. Choosing a mentor that is not a fit for your needs or personality type can be a waste of time and money, and be frustrating for both parties. Having a club match you up with someone may not work either if you have not done your self-discovery phase. If you know what to ask for, then you might get near to what you

Demographics and Skills

Gender – seriously, this can be important. Some mentees may just want the same-gender or non-binary identified person. That is fine and is a personal choice.

Age – Age does not always mean skilled. But, with age does come the wisdom of working with others in different formulations, and it has its value. Or, a younger, more credentialed beekeeper, may have appeal for others.

Location – Being geographically close is important, especially in this day and age of higher fuel costs. If you have an emergency, it's beneficial to have someone close.

Skills and experience -

- Based on your "know thyself" inquiry, what are you looking for and does the person have the skills?
- How many years have they been beekeeping?
- Have they split hives successfully?
- What is their experience with swarm management?
- What is their philosophy or experience with integrated mite management?
- What journals do they read? How do they keep up with science and research?

Education or certifications – This is not always necessary but some people just want a mentor who has proven their abilities through a certification program. That is a personal preference.

Experience – How many years and how many mentees has the mentor helped either informally or formally? Do they offer recommendations?

Style of Communication – People have different communication styles as well as methods of communicating. If you need more of a warm, encouraging style than direct messaging to be successful, look for that style.

Forms of Communication – This can be anything from Facebook messaging (yes, that's a thing), in-person hive checks, zoom and text messaging, to old-school phone calls. I know some mentoring beekeepers who do not do anything but phone calls and cannot even text message, but, they are great mentors.

Frequency of check-ins – Some mentors/mentees check in on a routine basis, for example, using the new 9-11 method of checking hives, scheduling either hive visits or follow-up around this pattern can work. Others may use the traditional method of waiting for the mentee to contact about a problem.

Giving Feedback -

 How does or will the mentor provide feedback on skill development?

- How will the mentor provide feedback on the relationship as a whole?
- Does the person use open-ended questions for discussion purposes?

Hours/availability/ schedule –

- Does the mentor offer what you need in regards to the degree of individual attention or skill level you require?
- Do you need someone you can send a text message for a quick confirmation, a 30-minute phone conversation or routine check-ins?
- Bluntly, how frequently do you want someone to be at your beck and call? Yes, that's a thing.

Fee or in-kind Service? - Traditionally, in the professional world, mentoring is free. In many instances, it is used for professional development purposes between the two parties. But suiting up in Summer and spending 45 minutes walking a mentee through a hive check after a 30-minute drive, may or may not be free. It depends on if the mentor needs volunteer hours for certification, has been burned by mentees who didn't follow recommendations or a plan or just feels that expertise is worth something and the mentee should have some financial skin in the game to reinforce commitment to bee management.

Scheduled or Formal Programming – As many of us say, real bee management begins in year two, if your hives made it through the Winter. Thus, my suggestion for new beekeepers is to find a mentor who will work with you through the first 18-24 months.

- With that said, does the mentor have a formal process for how that works?
- · What should you expect?
- What do they expect from you as the mentee?

As an aside: The University of Minnesota Bee Lab has created a mentoring workbook coming out soon!

Just-in-Time Mentoring – Some people just want someone to quickly (quickly being the operative word) check their idea or work. Buddying up with someone is always a good



idea and could be considered *mentoring lite* or the final phase of mentoring in the long-term relationship when the mentee is more independent and weaning off a more structured program.

Relationship Management

Mentors do have lives so I think it is unreasonable to think mentors are going to give unlimited time to others. Boundaries are important. Some mentees get into relationships and don't do their homework. They call or text too frequently. When I was a coach, I had three fee outlines - a basic one-hour coaching session fee, bundled fees of coaching sessions, and additional fees for frequencies of communication outside the coaching session including text messaging and emails. "Quick questions" or emails seemed to be never "quick" and in beekeeping, they tend to be the same. There's always a Facebook post, YouTube or blog with some method of beekeeping to discuss. That's fine. But respect the mentor's time, especially if it is free.

Final Mentee Tips

Congratulations if you have found the perfect mentor! It's a win! Now, as the mentee, check in with the mentor. Don't wait for the mentor to get frustrated and end the relationship. Be proactive. Literally ask,

- "What's going well and what's not with this relationship?" (Notice these are open-ended questions).
- "What may I do better to sustain the relationship?"

And always, express gratefulness. Even if it is not a fee-based relationship, a nice bottle of wine, a gift card or a big jar of honey goes a long way as a thank you.

all The BURSTS E

Hello Friends, Spring has sprung! Enjoy the sunshine and showers.

Bee B. Queen

Bee B. Queen Challenge

> See if you can find any dandelions in your area.







Margaret Hawkins, 7, CA

Dandelions

Here they come to save the day! Dandelions are an important plant for bees in the early spring since they have eaten much of their stored winter honey. They desperately need the nectar the yellow dandelions have to offer. These plants were brought to this country by early settlers from Europe to use as food and medicine. The leaves are very high in vitamins, calcium, and iron. The flowers can be deep fried and eaten. The roots can be made into a coffee-like drink. Besides that, dandelion flowers and fluffy seed heads add happiness to the world. What's not to love about this plant many call a weed?

The word dandelion comes from the French dent de lion or lion's tooth describing the plants jagged-edged leaves.

There are thirty different species of dandelion in the Asteraceae plant family.

The dandelion flower opens to greet the morning and closes in the evening to go to sleep.

Blow on the fluffy seed ball and make a wish!







The dandelion is the only flower that represents the sun, moon and stars.

The yellow flower resembles the sun, the puff ball look a lot like the moon and the scattered seeds looks like the stars.

ooo Bee Barr Comer



Paint a Dandelion

- 1. Pour a little yellow paint on a paper plate.
- 2. Dip the tongs of a plastic fork in the paint.
- 3.Press the fork onto the paper to make the petals. Point the tines out around a center point. Dip into the paint and repeat.

4. Draw a green stem.



Beecome a Bee Buddy Send two self-addressed

stamped envelopes and the following information to: Bee Buddies, PO Box 117, Smithville, TX 78957.

Produced by Kim Lehman www.kimlehman.com

www.beeculture.com

April 2024

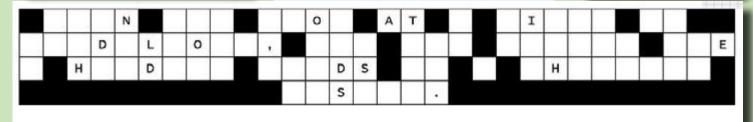
Name
Address
Age
Birthday Month
E-mail
(optional)

We will send you a membership card, a prize, and a birthday surprise!

Send all questions, photos, and artwork to: beebuddiesclub@gmail.com or mail to the above address.



Rebuild the message by choosing the letters below each cell.



DWNUE ROU WOYKU CAN FITLESAFE



Dandelion Legend

There are many legends about dandelions. Most of them are about fairies. Here is one of them. When people appeared on the earth everybody hid. The dwarves and gnomes went underground. The elves hid among trees. The fairies couldn't think of a place to hide. You see they loved the sunshine. So they transformed into flowers in the fields.

Make up your own story about dandelions. Why are the flowers yellow? Why do the flowers close at night? Tell how the seeds are really fairies.





Complete Selection of Beekeeping Supplies Live Bees, Equipment and More!

- · Bee Packages (pickup only)
- 5 Frame Nucs (pickup only)
- · Mated / Marked Queen races: Italian, Carniolan, Russian, Saskatraz • Honey Harvesting Items
- · Local Meyer Bees Stock Available
- Frames & Foundations Including Wax Glass & Plastic Bottling Supplies
- Wood & Insulated Hive Box Parts
- Large Selection of Tools
- Protective Suits & Gear

- · Feed Items & Supplements
- Treatments for All Seasons
- · Queen Rearing Supplies
- Extractors Manual & Motorized
- · Winterizing Equipment
- · Honey, Candy & Gifts
- Books & Classes

BASSWOOD Split Section Boxes for Comb Honey

"Kelly" Size & Style for competitions as well as general comb production

shipping to USA locations or visit our showroom just 35 miles SW of Chicago



2021 Holt Road Minooka IL 60447 www.meyerbees.com • 815-521-9116



HONEY BEE **HEALTH** COALITION



VARROA MANAGEMENT GUIDE

A practical guide and step-by-step demonstration videos featuring safe, effective methods to detect, monitor, and control Varroa mite infestations.

HONEYBEEHEALTHCOALITION.ORG/ **VARROA**

BMPs FOR BEE HEALTH

Check out our FREE Beekeeping Resources:

A guide for beekeepers featuring Best Management Practices on safety, pesticide exposure, bee nutrition, hive maintenance, treatment of pests and disease, and more.

HONEYBEEHEALTHCOALITION.ORG/ **HIVEHEALTHBMPS**

VARROA MANAGEMENT TOOL

An interactive decision tree that provides beekeepers with Varroa management and treatment options based on their specific circumstances and hive conditions.

HONEYBEEHEALTHCOALITION.ORG/ **VARROATOOL**



White Goatskin Beekeepers Gloves

BEEGT Ventilated (XXSmall to XXLarge) 3 pair @ \$11.75 per pair

BEENV Non-ventilated (Small to XXLarge)

3 pair @ \$12.75 per pair

Freight paid to a single destination in the continental USA. We gladly accept Discover, Visa and Mastercard.



GLOVES

Bucko Gloves, Inc. 1-800-966-1408

www.buckogloves.com











ABRC 2024 Proceedings

Part 1

https://doi.org/10.55406/ABRC.4.24.1

The American Association of Professional Apiculturists (AAPA) hosted its annual meeting, the American Bee Research Conference (ABRC), in New Orleans, Louisiana in conjunction with the American Beekeeping Federation's annual convention. This conference provides a unique opportunity for AAPA members to interact and exchange ideas between industry, academia and the beekeeping community. As an organization, AAPA consists of senior and junior scientists, students, beekeepers and inspectors who work with or study honey bees. At this year's ABRC, we showcased a record number of presentations from bee researchers from the U.S. and Canada. Research topics included Pests, Pathogens and Beneficial Microbes; Breeding, Genetics and Evolution; Chemical Ecology, Behavior and Nutrition; Pesticides and Acaricides; and Beekeeping Management, Education and Outreach. The large number of presentations given by students and postdocs was noteworthy; the high quality of the research they presented is an asset for the AAPA. We were also thrilled to host two keynote speakers: Dr. Diana Cox-Foster and Dr. Reed Johnson. AAPA is pleased to share the abstracts of this year's meeting with the readership of *Bee Culture*. We hope this information helps the beekeeping community learn about the latest research developments regarding honey bees in the U.S. and beyond. Thanks for reading and for participating in this year's ABRC.

Sincerely, The editors of the 2024 ABRC Proceedings: Izaak R Gilchrist Margarita Lopéz-Uribe Priyadarshini Chakrabarti Brock Harpur

Keynote Speakers

Interactions Among Bee Species: How do honey bees affect other species of bees?

Cox-Foster, DL 1

¹USDA-ARS Pollinating Insect Research Unit, Logan, Utah, USA

Over 4,000 species of bees are found in the U.S. and share the need for pollen and nectar. A major cause of poor bee health is lack of floral resources or "bee pasture", which has been exacerbated by changing climate. Concerns about the impacts of honey bee apiaries on other bee species is causing some to restrict placement of honey bees. We did a three year study that asked how honey bees affect other species of bees using experiments in cages and in the field. Experiments in cages generated competition by restricting the bees over a set amount of floral resources. In this environment with limited floral resources, we found that reproduction and colony growth was equally negatively impacted for honey bees, bumblebees and solitary bees. On flowers, no aggressors were found. In forests, we examined the impact of honey bee apiaries on sentinel bumblebee colonies and sentinel solitary bees, as well as endemic native bees. For reproduction, floral interactions and disease/health, there was no evidence for competition by honey bees with other species. Our research does reveal the importance of defining the carrying capacity of a location. The list of factors impacting carrying capacity is expanded when other land uses and weather are considered.

Interactions between honey bees and pesticides in agriculture

Johnson, R¹

 $^{\mbox{\tiny 1}}\mbox{Department}$ of Entomology, the Ohio State University, OH, USA

Pesticides are widely used in agriculture to control arthropod pests and plant diseases and are often applied together in "tank mix" combinations with multiple pesticide products and spray adjuvants. Testing for bee toxicity is performed as part of the pesticide registration process to ensure that a pesticide application will not harm bees, which is considered an "unreasonable adverse effect on the environment" under the Federal Insecticide Fungicide and Rodenticide Act (FIFRA). However, the risk assessment process for the environmental effects of pesticides includes a cost-benefit analysis and there may be situations where the benefit to crop production outweighs the risk to bees. With cost-benefit in mind, we performed laboratory testing with larval and adult honey bees using insecticides, fungicides and spray adjuvants, alone and in field-relevant combinations, that are commonly applied to almonds in California during bloom. The insecticides diflubenzuron and chlorantraniliprole demonstrated a toxic effect to bees and these effects were more pronounced when these insecticides were included in some tank mix combinations. Some spray adjuvant products also caused bee mortality, both alone and in tank mixes. While we demonstrated a risk to bees from insecticides and spray adjuvants included in bloom-time sprays, there is little evidence that there is a pest control benefit from these applications. The widespread use of neonicotinoid insecticides in corn seed treatments is

another scenario where the risk to bees exposed to seed treatment dust during corn planting may not be justified as these products are largely ineffective at controlling pests in corn. The use of insecticides during soybean bloom, where they are commonly applied in a tank mix with fungicides, is another case where the risk to bees may outweigh benefits from insect pest control, particularly when pest populations are low and an insecticide application would not be justified. On the other hand, the risk to bees from fungicides applied alone may be low in many situations, but the benefit of disease control for growers is likely to be substantial. Bee researchers and beekeepers are likely to be more persuasive in arguments against pesticide use when they engage with agricultural researchers and growers to put pesticide risk to bees in a cost-benefit framework.

Pests, Pathogens and Beneficial Microbes

RNA-seq of bees infected by Nosema apis, N. ceranae or both species

Huang, WF; Huang, ZY

Our previous study showed that honey bee workers that were mixed-infected by both *Nosema apis* and *N. ceranae* showed significantly earlier mortality compared to single *Nosema* infections. We thus tried to determine the gene expression profiles of worker bees infected either with no nosema (Ctr), *N. apis* (Na), *N. ceranae* (Nc), or both (Mixed). Workers were inoculated with either species or mixed species by hand and then sampled on day eight. We then confirmed each bee's infection status by PCR typing the content of each bee's hindgut. Only these with the correct infection as originally planned were used for sequencing. RNA-seq was performed by BGI. We found significant differences in gene expression in workers with different pathogen infection. Mixed infection caused significantly more differentially expressed genes compared to other treatments. The significance of these findings will be discussed.

The dispersal phase is a prerequisite for successful reproduction in young varroa mites (Varroa destructor) Sprau, L; Lee, SH; Cho, S; Traynor, K

The parasitic *Varroa destructor* travels and feeds on adult bees during the dispersal phase of its life cycle. It remains unclear whether this dispersal phase is critical for successful reproduction of mites post emergence from a bee cell. To answer this question, we collected mother and daughter mites just prior to emergence. Half were inserted back into freshly capped cells without a dispersal phase, while the other half were placed onto adult nurse bees for three days to experience a dispersal phase before being placed back into freshly capped cells. Eight to ten days post insertion, mite fecundity was assessed. Directly inserted daughter mites have approximately 7% their normal reproduction, while 93% are infertile or have delayed reproduction with immature offspring incapable of survival. In contrast, the mites allowed a three-day dispersal phase on worker bees, stabilized at a normal reproduction rate of 75%. This suggests that the dispersal phase is critical to normal reproduction, especially for the young daughter mites. The extent to which these mites need nutritional benefits from feeding on their hosts during the dispersal phase or whether it is simply a matter of time to activate their ovaries must be clarified in further studies.

Hidden in plain sight: Varroa aggregate on adult drones

Lamas, ZS; Krichton, M; Andrus-Lamas, N; Lamas, J; Hoang, T; Ryabov, EV; Evans, JD; Hawthorne, D

As an almost universal rule, parasites form aggregated distributions where a minority of hosts are responsible for harboring a majority of the parasite burden in any given population. For 30 years, *Varroa destructor* has been described as preferring nurse bees of its host *Apis mellifera*, while otherwise largely leaving *Varroa*'s distribution undescribed. As a result, disease transmission dynamics, sampling methodology and research focus has largely been worker centric. For the first time, we describe the intracolony dispersal patterns of *Varroa* on its western honey bee host. *Varroa* overwhelmingly distributes by sex and age cohorts, preferring young adult drones over any other cohort. We show *Varroa* form highly aggregated distributions on the drone cohort early in the season when infestation levels are low, and distribute broadly onto the worker cohort later in the season when infestation levels are high. In 1978, Anderson and May first proposed the theoretical framework that parasites would have little destabilizing effect on the host population until the degree of aggregation was low, or approached a Poisson distribution. The distribution patterns of *Varroa* are in alignment with their theoretical work, and maybe the underlying mechanism responsible for historical losses of honey bee colonies observed over the last decade.

Rates of $Melissococcus\ plutonius$ infection in Michigan apiaries and strains associated with clinical European foulbrood disease

Fowler, P; Milbrath, MO

European foulbrood (EFB) is a serious disease of honey bees caused by the bacterium *Melissococcus plutonius*. Beekeepers in the United States have been burdened with this disease for over a century, but little is known about prevalence or strains circulating. Strains classified as "atypical" have shown high virulence in larval rearing assays when compared to some "typical" strains but how these strains impact the colony is poorly understood. Here we present two years of cross-sectional surveillance data from Michigan beekeepers which reveal high rates of infection, with many hives containing both typical and atypical strains. Many of these colonies were asymptomatic at the time of inspection suggesting widespread inapparent infections. Pathogen prevalence was highly seasonal, and disease was strongly associated with the presence of atypical strains. Whole genome sequencing reveals four dominant strain types with the most common being an atypical strain. Phylogenetic analysis reveals closely related strains in multiple operations and regions suggesting high rates of transmission within and between operations. These results suggest



that EFB may be playing a more important role in hive health outcomes than previously thought, and more research in this area is warranted.

A novel neutralizing antibody therapy reduces Deformed wing virus loads in the western honey bee (Apis mellifera)

MacMillan, NJJ; Hause, BM; Feldon, A; Nordseth, T; Pitman, JL; Lester, PJ

The Deformed wing virus (DWV) is a major driver of high rates of colony loss of the western honey bee (*Apis mellifera*). There is currently no method to directly control the virus. Here, we demonstrate that a novel antibody therapy can reduce DWV loads in *A. mellifera*. Anti-DWV immunoglobulin Y (IgY) was raised in and collected from the eggs of chickens immunized with three recombinant DWV proteins, which was subsequently

fed to adult bees. An ELISA demonstrated the anti-DWV IgY treatments oral bioavailability in *A. mellifera*. We then assessed viral loads in bees using qPCR. The antibody therapy caused up to seven-fold and statistically significant viral load reductions in DWV-infected bees. Our findings demonstrate the potential for antibody therapies to help mitigate the damaging effects of DWV. This treatment modality could be used to target other crippling pathogens and parasites of *A. mellifera*.

Do hygienic honey bees detect and remove virus-inoculated brood?

Levin-Nikulin, S¹; Hesketh-Best, PJ²; Erez, T³; Osabutey, AF⁴; Soroker, V⁴; Spivak, M¹; Schroeder, DC²

- ¹Department of Entomology, University of Minnesota, Saint Paul, MN, USA
- ²Department of Veterinary Population Medicine, University of Minnesota, Saint Paul, MN, USA
- ³Department of Entomology, Agricultural Research Organization, The Volcani Institute, Israel; The Department of Environmental Economics and Management, The Robert H. Smith Faculty of Agriculture, Food and Environment, Hebrew University of Jerusalem, Israel.
- ⁴Department of Entomology, Agricultural Research Organization, The Volcani Institute, Israel

Hygienic handling of virus-infested brood could either increase or decrease transmission of the pathogen through the colony, depending on the timing of hygienic removal, the viral load in the pupae and the immune response of the hygienic bee. Using three hygienic and three non-hygienic colonies, as determined using a freeze-killed brood assay, we inoculated pupae with Deformed wing virus (DWV) in the white to pale-eye stage by injecting DWV at the dose of 55 viral copies directly into the pupae (after uncapping the cell). Pupae that were mock-injected with 1X PBS buffer and un-injected pupae were used as controls. Only pupae that were not infested with *Varroa* were injected. The challenged pupae were recapped and replaced in their respective colonies. We quantified the number of experimentally-inoculated and control pupae that were uncapped and/or removed by bees within the hygienic and non-hygienic colonies at several time points and up to 52 hours post-injection. Our preliminary results show that bees from hygienic colonies uncapped and removed the virus-injected brood more quickly than bees from non-hygienic colonies.

Discriminating active and background infections in honey bee ($Apis\ mellifera$) viruses through RT-qPCR and metatranscriptomic sequencing

Hesketh-Best, P.J; Levin-Nikulin, S; Erez, T; Osabutey, AF; Soroker, V; Spivak, M; Schroeder, DC

Honey bees (*Apis mellifera*) are vital pollinators, and are infected by viral pathogens that can contribute to colony loss. Here we explore the challenge of distinguishing between genuine active viral infections and incidental background signals in honey bees using quantitative RT-qPCR and metatranscriptomic sequencing. Bee pupae were injected with a low virus copy number inoculum of a recombinant Deformed wing virus (DWV), and sampled over 96 hours. The inoculum DWV genome was successfully assembled from infected pupae by de novo genome assembly. Notably, the presence of other viruses could be observed through a semi-automated metagenomic binning analysis. In addition, real-time PCR data were used as a comparative dataset against various parameters such as genome frequency, and unique k-mer frequency. These data were used to better understand the interpretation of virus detection based on RT-qPCR outcomes alone, particularly in studies involving environmentally acquired viral titers, a common practice in honey bee viral research. Environmentally acquired viral titers used in experimentation exhibit a diverse viral population due to co-infections, but may not be readily discernible through qPCR alone. A potential overlook of background signals could influence the interpretation of infection study results. RT-PCR results confirmation by unbiased meta-trascriptomics provides a crucial cross-validation.

Engineered microalgae feed additives to bolster honey bee disease resistance

Martin Ewert, A; McMenamin, A; Adjaye, D; Rainey, V; Ricigliano, V

Pathogenic diseases threaten the global beekeeping industry by weakening honey bee (*Apis mellifera*) health and productivity. To combat record colony losses, beekeepers need effective, practical and sustainable treatments against pathogens. Addressing this problem, we have genetically engineered microalgae to express double-stranded RNA (dsRNA) specific to honey bee pathogens. When consumed, these engineered strains provide dietary amino acids that support honey bee nutrition and stimulate the RNAi immune pathway against target pathogens. In previous work, we determined that adult bees fed DWV-targeting microalgae strains show reduced viral load after injection with DWV compared to controls. Here, we test whether this microalgae-induced disease resistance can also be conferred to younger life stages. In this study, larvae were reared on royal jelly diets containing either control engineered microalgae (Vector), non-specific dsRNA-producing engineered microalgae (YFP) or DWV-targeting engineered microalgae.

croalgae (DWV). The pupae reared on DWV-targeting diet as larvae had lower viral load after injection with DWV-A than controls. Our results show that engineered microalgae feed additives have potential to benefit whole colonies by dually supporting proper nutrition and improving disease resistance across all life stages of bees. Engineered microalgae feed additives represent a scalable, sustainable and effective opportunity to bolster honey bee health.

The vectoring competence of *Varroa destructor* for Deformed wing-like viruses is affected by methods for controlling the mite in honey bee hives

Cook, SC; Ryabov, EV; Johnson, JD; Nearman, AJ; Rogers, CW; Powell, NS; Evans, JD; Chen, YP

Varroa destructor are harmful ectoparasitic mites of *Apis mellifera* honey bees. Deformed wing-like viruses (DWV-A and B (VDV1)) are ubiquitous honey bee viruses that are vectored by *Varroa*; mite vectoring can cause an increase in virus infectivity and diversity of genetic variants. Beekeepers use both chemical (e.g., amitraz) and non-chemical (e.g., 'brood break') means to control mite populations in honey bee colonies, and these methods may be combined into an integrated pest management strategy. Here we explore how these control methods affected the DWV/VDV1 population in honey bee colonies, the diversity of viral genetic variants, and the competence of *Varroa* to transmit an overt DWV infection. We found that 'brood break' treatment significantly elevated *Varroa* populations in colonies with a concomitant increase in DWV-A and VDV1 levels, but not when combined with amitraz application. Our results demonstrate negative implications to honey bee colony health from chemical treatment failures on the levels of DWV-like viruses in adult bees and mites, and the ability of mites to transmit overt infections.

Using AmE-711 honey bee cells in basic virological methods

Goblirsch, M; McMenamin, A

Honey bee viruses impose a significant burden on the beekeeping industry. Viral infections can cause individual bee death, and depending on the prevalence and severity of disease, can contribute to the decline and death of colonies. Single-stranded RNA (+ssRNA) viruses are common infections of colonies. High viral loads, in conjunction with exposure to other common stressors, such as pesticides, *Varroa* mites and poor nutrition, can accelerate the progression of viral disease. Understanding the pathology associated with honey bee viral infections requires studies conducted at not only the organismal and colony levels, but also at the cellular and molecular levels. To help fill gaps in our knowledge regarding honey bee-virus interactions at the cellular level, we utilized the continuous honey bee cell line, AmE-711, in experimental-infections with select +ssRNA viruses, i.e., Black queen cell virus, Acute bee paralysis virus and Chronic bee paralysis virus. We demonstrate that AmE-711 permits characterization of the cytopathology and immune response of honey bee cells to different virus infections. We also provide a comparative approach for quantifying viral genome copies using RT-qPCR to infectious dose using plaque assays. Our goal is to show the utility of AmE-711 honey bee cells for virological studies.

A method for quantifying Vairimorpha spore maturity

Gehefer, K; Webster, T

Vairimorpha (Nosema) ceranae, is a microsporidian parasite that reproduces within the midgut cells of the honey bee. This fungal infection causes high mortality rates within honey bee populations globally. Worker bees are being assessed to quantify the maturity of Vairimorpha spores in the midgut. Midguts were extracted from honey bees 15 days post-inoculation. Spores collected from the infected midguts were stained with calcofluor and viewed under a fluorescent microscope. The software cellSens was used in combination with an Olympus DP74 color camera to view and save images of the Vairimorpha spores. The line profile tool within the software was then extended to assess the intensity of light, via image, and its range of penetration throughout the spore. This provided visual representation, as well as a data set, useful for spore identification. For example, when comparing mature spores to immature (primary) spores, contrast is visually represented with immature spores having a darker end, but quantitatively by the intensity of light able to penetrate the chitinous layers or lack thereof. Utilizing this method allows spores at various stages of disease development to be identified and quantified. This method applies to research on treatments for and evaluation of V. ceranae infections.

Life-history stage determines within-host dietary alternation of ectoparasitic mites

Han, B^1 ; Wu, J^1 ; Wei, Q^1 ; Liu, F^1 ; Cui, L^2 ; Rueppell, O^3 ; Xu, S^1

¹State Key Laboratory of Resource Insects, Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, China ²Cell Biology Facility, Center of Biomedical Analysis, Tsinghua University, China

³Department of Biological Sciences, University of Alberta, Canada

Parasitic mites of the genera *Varroa* and *Tropilaelaps* are serious threats to honey bee health. Both have specialized in exploiting their honey bee hosts as food and habitat. While *Varroa* shows a clear alternation between dispersal and reproductive life history stages, *Tropilaelaps* has a drastically shortened dispersal stage and exclusively feeds on brood. In a series of experiments, we show that *Varroa destructor* varies its main food source: While feeding on adults, *Varroa* feed primarily on fat body, as reported previously by S. Ramsey and colleagues. In contrast, *Varroa* that feed on honey bee pupae inside brood cells select different feeding sites and primarily consume hemolymph. This conclusion is supported by wound analysis, differential biostaining of nymphal and adult mites, and a proteomic comparison between parasite and host tissues. These results were paralleled by findings in *Tropilaelaps*, which also showed an enrichment of hemolymph and bee proteins associated with the hemolymph. In addition, the metabolism of dispersing and reproducing *Varroa* is fundamentally different and confirms that reproductive mites have a



very active protein metabolism. Thus, the complex life cycle of *Varroa* is accompanied by dietary specialization on the same host. The differences in food acquisition are important to consider when determining integrative pest control of *Varroa* and *Tropilaelaps*.

Molecular disease diagnosis of Brazilian Africanized honey bees

Kadri, SM; Orsi, RO; Ellis, JD; Epperson, KJ; Fulton, JC

The purpose of this research was to evaluate Brazilian honey bee colonies selected for high and low honey production (HHP and LHP respectively) from commercial operations in Polo Cuesta, São Paulo for bacterial (*Melissococcus plutonius*, *Paenibacillus larvae*), fungal (*Ascosphaera apis*, *Nosema ceranae*) and viral (Acute Bee Paralysis Virus, Black Queen Cell Virus, Chronic Bee Paralysis Virus, Deformed Wing Virus – A, Deformed Wing

Virus – B, Israeli Acute Paralysis Virus, Kashmir Bee Virus, Lake Sinai Virus, Moku Virus, Sacbrood Virus and Slow Bee Paralysis Virus) infections. Thirty-eight honey bee colonies standardized for queen age, population and honey production management were sampled, with N=20 HHP (89±23.9 kg/colony) and N=18 LHP(25±9.3 kg/colony) from 16 apiaries. DNA and RNA were extracted from 12 worker bee pupae from each colony and screened for pathogens using standard PCR and qPCR techniques. Analysis of variance was used to evaluate honey production between selected colonies and odds ratios between honey production and incidence calculated for each tested pathogen. LHP colonies were 15.9 times more likely to have *N. ceranae* infections than were HHP colonies (x2 1.746468x10E-07). No other pathogens were present at significantly different quantities. Kadri was supported by FAPESP (2022/14754-6). Fulton and Epperson were supported by FDACS-DPI.

The potential for indoor storage to improve control of *Varroa* mites in honey bee colonies Reed, R^{i} ; Hopkins, BK^{i}

¹Department of Entomology, Washington State University

It has become increasingly common for beekeepers to overwinter their hives inside cold storage facilities. However, indoor storage may also be a useful tool at other times of the year. Here we tested the use of Spring indoor storage as a method of forcing a break in brood production to improve control of *Varroa destructor*. Immediately following almond pollination, 72 colonies were placed in a cold storage facility and 39 hives were left outside. After 18 days, the colonies were removed from cold storage and transferred to another outdoor location near the 39 colonies. At that time the stored colonies had an average of 4.78 mites per 100 bees. At the same time, the colonies left outdoors had significantly lower infestations at 2.98 mites per 100 bees. All colonies were treated for *varroa* mites at that time. Approximately one month later, the opposite was true. The colonies previously placed in cold storage had an average of 1.83 mites per 100 bees, significantly fewer than the 3.85 mites per 100 bees found in the colonies that were not placed in storage. The colonies placed in cold storage started out with one frame of bees less than the outdoor colonies on average, but by the end of the study there was no longer a significant difference between groups. These results demonstrate the strong potential of Spring cold storage of honey bee colonies as a valuable tool in the fight against *varroa* mites.

Varroa destructor economic injury levels and pathogens associated with colony losses in British Columbia Morfin, N; Foster, LJ; Guzman-Novoa, E; vanWestendorp, P; Currie, RW; Higo, H

An Integrated Pest Management strategy to control $Varroa\ destructor$ is based on monitoring mite levels to treat the colonies before they reach damaging levels (economic injury level; EIL). Possible interactions between V. destructor and other pathogens may lead to high colony mortality. The aim of this study was to record varroa mite levels in colonies from five regions of British Columbia, Canada, and analyze them for associations with health parameters as well as with other pathogens identified using total RNAseq. Significant differences in varroa levels, colony strength, and colony mortality between regions were found. Also, varroa levels in the Fall significantly predicted the odds of colony mortality in the Spring. Colonies with $\geq 3\%$ mite infestation in the Fall had a significantly higher mortality rate compared to colonies with $\leq 3\%$ mite levels. Additionally, deformed wing virus-B (DWV-B) levels were higher than those of the DWV-A variant in all the regions. $Malpighamoeba\ mellificae$ and $Nosema\ (Vairimorpha)\ apis$ transcripts were identified, along with other viruses like Apis filamentous virus and Lake Sinai virus. The dynamic nature of host-pathogen interactions urges constant pathogen surveillance and revising EIL for V. destructor.

Variation in susceptibility to Deformed wing virus in honey bee drones in relation to quality metrics Simone-Finstrom M; Walsh, E; Slater, GP; Evans J; Weaver, D

A principle threat to honey bee health continues to be viral infections, which often compound with other abiotic and biotic stressors to impact individual bee health and colony productivity and survival. Despite the significant impacts of viruses, there are no antiviral treatments available to bees. However, bees vary in their susceptibility to viral infection, and this variance can be used as a target for selection of virus resistant bees. To do this, we have screened the viral resistance of (haploid) male bees in two different honey bee populations, one from a commercial beekeeping operation that has exhibited some viral resistance and one from a research derived *Varroa* mite resistant population. Resistance in this case is defined as reduced replication and maintenance of low levels of Deformed wing virus (DWV) for 48 hours post-injection of adult drone honey bees. Proportion of bees considered resistant or susceptible to DWV differed across populations. Additional measures of drone quality, including thorax width and gene expression of targets associated with sperm quality and flight performance, will be discussed in relation to

susceptibility to viral infection. Overall, this initial work shows promise in drone selection as a target for breeding for virus resistance in honey bees.

Breeding, Genetics and Evolution

The Influence of Queens on Varroa Infestation Levels and Virus Profiles in Honey Bee Colonies

Waldbieser, S^1 ; Hardy, J^1 ; Wagoner, K^2 ; Amiri, E^1

¹Delta Research and Extension Center, Mississippi State University, MS, USA

²Biology Department, University of North Carolina at Greensboro, NC, USA

The genetic profile of a honey bee colony plays a crucial role in its resistance/tolerance to pests and pathogens. With the increase of *Varroa* mite problem, bee breeding programs were developed to control *Varroa* mite populations in honey bee colonies. Breeding activities improved the hygienic behavior of the colonies to decrease mite populations. However, *Varroa* mites could potentially co-evolve with hygienic bees. The impact of such co-evolution on virus diversity and levels in honey bees and *Varroa* mite are not well understood. To address this, we established two apiaries with colonies headed by queens selected for hygienic and non-hygienic behavior in Mississippi and North Carolina. Over a beekeeping season, we measured *Varroa* infestation levels between hygienic and non-hygienic colonies in both locations. We collected honey bees and *Varroa* mite samples from all experimental colonies once every month to measure the virus diversity and infection level. *Varroa* infestation results diverged between hygienic and non-hygienic colonies over time in both locations. Laboratory analysis of single mites found lower virus levels in hygienic colonies compared to non-hygienic colonies. This suggests that hygienic queen genetics allow workers to control both infestation and virus levels.

Honey Bee Germplasm Importation, Cryopreservation, Distribution and Propagation

Cobey, S; Hopkins, B; Sheppard, W

Germplasm of four honey bee subspecies, *A.m. carnica*, *A.m. caucasica*, *A.m. ligustica* and *A.m. pomonella*, has been imported from original source populations in the Old World. U.S.-reared virgin queens were inseminated with fresh and cryopreserved semen from each subspecies and those genetics subsequently distributed to U.S. beekeepers. A cryogenic storage repository for honey bee germplasm was established at WSU for future use in honey bee breeding and conservation. The U.S. commercial beekeeping industry largely manages bees descended from Old World sources that were collected and introduced before 1922. The recent introduction and distribution of additional germplasm of *A.m. carnica* and *A.m. ligustica* has enhanced the genetic diversity of honey bee populations selected by queen breeders and producers. A new "Caucasian" strain of honey bees is also available to U.S. beekeepers, derived from backcrossing *A. m. caucasica* into a maternal Carniolan line. *A.m. pomonella*, a cold hardy bee endemic to the wild apple forests of Central Asia, may offer an advantage for early season pollination. We are introducing the genetics of this subspecies from cryopreserved semen and collaborating with colleagues from Cornell University to establish and propagate a honey bee strain well-suited as a pollinator of tree fruit.

Do Honey Bees Selected for Resistance to Varroa Parasites also Resist Pathogens?

Dyrbye-Wright, I; Spivak, M

To improve the health and vitality of honey bees, *Apis mellifera*, beekeepers can propagate stocks that demonstrate resistance to parasites and pathogens. One mechanism of resistance in honey bees is hygienic behavior, in which adult bees detect and remove mite-infested and/or diseased brood from the colony. A line of bees bred specifically for *Varroa* resistance shows effective hygienic removal of mite-infested brood but has not been tested for its ability to remove and resist diseased brood. I began by comparing disease resistance among three lines of bees: 1) POL line bred specifically for *Varroa* resistance; 2) MN Hygienic line bred for disease resistance but with limited *Varroa* resistance and 3) an unselected, commercially available line as a control. I challenged 12 colonies within each line with chalkbrood, *Ascosphaera apis*, and quantified signs of disease, mites and viral loads. I predicted that POL and MN Hygienic colonies would have similar levels of pathogen resistance, but the POL line would have lower mite and viral loads compared to MN Hygienic and control colonies. If confirmed, my findings would indicate POL line bees show both parasite and pathogen resistance, and use of this line by beekeepers would improve colony health and reduce economic costs for treatments.

Maternal effect in honey bees: Selection for egg size can improve the weight of new honey bee queens $Martinez\ Caranton,\ O^1;\ Amiri,\ E^1$

¹Delta Research and Extension Center, Mississippi State University, MS, USA

Queen is the sole reproductive individual in a honey bee colony. She invests resources into her eggs, which this investment reflects in the size of produced eggs. Queens have been observed to actively adjust the size of their eggs in response to variable environments including food scarcity and colony size. Egg size also varies among queens, with some naturally laying large eggs. In our investigation, we found a significant variation in the size of eggs produced by sister queens, even when they are kept in the same apiary and heading colonies with almost equal number of honey bee workers in each colony. Further analysis also confirmed that larger eggs confer a body size advantage in grafted larvae, which persist into adulthood. Queens reared from young larvae that were hatched from small and large eggs show that increase in maternal investment can enhance the weight of queens across all developmental stages, including larvae at 72 hours, larvae at six days, pupae at nine days after grafting as well as newly emerged



queens. While the molecular mechanisms underlying these differences require further elucidation, our findings demonstrate the advantage of selecting queens that produce larger eggs to improve the weight of offspring queens.

Female cryptic choice for sperm storage in honey bee (Apis mellifera) queens as a reproductive mechanism for strain differentiation

Ritchie, K^1 ; Sheppard, W^1

¹Department of Entomology, Washington State University, WA, USA

Honey bee queens store and use sperm from mating with multiple drones early in life. Queens can mate with drones from multiple strains in the U.S. to produce viable offspring. There is evidence to suggest that queens differentially use sperm during fertilization, but

it is unclear when and where sperm selection is taking place in the queen reproductive tract. To evaluate differential sperm storage in honey bee queens, queens from different U.S. strains representing Old World subspecies were instrumentally inseminated with pooled semen from individual strains. Queens inseminated with semen from one strain were sacrificed and dissected 40 hours after insemination and sperm counts from the dissected spermatheca were performed. Data suggests there is an asymmetric effect of sperm storage by queens from different evolutionary lineages. Caucasian queens stored more sperm when they were inseminated with semen from drones of the same strain; Italian queens stored semen in concentrations that were not significantly different. Future work will analyze sperm use via microsatellite paternity analysis of worker progeny from queens inseminated with multiple strains of semen. Findings from this research will improve the knowledge of honey bee mating biology and lead to more informed breeding practices.

Honey Bee Pangenome Highlights Structural Variation and Diversity of Commercial Stocks

Slater, GP; Avalos, A

The *Apis mellifera* genome is the most widely used resource in honey bee genetics and is due for a major update. Its current structure is a linear composite, with a single individual comprising most of the sequence. It contains biases and errors within a framework that does not represent commercial honey bee genomic variation. A high-quality reference with commercial representation of common variants, including single-nucleotide variants, structural variants and functional elements, is needed. We aim to create a more sophisticated and complete honey bee reference genome with a graph-based, telomere-to-telomere representation of genomic diversity. Here we leverage innovations in technology, study design and global partnerships with the goal of constructing the highest-possible quality human pangenome reference. Our goal is to improve data representation and streamline analyses to enable routine assembly of complete honey bee genomes. This honey bee pangenome reference will contain a more accurate and diverse representation of commercial genomic variation, improve gene-disease association studies across populations, expand the scope of genomics research to the most repetitive and polymorphic regions of the genome and serve as the ultimate genetic resource for future research.

Genetic diversity and Varroa destructor survey of commercial beekeeping operations across Southwest Saudi Arabia

Nichols, K; Kahn, K; Ghramh, H; Shepherd, T; Rangel, J

The honey bee subspecies native to Saudi Arabia, *Apis mellifera jemenitica* Rutter, is currently being threatened by genetic pressure from exotic subspecies imported by commercial beekeeping operations. Uncontrolled interbreeding between native and exotic subspecies could dilute advantageous adaptations and give rise to new haplotypes that are not well suited for the harsh climate of Saudi Arabia. In this study, we analyzed the mitochondrial genetic lineage, as well as the levels of parasitization by the mite *Varroa destructor*, in honey bee colonies managed by commercial beekeepers across the Southwest region of Saudi Arabia. We found that all of the 55 colonies analyzed belonged to the *Apis mellifera jemenitica* subspecies, which is part of the Z subgroup of the A lineage. Analysis of the mitochondrial genome revealed ten new haplotypes at four of the eleven locations, suggesting the possibility of interbreeding between various lineages at those sites. Furthermore, the average (±SEM) number of *Varroa* mites per 100 workers across all sites was 1.95 ± 0.96, and was below the 3% infestation threshold at nine of the eleven locations, indicating a pattern of low *Varroa* levels in commercial beekeeping operations in the sampled region. This preliminary look at the genetic diversity and *Varroa* mite levels in this population is the first step in a selection process for the future implementation of a breeding program aimed at improving disease resistance and honey production of *A. m. jemenitica* colonies in southwest Saudi Arabia.

Comparing the performance of commonly available honey bee stocks for Midwestern and Northeastern beekeepers

López-Uribe, MM¹; Underwood, RM¹,²; Dean, CAE¹; Cambron-Kopco, L¹; Given, JK³; Harpur, BA³

¹Department of Entomology, Penn State University, PA, USA

The availability of honey bee stocks that are resistant to pests and pathogens is of critical importance for the implementation of integrated pest management practices in beekeeping that rely less on chemical controls. Currently, dozens of stocks are available to beekeepers in the United States, which are commercialized for different traits

²Penn State Extension, PA, USA

³Department of Entomology, Purdue University, IN, USA

including resistance to *varroa* mites. However, there is a lack of reliable data demonstrating differences in their performance in field-relevant settings. Here, we quantified mite numbers, virus levels, expression of grooming-related genes and honey production in 400 colonies from five commonly commercialized stocks in the northeast and midwest of the U.S. The colonies were managed by beekeepers in Pennsylvania and Indiana after the introduction of the queens from the different lines. We found significant differences among stocks in DWV levels, expression of grooming-related genes and honey production demonstrating that the performance of the selected stocks is different. Our results highlight the importance of generating regional data on the performance of different honey bee stocks to facilitate data-driven decisions by beekeepers on which queens to purchase.

Grow in petrochemical environment: Effects of commercial plastic queen cell cups on the rearing success and development of honey bee queens

Amiri, E^1 ; Abou-Shaara, $H^{1,2}$; Chen, J^3

¹Delta Research and Extension Center, Mississippi State University, MS, USA

²Department of Plant Protection, Damanhour University, Egypt

³USDA-ARS, Biological Control of Pests Research Unit, Stoneville, MS, USA

Plastic queen cell cups have become an integral part of queen rearing practice and gained widespread popularity among beekeepers. However, these petrochemical-based products have raised concerns regarding potential adverse effects on the success of queen rearing and the development of queens. To address this concern, we conducted a comprehensive survey to compare the success of queen rearing, birth characteristics of newly emerged queens and the expression of detoxification and immune genes in queens and larvae raised in beeswax cups with 10 different commercial plastic queen cups. The results indicate significant differences in larval acceptance rate, sealing and emergence rate among different types of queen cups. Although a negative correlation was observed between the increasing size of queen cups and the three components of queen rearing success (acceptance rate, sealing and queen emergence), the strength of this correlation was relatively modest. Potentially, the chemical components that queen cups are made of have also a role in queen rearing success and physiological changes of queen larvae. These chemical components showed to elevate some of the detoxification genes in both queen larvae and newly emerged queens, which highlights the impact of petrochemical composition of cups during development.

Using the Unhealthy Brood Odor (UBO) assay, a novel hygiene-eliciting assay, as a selection tool in bee breeding programs

Alger, SA¹; Miller, MS¹; Burnham, PA²; Wagoner, K³; Palmer, M⁴; Collins, A⁵; Munkres, A⁶; Rath, J⁷; Braman, B⁵; Peck, D⁸
¹Plant and Soil Science Department, University of Vermont, VT, USA

²Biology Department, University of Vermont, VT, USA

³Biology Department, University of North Carolina Greensboro, NC, USA

⁴French Hill Apiaries

⁵Vermont Bees, LLC

⁶Lemon Fair Honeyworks

⁷Hundred Acre Wood Apiary

⁸Betterbee

Vermont USA is home to several well-known bee producers whose bees are prized in the region due to their adaptiveness to the northeast climate. In 2021, the University of Vermont Bee Lab began leveraging diagnostic services for Vermont bee producers towards the development of more disease resistant stock. In 2022, we began to trial the Unhealthy Brood Odor (UBO) assay across three major bee producers with long-time selection programs. UBO is a novel tool to assess a colony's performance of hygienic behavior. The assay measures a colony's hygienic response to a blend of synthetic pheromones that simulate unhealthy brood. UBO is anticipated to be available to a broader market by Spring 2024. In preparation for its release, we present case study examples of three Vermont breeding operations that are using UBO to identify and select for stock that is more disease and pest resistant. We share results of this new assay in the context of both open mated and instrumentally inseminated programs. By pairing pest and pathogen sampling with UBO scores, we show how UBO performance correlates with lower pest and pathogen loads. In particular, we found that high UBO performers have reduced *Varroa* and *Vairimorpha* (*Nosema*) loads. We share lessons learned and how beekeepers are selecting for these traits in their operations.

Why diversity matters: non-additive fitness benefits of individual versus colony-level genetic variation in social insects

Ryals, DK; Given, KJ; Brito, LF; Harpur, BA

Numerous studies have shown queen polyandry increases the fitness of social insect nests. While increased genetic diversity is implicated, we lack sufficient evidence to show causality. In particular, previous experiments do not separate genetic diversity at the individual (worker) level from that at the social (colony) level. Fitness impacts of individual heterozygosity (i.e., heterosis) are already well-known in animal systems, while those of social diversity are comparatively novel. Through controlled, single-male breeding and brood mixing using two genetically distinct honey bee populations, we created an array of experimental colonies that range from high to low levels of social diversity and contain individuals ranging from high and low levels of heterozygosity. We quantified the fitness of each colony for two independent traits: survival against infection in a laboratory setting and variance of brood nest temperature in a field setting. We found both social and individual diversity increased colony fitness by similar effect sizes across



both traits. This result highlights the importance of non-additive effects like directional dominance, indirect genetic effects and division of labor in social insect fitness, and holds implications for social evolution and bee breeding.

Beekeeping Management, Education and Outreach

The Pollinator Plexus Tapestry: Interlacing Indigenous perspectives with Western science for pollinator research & outreach

Kirby, M; Quintan, T; Quintana, P; Logan-Brayshaw, L

Based in Santa Fe, New Mexico – IAIA is a global leader of contemporary Indigenous artistry and diversity. Through the concept of art as a traditional path of creativity, IAIA

excels at skill building, provoking thought and providing a place to embrace the past, enrich the present and create the future, moving ahead to establish paths where traditions are rediscovered, explored, deepened. And, where art and cultural identity are celebrated and revered. IAIA Land-Grant Programs is the agriculture extension department which focuses on the development of integrative approaches weaving the arts and earth sciences together through Traditional Ecological Knowledge (TEK) and Western sustainable ag science. This poster shares an introduction and overview of Indigenous Research Theory and practices as related to pollinator stewardship and conservation at IAIA. Recently, IAIA Land-Grant Programs signed a cooperative agreement with the USDA Office of Tribal Relations to establish Grassland and Pollinator Stewardship research of interest to tribal communities and also the development of resource guides for tribal college campuses developing pollinator conservation programs. Named one of the top art institutions by UNESCO and the International Association of Art, IAIA also recognizes that Agriculture and Apiculture are also Land Arts.

The Adaptive Bee Breeders Alliance: Phase 1 - Building Comb Between the Field & the Lab

Kirby, M; Mahoney, M; Mahood, J

ABBA is a cross-country network of bee breeders and researchers collaborating to better nurture adaptive and regenerative approaches to queen honey bee reproduction for supporting healthy and productive hives. Based in northern New Mexico, the Adaptive Bee Breeders Alliance was founded by Melanie Kirby of Zia Queenbees Farm & Field Institute in 2021. The ABBA-Building Comb from Castle to Castle program will be sharing collaborative open-source findings and media guides helping to build bridges between the field and the lab that can help us all become better producers and stewards. Program launch will unfold over the next three years from 2022-2025 and includes: Genetic stock analysis for both Mitochondrial (maternal) assessment; Genomic techniques to understand drone fertility in each of the participating producers breeding areas; Instrumental Insemination (I.I.) training in advanced breeding techniques for sharing across distances and times; Cryopreservation of honey bee germplasm for inclusion in the USDA American Honey Bee Germplasm Repository Program; Determination of drone congregation area research with UAVs; Educational outreach opportunities via webinars; and in-service workshops for all interested beekeepers to support continued professional growth, development of climate smart practices and encourage resilience of stewards and of their bees.

Taking the sting out of honey bee medicine: training and tools for veterinarians

Milbrath, MO; Bammer, M; Chapman, H; Fowler, P; Harris, D; Heck, A; Lee, K; Rangel, J; Vu, A

In 2017, federal policy changes required that beekeepers work with a veterinarian to access needed honey bee medications – treatments that used to be directly available. Honey bees, like other animals, can be affected by viral, fungal and bacterial diseases, but finding good care can often be difficult, as honey bee medicine is not covered by most standard veterinary schools. Trained veterinarians are needed to provide access to needed antibiotics, but in time can also help to address other issues with the bee crisis, including optimizing nutrition and managing parasites. In 2022, four universities began working together on developing training materials for veterinary professionals. We first administered a survey to determine the level of interest, confidence, and ability of veterinarians to take on beekeeping clients. This survey also highlighted training gaps and needs to focus our materials. We have developed the first modules of an online training series, and we developed and disseminated over a hundred honey bee veterinary medicine kits at hands-on workshops. We have had positive results from our work and are developing materials that can be shared with other extension educators and specialists to help train veterinarians in each state. All results and resources are posted on www.beesneedvets.com.

BeeVision: Using Dynamic Vision Sensors to track Pollinators

Traynor, K; Wagner, A; Treder, M; Glück, M; Gebler, C; Pohle-Fröhlich, R

We are developing BeeVision, a radical, new, non-invasive insect monitoring method with significant potential for biodiversity research. BeeVision combines technical advances in dynamic vision sensor (DVS) image analysis with artificial intelligence methods and our expertise in pollinators. Unlike conventional cameras, DVS cameras record event streams, capturing only changes of brightness at each pixel position. These camera systems thus require less memory than conventional video recording, making them convenient for long-term monitoring. Our project partner has conducted successful initial tests with this sensor, automatically detecting insect flight from background noise. We intend to use DVS to monitor the flight patterns of pollinators in a landscape or agricultural field, detecting their presence and categorizing them into the main pollinator groups. Machine learning will be applied to tagged record-

ings with the goal of classifying patterns of flight activity. We seek to establish classifiers of six major insect groups which we currently use in our monitoring activities of flower-rich meadows: honey bees, bumblebees, other bees, hoverflies, butterflies and other insects. We have previously examined the impact of increased honey bee density on pollinator activity using trained entomologists, but this limits observations to a specific quadrant and time frame. BeeVision will permit continuous monitoring.

buzzdetect: a machine learning tool for automated acoustic detection of honey bee activity

Hearon, LH1; Johnson, RM1

¹Department of Entomology, the Ohio State University, OH, USA

A common demand of bee research is the in situ detection of foraging honey bees and the quantification of their activity. Visual observation is a direct solution, but is labor intensive, requires expertise for accurate identification, and is not feasible when flowers are obstructed. Other methods, such as pan traps or sticky cards sample destructively and are often a loose proxy for desired endpoints such as pollination activity. To better detect bee activity we are developing a machine learning tool called "buzzdetect" that detects and quantifies the audible buzz produced by honey bees in flight. buzzdetect facilitates low-cost, non-destructive, accessible and scalable acoustic surveys of honey bee activity. Current performance of buzzdetect compares well with our previous semi-automated using human labeling. buzzdetect correctly identifies most of the human-made labels and finds previously undetected buzzes in the recordings. Performing these detections at a rate thousands of times faster than manual labeling, buzzdetect is a valuable tool for bioacoustic assays.

Bee Health Assessment in Kentucky: Stressors and Management Practices

Olden, F; Palmer, J; Holbrook, K

The substantial decline in the honey bee population has prompted research efforts to uncover the underlying causes, revealing a complex interplay of contributing factors. These findings underscore the need for addressing this issue through an integrated approach that examines various local stressors. To comprehensively assess seasonal diseases, pesticide residues and stored-pollen quality in Kentucky's apiaries, we systematically collected hive matrices and bees from 60 apiaries throughout Kentucky during the Fall of 2022, Spring of 2023 and Summer of 2023, totaling 900 sampled hives. These hives were also assessed for colony strength, categorized as strong, moderate or weak. The analysis of pesticide residues in the Fall 2022 pollen has been completed, while disease diagnosis and discovery through RNA-seq in bee samples are currently underway. Furthermore, a metagenomics analysis to identify different species in the Fall 2022 pollen samples is in progress. An epidemiological pilot survey was also conducted to evaluate colony management and Winter colony losses among all participating beekeepers. The results of the pesticide analysis of the Fall samples indicate that out of 468 analytes, only 15 were identified, with some falling under the Method Detection Limit (MDL). The most prevalent pesticides were coumaphos, carbendazim and EPN. Aside from one sample containing imidacloprid at a dose lower than the MDL, no neonicotinoid was found. Regarding colony management, the pilot survey revealed that beekeepers, regardless of their operation size, consider varroa and Fall colony weakness as the most significant factors contributing to their Winter colony losses. Surprisingly, many beekeepers with operations of one to 10 hives and 10-30 hives do not monitor varroa, despite recognizing its importance.

Enhancement of a Pollen Substitute to Promote Honey bee Health

Ghimire, S; Palmer, J; Holbrook, K; Olden, F

The honey bee, essential for both pollination services and honey production, faces several environmental challenges, including pathogen exposure, chemical toxicity and malnutrition. Previous research has demonstrated that commercial honey bee diets often fall short in comparison to natural pollen, impacting overall bee health. This study aims to improve the impact of the pollen substitute MegaBee on bee health. Newly emerged bees were distributed into four diet groups: 1) Sugar-only (Control), 2) MegaBee (MB), 3) MegaBee with invert sugar, honey bee health supplement and vitamin C (MB+) and 4) MB+ with the probiotic superDMF (MB+/DMF). Daily records were maintained for mortality and data on diet consumption and body weight were collected at various time intervals, including at the conclusion of the 14-day experiment. Bee samples were also collected and frozen for subsequent analysis of physiological characteristics and gene expression. The initial findings suggest that, while there is no significant difference between the diets in terms of mortality and food consumption, there is a noticeable difference in the body weight of bees fed MB or MB+/DMF compared to the control. Further analysis of physiological and molecular aspects will provide insights into the nutritional status of bees fed MB, MB+/DMF or MB+.

The path to organic beekeeping in the U.S.: factors affecting pesticide loads in colonies on organic farms

DeMoras, BX; Baert, N; Zhao, C; Anderson, WB; Underwood, RM; López-Uribe, MM; McArt, SH

While organic agriculture is growing in popularity and prevalence, a lack of formal USDA Organic Apiculture standards prevents American beekeepers from reaping the economic benefits of Organic certification. While Underwood et al. 2023 found that organically managed colonies are just as healthy and productive as those managed conventionally, data on the foraging and pesticide exposure of colonies placed on organic farms are needed before Organic certification is possible. In this poster, I will describe preliminary pesticide exposure data from (A) colonies managed in Underwood et al. 2023 and (B) an ongoing study of another 72 colonies established on Organic farms in Pennsylvania and Upstate New York in the Spring of 2023. Analysis of these data is still in progress and will be



connected to measurements of colony populations and estimates of habitat quality from the Beescape landscape model. Results will clarify factors that affect pesticide loads in colonies placed on organic farms and will be incorporated into discussions with the USDA and the National Organic Standards Board to redefine standards for organic apiculture.

Quantifying Texas honey bee health risks associated with dominant beekeeper business models to improve colony survival, honey production and crop pollination services

Rangel, J; Houston, B; Aurell, D; Steinhauer, NA; Fauvel, AM; Meredith, A

Texas commercial beekeeping operations can be categorized into four groups: 1) stationary honey producers; 2) stationary honey producers who are also pollination providers;

3) migratory honey producers who produce two honey crops per year – one in Texas and one in the upper Midwest (ND, SD, MN); and 4) migratory honey producers who only produce out-of-state honey. Each of these operational types differ in several factors that can affect colony health, disease susceptibility and management options that can be used. Such factors include: the timing and distance of colony movement, optimal timing for reaching maximum colony strength and pesticide exposure rates. The goal of this project was to identify whether there is variation in management styles adopted by the most prevalent Texas beekeeper operational classes, and if so, to determine the major risk factors (e.g., disease loads, pesticide exposure, mortality) that beekeepers in each operational class experience throughout the season. Across all beekeeper participants, 288 colonies were monitored each year. Colony mortality was 58.8% in 2020 and 20.8% in 2021. Five types of management actions were tracked monthly from September 2019 to January 2021: Pest/Disease Treatment, Requeening, honey harvest, feeding and equipment change. Migratory beekeeping operations executed a greater total number of management actions than the stationary operations, especially in treatment and feeding categories. There was wide variation among operations in all the colony health metrics examined, but there were no significant differences between beekeeper operational category in any of these metrics, including *Varroa* load, *Nosema* load and colony size.





"We love your uncapper! It's the best!"

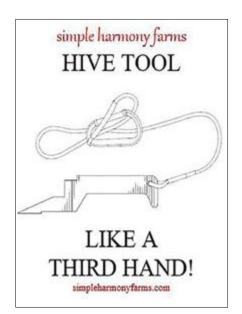
Bowman, ND

We sell liquid sucrose and 55% High Fructose Corn Syrup as feed for your bees.

Dakota Gunness, LLC

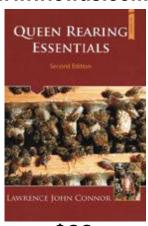
P.O. Box 106, Abercrombie, ND 58001 888.553.8393 or 701.553.8393

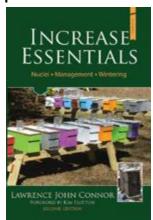
dakgunn@rrt.net • www.dakotagunness.com

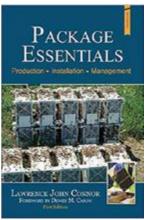


www.wicwas.com • postpaid in USA • 1620 Miller Rd. Kalamazoo MI 49001









\$28

Quantity Discount for six or more of a title: 40%

Address

Subscribe to keep your Hives Alive!

Monthly Magazine 100+ pages every month

Science & How To Articles that keep you informed about the latest scientific advancements and hive management techniques

Great Columnists

Including: Peter Borst Randy Oliver Rusty Burlew Wyatt Mangum Jamie Ellis Scott McArt

Beekeeping Basics beginners every month

And So Much More...



Subscribe Now!

Stay informed every month for the price of a cup of coffe

VIII	prices	good	through	December	31,	202
			11 -			

- **New Subscription**
 - Renew Subscription
- Order Back Issues Current year \$5.95 each plus postage For other back issues, write for prices Change of Address
 - address/label reference or customer number Prices subject to change without notice

Name. Address

City American Bee Journal 51 S. 2nd St., Hamilton, IL 62341 www.americanbeejournal.com

_Zip State

- U.S. 1 Year \$34.00 2 Years \$62.00
- 3 Years \$86.00 Canada
- 1 Year \$55.00 2 Years \$103.00
- Foreign 1 Year \$66.00 2 Years \$119.00
- Digital 1 Year \$21.00 2 Years \$42.00

Ph: 217-847-3324 Fax: 217-847-3660 1-888-922-1293



Almond orchard at petal fall.

As I'm writing this in early February, the first almond blooms are starting to pop in the orchards throughout San Joaquin Valley. This makes it only appropriate to kick off this article with a discussion of our work in almond pollination. Then we will venture to talk a little about the dreaded pesticides and continue with an equally somber discussion of the impact of climate change on honey bee health, and wrap up with a mention of a bee sampling technique veterinarians can use for histological analysis of honey bee health. All I can say is there is never a dull moment in the lab!

Almond Pollination Requirements

There are several important predictors of almond nut yield such as the age of production trees, tree density, temperature, light interception, man-

agement approaches, etc. In addition, we all know that almond production in California is highly dependent on successful pollination by honey bees. Almond growers have been renting honey bee colonies for decades in order to ensure pollination of their orchards, thereby guaranteeing optimal production (providing, of course, everything else aligns). The University of California recommendation for stocking a one-acre mature, nut-bearing orchard is two to 2.5 hives, with an average strength of eight frames per hive. The cost for renting a colony has been sitting at about \$180-220/hive for a few years now, and with California having approximately 1.4 million nut bearing acres, you do the math.

This, along with continued reports of colony losses, has caused concern in almond growers over having access to sufficient bee supply and increasing costs of hive rentals. In hopes of reducing reliance on bee pollination, growers slowly began adopting new self-fertile almond varieties such as Independence®, Shasta®, Pyrenees®, Yorizane and a few others. These varieties do not require a pollinizer like the conventional varieties, and therefore the thought is that these varieties would do very well without the presence of pollinating bees. In fact, what got me interested in conducting research on pollination needs of self-fertile almond varieties were very bold titles of many online articles that bees are no longer needed (my favorite remains: "Some almond trees don't need to stinkin' bees! - neogen.com) despite the obvious lack of data supporting this assumption. Prior study (see https://www.nature.com/articles/ s41598-020-59995-0) found that Independence trees in absence of bees had significantly lower nut set and yield. In 2020-2023, my collaborators (Dr. Arathi Seshadri, USDA-ARS; Dr. Angelita De la Luz, Beeflow, Inc.; Zac Ellis, OFI) and I continued to address the question of bee pollination needs of Independence® and Shasta® varieties, and expand to address specific

Research at the E. L. Niño Bee Lab at UC Davis, Part 2

The UC Davis Series

Elina L. Niño

pollination parameters such as number of bee visits, nut quality and determination of optimal stocking rates.

Our comprehensive research utilizing bee exclusion experiments provides substantial evidence that the presence of honey bees during the bloom period significantly enhances both the final nut set and the overall yield of the two almond varieties under study. This enhancement occurs without any discernible negative impact on the quality of the Independence® almond nuts, however, we did record that the kernel mass was lower when trees were exposed to be visitation. This is likely due to resource distribution, when bee-visited trees set higher number of fruits per tree, the tree has fewer resources to allocate to individual kernels leading to lower mass. This suggests that even varieties that can self-pollinate benefit from the presence of bees, possibly due to more efficient pollination. In 2021, we also addressed the impact of hive stocking rates on bee visitation numbers, presumably driving yield. When we compared orchards stocked with one or two hives per acre, there was no apparent benefit from supplying an extra hive per acre. It is worth noting that there was ambient presence of bees in the no-hive treatment, but there was a marked increased in bee visitation rates when the stocking rate was at one hive per acre. Our economic analysis underscores advantages of renting

bees for use in self-fertile almond orchards, a practice that could potentially increase profitability for almond growers. At the time of my writing, the manuscript outlining our research thus far has been submitted for peer review and if you want to learn more, I invite you to read the pre-print of our manuscript at Research Square https://www.researchsquare.com/ article/rs-3870916/v1. Just keep in mind that the study at the time of your reading might still be under peer-review. However, I can't complete this paragraph without telling you perhaps the best thing about this study. My collaborators and I actually conducted our studies independently in two separate years and didn't know about it until we met up at a conference the following year. It was an event that every researcher dreams about - to have their work validated independently by another scientist without any prompting. Needless to say we were more than excited.

As we move forward, our research will focus on refining the optimal stocking rates for both self-fertile and conventional almond varieties. The outcomes of this research could provide valuable insights that will help alleviate the challenges faced by both almond growers and beekeepers. These challenges include optimization of the best practices for bee management in almond orchards, optimizing the use of bees for pollination and ensuring the health and survival of bee populations. By addressing these issues, our research could contribute to the sustainability and profitability of both the beekeeping and the almond industry.

Evaluating Potential Risks and Benefits in California Agricultural Lands

When foragers go out to collect beneficial food sources (and pollinate plants in the process) sometimes they encounter potentially risky composites such as pesticides, which can negatively impact colony health and survival. Additionally, research suggests that these negative impacts can be alleviated by ensuring the bees have access to proper nutrition further highlighting the importance of habitat management for healthy bee populations. To evaluate the level of risk that the bees are exposed to, particularly in California's agricultural landscapes, my lab collaborated with

Caged almond tree during the bee exclusion experiments (Photo by E. L. Niño)



Dr. Neal Williams (UC Davis), Dr. Eric Lonsdorf (Emory University) and Dr. Arathi Seshadri (USDA-ARS Bee Lab). We utilized the Pesticide Use Reporting database provided by the California Department of Pesticide Regulation to assess the predictive pesticide risk in three counties. Based on these data, we then selected 20 different locations to represent a gradient of environmental conditions and potential exposure to pesticides. We placed three sentinel honey bee hives at each of the locations and we closely monitored colonies for various strength and health parameters, providing us with valuable data on bee health. Over time, we collected pollen that the foragers were bringing back from the local environment and have analyzed it to determine the plant composition within the landscape and the actual pesticides brought into the hive by foraging bees. This data is currently being analyzed and we anticipate that the results will be instrumental in informing management decisions of agriculture stakeholders. In addition, Dr. Williams and his team have been utilizing some of this information to develop a predictive model of bee pesticide exposure. This model integrates an already developed pollinator foraging model, pesticide use data from CDPR and pesticide information collected from our sentinel hives. You will be able to learn in more details about this particular project from Dr. Williams himself in an upcoming issue of Bee Culture. By

Visitors to the UC Davis Bee Haven garden. The orange tint of the photo is due to the heavy air pollution from California wildfires.



understanding the risks and benefits of different landscapes in which bees exist, beekeepers, land managers and growers can make more informed, predictive decisions that support bee health and productivity.

While it is great to parse out what are the stressors or combinations of stressors that might impact the bees, I always want to know if we as researchers can be even more proactive in protecting pollinators. This is why in collaboration with Dr. Florent Trouillas and Dr. Rachel Vannette (UC Davis) we set out to identify novel microorganisms for biocontrol of fungal diseases in almonds, thereby potentially reducing exposure of bees to possibly harmful synthetic pesticides. We have been successful in identifying several possible microorganisms which had efficacy against the causative agent of brown rot in almonds, and seemingly no negative impact on bees (read the full article here https://apsjournals.apsnet. org/doi/full/10.1094/PDIS-03-21-**0549-RE**). What really triggered this project was my interest in apivectoring. This term simply means that the bees are used as vectors or delivery agents of biocontrol microorganisms to various crops during pollination for control of various diseases or even pests. The idea is that the bee picks up the biopesticide while exiting the hive and drops it off while visiting various flowers. This methodology has been used with bumblebees in a number of different crops and it seems that almonds could be the next frontier. It has the potential to reduce grower costs for pest management by reducing labor and possibly even increasing the coverage all the while being less risky for bees. It could benefit the sustainability and profitability of the almond industry, while also supporting the health and survival of bee populations.

Impact of Climate Change-Driven Air Pollution

Even with the increased concerns about the climate change impact on all life, there is fairly little known about the impacts of climate change on honey bee health in particular. The occurrence of particularly severe wildfires in California in the past decade or so has caused losses to beekeepers who had hundreds of colonies burn down in the fires. While the devastation is obvious when the



Honey bee research colonies used for evaluation of supplemental forage in almond orchards (Photo by E. L. Niño)

colonies burn down, the bigger question is what are the impacts of the resultant air pollution on surviving colonies. Together with my USDA collaborators (A. Seshadri and C. Mayack) we followed colonies strategically placed in areas in California historically prone to wildfires. During the wildfire season, we recorded air quality, colony strength and health parameters, and processed samples for presence of pathogens and immune responsiveness. Perhaps expectedly, our data indicate that poor air quality is associated with higher maximum daily temperatures, lower expression of prophenoloxidase (immune gene) and higher vitellogenin (gene associated with longevity) expression resulting from higher oxidative stress. There was also an indication that varroa mite infestation decreases heat shock protein gene expression, suggesting the limited ability of mite-infested colonies to buffer against extreme temperatures. To learn more about our findings visit https://www.ncbi.nlm.nih. gov/pmc/articles/PMC10455886/. We plan to continue documenting the indirect impacts of poor air quality on colony health so we can better equip beekeepers with tools to buffer against climate change effects.

Sampling Protocol for Histological Evaluation

I wanted to finish this article on a more positive note so I'll tell you about a fun study which helped us develop a detailed sampling protocol for using honey bees for histological analysis in veterinary diagnostics. When the Food and Drug Administration came out with the new rule stating that the veterinarians are to diagnose honey bee diseases and prescribe antibiotics, I think I could hear a light collective panic of the veterinary medical com-

munity. Honey bees and apiculture might be traditionally associated with veterinarians and veterinary colleges across the world, but that is not the case in the U.S. and veterinarians do not get any beekeeping training during their formal education. This however, invited some great new opportunities for collaborations with the veterinary medical community (S. Cook, UC Davis School of Veterinary Medicine) and resulted in several great outcomes. One of them being the publication describing the optimal protocol for honey bee field sample collection for histological analysis. In this study, we developed and tested several field protocols for the sampling of honey bees and then compared the tissue quality to ensure no to minimal damage. Our results suggest that the common formalin fixation is sufficient for subsequent histological analysis, and using dry ice to immobilize bees in the field (as it is commonly done in research





Remnants of two hives burned in a California wildfire in 2020. Only metal components remain.



Pollen collected by sentinel hives and analyzed for plants visited and pesticides present.

and sample collecting) does not negatively impact the tissue quality. To learn more visit https://journals.sagepub.com/doi/10.1177/10406 387231191732.

The second outcome was the development of the online "Honey bees and beekeeping" course for veterinarians (https://beevets. wifsslearning.com/) in collaboration with UC Davis Western Institute for Food Safety & Security and Dr. Ramesh Sagili (Oregon State University). The course has been certified by the American Association of Veterinary State Boards which veterinarians can complete for Continued Education credits. Supporting veterinarians in providing necessary services to the beekeeping communities will ensure that beekeepers minimize pathogen spread and therefore support colony health. If you are a veterinarian interested in providing services for beekeepers or just want to learn more, I encourage you to take the course and please feel free to contact me with any questions.

I am very grateful to our funders as the work would not have been possible without their support: Almond Board of California, California State Beekeepers Association, California Department of Pesticide Regulation, USDA-SCRI, USDA-ARS, University of California Davis and Project Apis m. And lastly, I want to acknowledge all of the past and current members of the E. L. Niño Bee Lab as they are the real driving force behind all of our accomplishments. Please make sure to visit our websites (see below) to learn more about the team and many other exciting things that we are involved in. And don't forget to read more about it in the upcoming issues! BC

Disclaimer: Mention of any products and companies does not constitute an endorsement.

E. L. Niño Bee Lab: https://elninobeelab.ucdavis.edu/
California Master Beekeeper Program: https://cambp.ucdavis.edu/
UC Davis Bee Health Hub: https://beehealthhub.ucdavis.edu/



Canadian National Beekeeping Convention and Tradeshow

Bee Tech Recap

On February 9th and 10th, the Canadian Honey Council (CHC) and the Canadian Association of Professional Apiculturists (CAPA) organized the first ever Bee Tech - a Canadian national beekeeping convention and tradeshow. With over 250 registrants, the event brought together researchers, producers and industry representatives from various parts of Canada and the world. The convention featured a diverse group of over 50 presenters which included six panels that engagingly discussed important areas of beekeeping. Presentation topics ranged from honey bee diseases and pests, Tropilaelaps mites and Varroa mite treatments, to blueberry and canola pollination, honey bee nutrition, honey prices, queen health/ production and stock replacement. The trade show showcased numerous exhibitors and research posters, offering attendees the opportunity to engage with businesses and stay updated on the latest research findings. The banquet on the first night was a sold-out affair that included an entertaining talk from Jamie Macoun and locally crafted drinks using Alberta honey from Fallentimber Meadery and Blindman Brewing. Bee Tech proved to be an excellent platform for networking on a national scale, fostering valuable connections, insightful conversations, and significant learning experiences. Thank you to all

Nicole McCormick

Originally published in the Bee News

the attendees, speakers and vendors that shared their knowledge and expertise, and to Shelley Hoover and Rod Scarlett for organizing this informative event!

Some highlights from the presentations include:



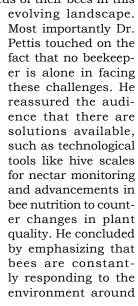
Keynote Speaker: Dr. Jeff Pettis

President of Apimondia Research Scientist and Consultant, Pettis and Associates LLC

Beekeeping in a Chang-

ing World: Fires, Floods, and Opportunities? - Dr. Pettis opened his presentation by stating that "we learn beekeeping from a mentor, but we have to be able to adapt [our learnings] as the world changes." He discussed how climate change has led to unusual weather patterns, such as extreme temperatures, unpredictable rainfall and escalating natural disasters, all of which directly impact beekeepers and their bees. Additionally, he highlighted some indirect effects of the changing world like reduced honey production and broodless periods, which pose challenges for beekeepers in the long run. Dr. Pettis pointed out that traditional calendar-based beekeeping practices are

becoming less reliable due to shifting blooming times caused by climate change. He also explained how research on the effects of rising CO₂ levels has shown to have a negative effect on the concentration of protein in pollen changing the plant quality. He stressed that we are not doomed and that beekeepers can adapt





them, and it is important for beekeepers to then respond to their bees.



Maggie Gill Regional Bee Inspector for Wales at the National Bee Unit

Tropilaelaps surveillance, distribution, prevention and management – All the way from Wales, Maggie Gill delivered two highly informative talks. Drawing from her research on the *Tropilaelaps* mite in Thailand, she shared valuable insights on how

beekeepers can effectively monitor the spread of these mites. Maggie showcased an elaborate map tracing the emergence and expansion of Tropilaelaps mites into new geographical regions, noting South Korea's significance due to its lower temperatures than previously believed survivable by the mites. Additionally, she emphasized that the primary transmission route is likely through ports, where the mites can hitch a ride on bees transported by shipping containers and boats. Maggie explored various traditional methods of monitoring, such as the bump method, alcohol shakes, sticky boards and sugar shakes. Each method was discussed in detail, highlighting the challenges faced when dealing with Tropilaelaps mites. The bump method was disruptive to hives, alcohol washes proved ineffective at separating the mites and sticky boards were not practical due to the mites' size. She concluded that the sugar shake emerged as the most successful monitoring technique, as it was able to accurately represent the number of mites per shake.

National Bee Unit inspections program and Asian **hornet prevention -** The Asian hornet has been found in the UK, leading regional inspectors to implement an active reporting and tracking system. Maggie explained that with the hornets' spread, more stringent measures were required to prevent their proliferation, as they pose a threat to honey bee colonies. The system relies on public reporting, where public awareness prompts the reporting of possible Asian hornet sightings. Subsequently, the inspection team reviews all reports and, upon confirmation, sets up bait stations in the reported area. Hornets visiting these bait stations are monitored with an app that automatically traces their flight path. By analyzing multiple flight paths and deploying additional bait stations, inspectors can pinpoint the nest location and eliminate it. Interestingly, Maggie mentioned that all nests are collected and examined to determine specific characteristics like lineage and the reproductive stage, aiding in determining if the hornets have established themselves in the UK.

Congratulations to the CAPA Student Merit Award Winners:

Rhonda Thygesen – Berry Sad Bees: Assessing Honey Bee Health Stressors in Highbush Blueberry with Proteomics

Courtney MacInnis – How honey bees respond to infection with Vairimorpha (Nosema) ceranae and Lotmaria passim

Congratulations to Dr. Rob Currie

CHC Willie Baumgartner Memorial Award CAPA Outstanding Service Award CAPA Honorary Membership

The Manitoba Beekeepers' Association (MBA) would like to nominate Dr. Robert William Currie for the Canadian Honey Council Willy Baumgartner Memorial Award for his outstanding contributions to honey bee research in Manitoba, Canada, and internationally.

Dr. Currie's career started as a provincial student honey bee inspector in the mid-1970's where





he developed a keen interest in bees. He went on to obtain graduate degrees at the University of Manitoba and completed post doctoral work at Simon Fraser University. In 1991, he accepted a position as bee researcher at the University of Manitoba and for the last 10 years of his career, served as the Head of the Department of Entomology. Dr. Currie has also held various executive roles with the Canadian Association of Professional Apiculturists.

Dr. Currie's career has revolved around applied research to help improve honey bee health. He continued the work of his predecessors on wintering techniques and Fall treatments of diseases and pests to help improve wintering success of healthy colonies. His early work on the biology of varroa helped the industry understand this new mite pest. Dr. Currie's pioneer work on Formic Acid to control varroa mites lead to the development of treatment criteria, and he has been instrumental in improving our understanding of the impact of Nosema on wintering in Canada. Throughout his career, Dr. Currie was involved in collaborative research projects with other researchers while often doing the majority of the field work. Early on in his work, Dr. Currie was involved in determining syrup quality. His development of testing criteria for quality and its effect on the longevity of bees continues to be the standard today, yet he still works diligently to improve that standard through his current field trials.

Dr. Currie has written and contributed to 84 peer reviewed articles and was the major contributor to the chapter of Wintering in the updated version of the *Hive* and the Honey Bee. He also contributed to the writing of Beekeeping in Western Canada as well as the CAPA Honey Bee Diseases & Pests manual. Throughout his career, Dr. Currie has taught the U of M "Beekeeping for the Hobbyist" course which has trained hundreds of new beekeepers and has guest lectured at various beekeeping courses throughout the country and internationally.

Dr. Currie has presented at countless Provincial and Regional Association conferences as well as interna-

tionally, and has long been an advisor to the Manitoba Beekeepers Association.

The MBA board fully recognizes the importance of Dr. Currie's influence on beekeeping in Manitoba and across Canada, and considers him well deserving of this award from the Canadian Honey Council.

-MBA Board of Directors



Congratulations to Tim Wendell

CHC Fred Rathje Memorial Award

Throughout his long and successful beekeeping career, Tim has been dedicated to improving the beekeeping industry. He has always graciously volunteered his time and efforts to serve beekeeping in Saskatchewan and beyond.

Tim has always been generous, sharing ideas and experi-

ences with other beekeepers. With his ample experiences and fearless willingness to try new things, he has vast amounts of knowledge to share. He has spent many hours in meetings, giving presentations and in person passing on the successful ideas and techniques to help other beekeepers. This knowledge has helped to ensure a progressive, positive industry in Saskatchewan and beyond.

Tim has also been a very active member of the Saskatchewan Beekeepers Association (SBA). He was president for eight of the 14 years that he spent on the SBA board of directors. During his time on the SBA board, he was a driving force behind changes in the industry. He was instrumental in addressing many challenges the beekeeping industry faced over the years. These challenges include optimizing business risk programs like the Net Income Stabilization Account (NISA) to make the program work for beekeepers, representing Saskatchewan on national committees and working groups like importing queens from the United States, and so much more.

Honey bee research has always been near and dear to Tim. He has donated money, time, effort, bees and equipment; however, while he was president, Tim realized that more was needed, and what was needed was a commission. Tim led the initiative but worked with many others to establish the Saskatchewan Beekeepers Development Commission (SBDC). The main goals of the commission are to better support promotion of the industry and research. The legacy of this commission has been vast, enhanced support of many research programs, establishing the Saskatchewan Tech Adaptation Team to work directly on applied research projects, and more have all been offshoots from the implementation of the SBDC.

The achievements highlighted in the nomination are just the tip of the iceberg. Tim has had a long history of service to the bee industry. He has volunteered endless amounts of time, effort and resources for the betterment of beekeeping in Canada. Tim is an excellent candidate and is very deserving of the Fred Rathje Memorial Award.

—Nominated by Stan Reist. BC

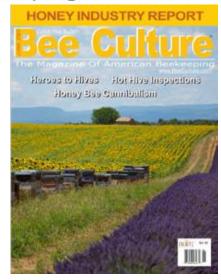
ADVERTISE WITH

Bee Culture

The Magazine of American Beekeeping

Print Ads | Web | Email beeculture.com/advertise

Contact Jen Manis jen@beeculture.com 1-800-289-7668 Ext. 3216





BEETECH

Study Hall - From the Editor, Jerry Hayes

I had the great opportunity to attend and speak at the 1st Canadian National Convention and Tradeshow, BeeTech, supported by Canadian Honey Council (CHC), Canadian Association of Professional Apiculturists (CAPA) / L'Association Canadienne des Professionels de l'Apiculture (ACPA) held in Calgary, Canada on February 8-10, 2024.

Canada has a strong, vibrant, economically significant managed honey bee industry. There are approximately 794.34 thousand colonies in Canada that are responsible for 20 million tons of oilseed canola and 200 tons of blueberry production. There are many other pollinator dependent crops but these are two of the most valuable crops that collapses without honey bees' production.

Canada also is a leader in honey production with recent data showing 74.4 million pounds.

But you can't have these positive outcomes if there is not significant honey bee research into pest, parasite and disease control, educational outreach, mentoring and inspections. In no particular order and hope I got most of them, University of Guelph, National Bee Diagnostic Center, York University, University of Alberta, University of Calgary, University of Lethbridge, University of British Columbia, Agriculture and Agri Food Canada/Beaverlodge Research Program, University of Manitoba, University of Laval and all the provincial apiarists https:// apiaryinspectors.org/Canada-Inspection-Services. They have it well organized in Canada.

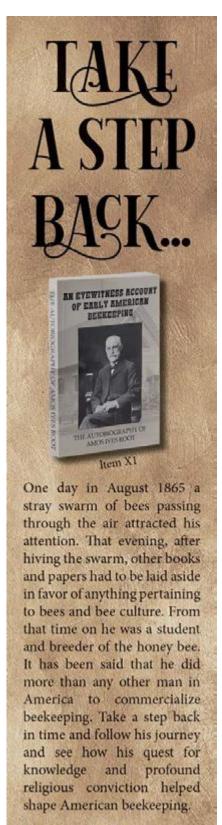
In my mind, all the talks were interesting and valuable. Not to 'cherry pick' or ignore any of the major speakers or student presentations but these are the ones that got my attention:

• Andony Melathopoulas – *Getting a* little respect while making my honey crop

- Jeff Pettis The exotic world of beekeeping: new exotic threats like hornets and Tropilaelaps mites
- Panel: What should the relationship between the Canadian and U.S. beekeeping industries look like? Chris Hiatt, George Hansen, Simon Lalonde
- Jerry Hayes Confirmation Bias
- CAPA PhD Award Winner, Courtney Macinnis – How Honey Bees respond to infection with Vairimorpha (Nosema) ceranae and Lotmaria passim
- Leslie Holmes Queen Fertility in Response to Exposure to Antibiotics and Temperature Stress
- Samantha Muirhead Canada and the Tropilaelaps mite, should we be concerned?
- Rob Currie Assessing syrup quality. Does it matter what and when you feed your bees?
- Panel: Impacts of Honey Fraud Chris Hiatt, George Hansen, Kirk wilson, Graham Strom
- Stephan Pernal Intra colony transmission of wax borne honey bee viruses following irradiation and storage

And of course there were dozens of other talks sharing contemporary issues in 'our' industry.

All this to say the 1st Canadian National Convention and Tradeshow, BeeTech, supported by Canadian Honey Council (CHC), Canadian Association of Professional Apiculturists (CAPA) / L'Association Canadienne des Professionels de l'Apiculture (ACPA), was well organized, great location and the best part was being able to visit with so many commercial, sideline and hobby beekeepers. Those hallway and lunch and dinner conversations are always fun. We are all in this together. Let's be sure we take time to connect, understand and support each other. BC



Bee Culture BOOKSTORE

Order yours today at www.store.beeculture.com/books/

BEE CULTURE 75

Witch Hazel Should You Plant? Alyssum Flowers



Hamamelis virginiana, Eastern witch-hazel

A welcoming bright star in Winter months is witch-hazel, *Hamemelis species*, which can flower anytime from October through March, depending upon the species selected. Witch-hazel produces pollen and nectar. The strong scent of witch-hazel flowers attracts honey bees on mild Winter days. Witch-hazel species bookend the pollination season in the environment. The flowers are clusters of usually bright yellow, thread-like petals with a yellow or brown center, four per flower each of which is ¾ to one inch in diameter. In a dreary Winter landscape, the cheerful flowers offer a burst of color, many of which have a delightful scent. The leaves are broadly oval with wavy

edges which turn golden or amber in the Fall. Witch-hazel prefers to grow in partial shade in woodlands situations but can grow in full sun. A compact shrub or small tree can reach 20 to 30 feet tall. Normally the shrub form does not grow over 12 to 15 feet tall.

The botanical name, *Hamamelis*, translates to "together with fruit" because the fruit and flowers occur at the same time on each plant. As the shrubs bloom, the seeds from last year mature. Once fully developed and dry, the seed capsules pop, throwing the hard, shiny black seeds up to 40 feet away! The common name Witch-hazel is derived from the word "wych" or "wyche", due to the soft, flexible branches which were used to make bows and for divining rods to search for water. The plant looks similar to the common hazelnut tree, which is why "hazel" was added to the name. The astringent, witch-hazel is still made from this plant with more than a million gallons sold yearly in the United States.

The flowers are by far the most spectacular feature of the plant, as they can last eight weeks. On warmer days, the tender petals open; some are straight, some crinkled and some a combination of both. At night or when the temperatures drop to freezing, the petals curl toward the center of the flower. On warmer days, the petals unfurl again. A reliable source of pollen, witch-hazel is visited by honey bees as well as some fly species and several moths, including the *Catocola spp*, known as owlet moths, which, with their colorful hindwings, are worth staying up to see.

Five (or six) species are in this genus, three (or four) of which are native to North America: **Eastern witch-hazel** (*H. virginiana*), Vernal witch-hazel (*H. vernalis*) and Big-leaf witch-hazel (*H. ovalis*). Mexican witch-hazel (*H. Mexicana*) sometimes is considered to be its own species, however it is listed as a subspecies of *H. virginiana*. The hybrid, **xintermedia**, is also very popular. The two nonnative species, Chinese *Hamamelis mollis* and Japanese witch-hazel (*H. japonica*) also grow in North America.

Plant several witch-hazels in a cluster or use as a focal point. Choose the species that best fit the landscape and yourself.

Common or Eastern witch-hazel blooms from October through November. With yellow Fall foliage, the flowers are not as easily seen, however, with a lovely spicy scent, they are worth looking for. The cultivar 'Harvest Moon' flowers after leaf drop, so its shows well in a landscape. The dwarf cultivar 'Little Susie' only reaches five feet tall and wide. A compact, weeping cultivar called 'Pendula' grows to be eight feet tall by six feet wide.

Vernal witch-hazel, also called Ozark witch-hazel, is native to southern and central United States and is one of the earliest and longest-blooming witch-hazels. It is normally found along streams or in moist woods but can be adapted to landscapes. This species tends to be smaller and more compact than the Eastern witch-hazel, and the main difference is that it blooms in late Winter



Hamamelis japonica 'Tsukubana-kureani'. Photo by Paul Snyder. Photo from https://bygl.osu.edu/node/1751

with orange-red flowers. If Spring's weather stays cold, the flowers may continue until April.

Big-leaf witch-hazel grows naturally only in the head-waters of one creek in southern Mississippi, with leaves three times larger than the common species. Unlike the other species, it spreads by underground roots and only reach two to four feet tall. It prefers to grow in low, wet slopes. The flowers are various shades of red, maroon, scarlet and maybe yellow which occur in January. It is not commonly available for purchase.

Chinese Witch-Hazel flowers from January to March with golden Fall leaves. It is slightly more upright and rounded than some other witch-hazels and can spread to 15 feet wide. A popular cultivar is 'Wisley Supreme', which is smaller than the original species, with large, fragrant, golden-yellow flowers.

Japanese Witch-Hazel is another yellow flowered species which grows 10 to 15 feet tall and wide. This species tends to grow wider, especially when planted in deep shade. "Arborea" is a lovely cultivar with yellow flowers and a wonderful scent. It reaches 10-16 feet tall.

Due to an accidental cross done at Arnold Arboretum between *Hamamelis mollis* and *H. japonica*, hybrids were developed which had the best features of both parents. This hybrid was given the name xintermedia in 1945. The



Hamamelis virginiana, Eastern witch-hazel fall color. Photo by David J. Stang / CC BY-SA 4.0



Hamamelis vernalis, Vernal witch-hazel. Photo by David J. Stang / CC BY-SA 4.0

first hybrid, which was introduced as 'Arnold Promise' in 1963 is still popular today. Common cultivars include 'Diane', which has red flowers, 'Pallida' with light-yellow-flower, and 'Jelena', a vase shaped shrub with fragrant flowers ranging from orange to dark copper.

Soil should be moist, acidic and well drained. Pruning is not usually necessary, however it can be shaped in early Spring. Although it does not tolerate drought, it can grow and tolerate some browsing by deer.

References:

https://www.fs.usda.gov/wildflowers/plant-of-the-week/hamamelis_virginiana.shtml

https://bygl.osu.edu/node/1751

https://www.bbg.org/article/witch_hazels_winter_flowers fall foliage and lovely form

https://hortnews.extension.iastate.edu/all-about-witchhazels

https://www.fs.usda.gov/wildflowers/plant-of-the-week/ hamamelis_ovalis.shtml



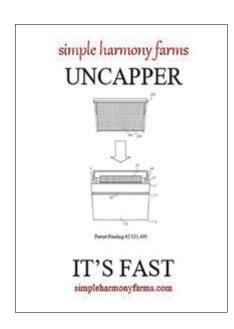


















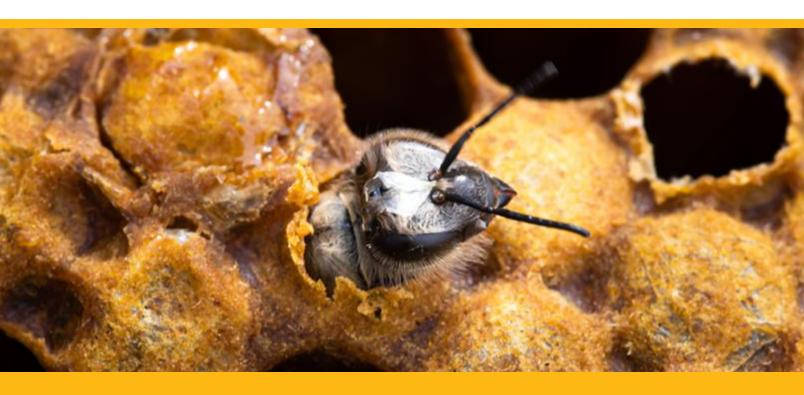




Start this season stronger.

Formic Pro[™] targets varroa mites under the brood cap, helping you protect developing bees to build healthier, more productive colonies this spring.

Organic • Sustainable • Residue Free



Ask for NOD Apiary Products at beekeeping supply stores across North America.



Healthy Bew. Healthy Planet.

1-866-483-2929 | www.nodglobal.com | info@nodglobal.com











Teresa Krzewski

As a backvard beekeeper in Southern California, we have to deal with some bees that are more defensive. My bees get three strikes before they are either relocated to a less populated area where they can be split and requeened, or destroyed.

Over the years, I have tried wrapping the hive in black plastic bags, dry ice and soapy spray. Unfortunately, they all have disadvantages like brood emerging several days later and having to apply more dry ice, etc.

I found that the best and most humane way, even though a bit time consuming, is to use a dry/wet shop vacuum. In the vacuum canister, I put two to three inches of water as well as adding Dawn dishwasher soap. It is agitated until a bit foamy. Once the bees are vacuumed, and hit the soapy water they die quickly as they cannot breathe (I have one vacuum system that I have put clear plastic pool tubing on to watch the bees being vacuumed).

Procedure - I will close up the front entrance to the point where there is only a couple of inches open to start vacuuming the bees. As foragers return, I will temporarily close the entrance entirely with a rag, piece of wood or something to block the bees exit while I vacuum up the bees returning. I will sometimes alternate from the front entrance to the hive lid area by sliding the cover over slightly to allow the vacuum to suck up the bees as they "boil" out.

Depending on the type of lid you have on your hive (ie. migratory vs telescoping), you may want to have a strip of wood/towel to block the rest of the space once the lid is slid so only a small ~2" hole is visible and the vacuum can get all the bees as they try to leave.

As the number of bees is markedly reduced, I will then vacuum each frame to get remaining bees.

Once completed, I then pour the bees out of the vacuum base container through a colander or screened container to drain away the water before disposing the bees in the trash.

The frames and hive can then be dismantled and stored appropriately. I keep my bee boxes with frames outside standing on their ends so they look like a bookcase to discourage wax moths. 35





POLLEN – IT MIGHT BE A TRAP

Greg Carey

Probably the first thing that should be done when discussing pollen with someone who may not know about it is to give a general warning. I'm not one of those beeks who will tell you that all hive products are wonder drugs which cure everything from bad breath to cancer. In fact, the only claim I make about my own honey is that it tastes good. I was raised in a barn and have no allergies that I know of (unless you count that time I was running English Pointers in my beloved South and broke out in a terrible #8 birdshot rash. If poor judgment is an allergy then I got that one bad), so I dove right into collecting and processing pollen. Believe it or not, I got a bit stuffy when I started drying pollen and being exposed to the fine dust. Nothing serious, but still a surprise for me. It quickly subsided and hasn't reoccurred. I took it as a warning shot that everyone who hears from me about pollen should hear. Pollen is potent. If you have any allergies, I highly recommend speaking to your doctor before collecting, processing or eating pollen. Even then you should go slow and pay attention to your body's responses to pollen.

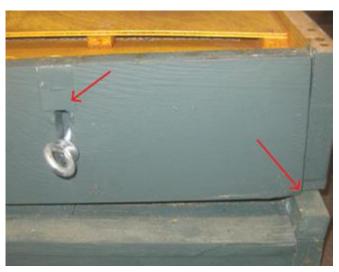
Pollen is collected by a variety of devices collectively called pollen traps. They all work by stripping the pollen from the foragers' pollen baskets as they try to go back into the hive. Maybe they should be called pollen strippers. The traps partially close the entrance to about 0.2 inches via the use of screens (plastic, wire or punched plate) which usually pull off at least one of the pollen pellets from the forager, allowing the pellet to fall through another screen into the screen bottomed drawer below.

I have never had a top mounted pollen trap and can't say much about it. It would seem that one of its advantages is that you can remove and install it without lifting the whole stack of hive bodies. I noticed in one of the write ups that you shouldn't use a queen excluder with the top mounted trap.

Every pollen trap that I have bought has needed some form of adjustment or adaptation to be used in my applications. Many will be covered below as we come to them.

The bottom mounted pollen traps I have and use. I prefer the ones with the drawer opening to the back. I also have a couple with a drawer which can be moved from the left to right side and vice versa.

The first 8-frame bottom traps I bought had a design/manufacture flaw which allowed the foragers to bypass the trap and go directly into the hive body. Also, because the traps were not made to the measurements of my equipment some adjustments were made. The photo (top right) shows the metal tab I put over the hole that allows the trap to be opened or closed. It was cut too long. When I called the maker, they said they were aware of the problem but had cut many that way and would use them up before making the correction. You will also note that the closure was too wide for my bottom board. I just put it on the table saw and notched it to work with my stuff.



This trap also had a problem with pollen falling behind the back wall of the drawer and being lost out the bottom. I installed a slanted metal top to the drawer which caught the pollen and let it slide into the drawer.



This is a good place to mention that I never run pollen traps when I have supers on the hives. I do not wish to distract the nectar foragers and have them converted to pollen foragers. This means that I usually put the pollen traps on in mid to late July through September. That means that I have the traps on during the height of bearding in my area.

Next problem. The bottom traps with the side mounted drawers can have a problem when the bearding wraps around the front of the hive and onto the drawer, making it difficult to open and close without killing and agitating

some bees. For this problem I created the bee baffle. It keeps the bearding to the front of the hive and prevents the bees from covering the drawer.



The entrance mounted pollen trap is my favorite because it can be adapted to any hive I have and is easily put in place or removed. That word "adapted" hides a bit of work but, again, makes this trap very versatile. I use it on my 8-frame hives, Long Lang hive, 5-frame nucs and my observation hive. The key is in the type of wooden insert I place in the back of it to make it fit the application I have in mind.







Long Langstroth



Observation hive window entrance

The entrance trap also has some design issues that I felt compelled to address. Remember, if there is any way the foragers can bypass the trap and keep their pollen load intact, they will figure it out. I am convinced they communicate these areas to the others. If you watch them they will also tell you where the problems are.



Here are a couple of the fixes in place. I made the drone escape a one way valve using #8 wire and hot glue. I also closed openings, using propolis, where the bees were trying to bypass the trap.



Bearding is no less a problem with the entrance traps. Maybe more. I usually smoke the entrance and gently pull out the drawer and place in on the ground in front of the hive. I let/encourage the bees to abandon the drawer and return home.



Okay, the bottom left photo is an extreme example used primarily to show you the nylon cord and spring arrangement which holds this type of trap on my large hives. Here is a photo of what you can typically expect.



Here is one last problems to be aware of. When the pollen flow is heavy there can be enough falling to the screen above the drawer so as to clog it and result in the pollen being scattered on the ground in front of the hive.





This is not a big problem and can be cleared with a brush when collecting the pollen. Since pollen will mold fairly easily, I recommend clearing the drawers late every evening before the dew falls.



I pour mine into a paper bag and freeze it for three days before moving it into another plastic container to be held in the freezer until packaged and used. This partially dries it. I have three paper bags for this purpose and just rotate them.





Obviously, you will collect different pollens during different seasons. You heard my reasoning for when I put the traps on. You can expect the first couple of days to yield very little pollen. It takes a bit for the bees to notice they are being robbed. Then they will start recruiting more pollen foragers. I have pulled more than a pound of pollen per day from a single trap. This leads to a caution. Do not leave the traps on too long. Depending on how sensitive your queen is to the cupboard, she may shut down laying. You do not want this. You must be sensitive to each colony's tolerance. It might be a trap.

Beekeeping, more than bugs in a box. 🗠





BUILD A SUPER —

What is a frame popper and why rould anyone want or need one? hat was my first impression of a quat little table with a couple of exca boards on it. Well, it didn't take

What is a frame popper and why would anyone want or need one? That was my first impression of a squat little table with a couple of extra boards on it. Well, it didn't take me long to realize that it is an unbelievable time saver when it's time to extract thirty or forty supers. This little gizmo is an extremely stable piece of equipment that helps you release all ten frames from a honey super at one time.

Parts (Thickness x Width x Length) 1.3/4" x 19" x 22" – Top (1) 2.3/4" x 5" x 20" – Drip edge (2) 3.3/4" x 5" x 20" – Drip edge (2) 4.3/4" x 11/2" x 15" – Popper Bar (2) 5.2" x 4" x 14" – Leg (4) 6.3/8" x 3" x 20" – Leg Brace (2) 7.3/8" x 3" x 20" – Leg Brace (2) 8. Silicone Caulk

Construction

This is another easy piece of equipment to make which will pay for itself the next time you extract honey. I'll guarantee the time savings during extraction will more than make up for the time it takes to build this unit.

Step 1: Cut the top (part 1) from a piece of heavy plywood or particle board.

Hint: Make sure the top surface is smooth. It makes cleaning a lot easier.

Hint: Use an old countertop to make this piece

Step 2: Cut the drip edge (parts 2 and 3).

Glue and nail or screw the drip edge to the tabletop. Be sure the top of the drip edge is at least 3/4" above the top surface of the top (part 1).

Note: This drip edge has two functions:

- To contain the honey that escapes
- To attach the legs to the top

Step 3: Cut the four legs (part 5)

Step 4: Turn the top over so the top surface is against a flat surface and screw through the drip edge into the legs.





Step 5: Cut the leg braces (parts 6 and 7).

Step 6: Attach the braces to the sides. Angle the side braces to provide a rigid set of legs. After the sides are complete then attach them to each other with a second set of braces. The result will be an extremely sturdy set of supporting legs.

Step 7: We added a drip edge to the table so that any honey that dripped from the frames would be caught and not escape to the floor. To keep the honey on the table, you need to caulk the joint between the drip edge and the tabletop.

Step 8: Add the popper bars. The popper bars are used to raise the honey frames out of the super. To position the popper bars correctly, take an empty super and center it on the tabletop and mark the inside edges with a pencil. Use these marks as guides to position the popper bars so they will raise the frames when the super is forced down over them. Screw them in place.

Step 9: Paint - Paint - Paint!

Extracting honey is messy. Removing the frames from the supers is messy. To preserve the honey that escapes, you need to paint the popper table with a good grade of glossy or semi-gloss enamel. Add at least a couple of coats to make sure the surfaces are smooth.

Usage

When you are ready to remove the frames from the super all you need to do is place the super over the popper bars and force the super down to the table surface. The frames will POP UP 3/4" and be easy to remove from the super.

Conclusion

In addition to making the removal of honey frames easier, the popper box collects much of the escaping honey and keeps it off the floor and the bottom of your shoes.

Note: My popper has now been in use for over 20 years and it still works perfectly.

Front 3 3/8 Side 14 - 31/4 24 3/4 Top 19

Drawings

DO I HAVE A FUTURE IN BEEKEEPING?

A fifty-year reflection

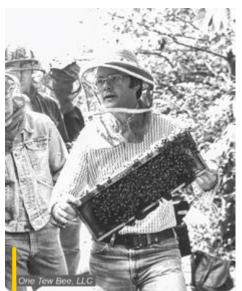
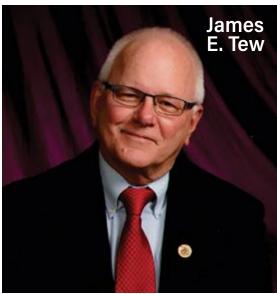


Figure 1. Jim Tew 48 years ago and 30 pounds lighter. The bee world in this photo is now gone. This is just a snapshot of a moment.

Your present perception of beekeeping is only a snapshot in time

Beekeeping today is not beekeeping past or future beekeeping. Apiculture as we know it is simply our version of present-day beekeeping. It will change. It always has. I am a member of a rapidly aging generation of beekeepers, who kept bees before predaceous mites arrived. *Killer Bees* did not exist. Those days are gone, and the beekeepers who remember those days are passing.



A friend and peer recently suggested to me that, whenever possible, I should record some of my pre-varroa mite memories and experiences. After all, our current bee management goal is to remove the parasitic mite load from our honey bee population. Present-day beekeepers would like for our bee management procedures to return to pre-1984, a time without mites in our honey bee herd.

I don't mean to be a hero egotist

Much like a disaster appetizer, in 1978, researchers determined that *Sudden Infant Death Syndrome*¹ may sometimes be caused by botulism spores contained in honey. For the beekeeping industry, it was dreadful that pure, wholesome honey could be the occasional cause of an infant's death. Unknown at the time, this revelation was a harbinger of more things to come.

GRANULATION: ALL NATURAL HONEY
WILL TURN SOLID. TO RELIQUIFY,
PLACE JAR IN WARM WATER.
WARNING: DO NOT FEED HONEY
TO INFANTS UNDER ONE YEAR.

Figure 2. Infant Botulism warning label (Betterbee label, 2024)

I don't mean to suggest that I had major part in saving the Kingdom of Honey Bees, but the six-year period from 1984-1990, can only be described as beekeeping-ly hellish. I was there. In 1984, Tracheal mites were found in southern Texas. Beekeepers went crazy. Just three years later, in 1987, Varroa mites were found in the U.S. Beekeepers went even crazier. Canada and Mexico shut out U.S. bees. Six years after that singular event, in 1990, Africanized honey bees were finally found in southern Texas. This time it was the public that went crazy. It seemed that rabid honey bees were going to kill us all. It was a tough time to be in beekeeping. Honey was apparently poisonous to infants, predaceous mites were going to kill all our bees,

¹https://ufhealth.org/conditions-and-treatments/sudden-infant-death-syndrome





Listen along here!

and *Killer Bees* were going to kill many of us. This was a great time to recruit new beekeepers. Yeah, right!



Figure 3. A Varroa mite on a drone. The parasite that fundamentally changed beekeeping.



Figure 4. Barton Smith (Maryland) and Pat Powers (Virginia), left and center, working Venezuelan Africanized honey bees circa 1992.

We knew changes were coming

It's not like beekeepers were asleep. All of the U.S. beekeeping industry had been alerted that these historic events were coming. The scientific and communication communities did a good job informing all beekeepers to prepare for the pending invasions. I wrote an article on this subject for *Bee Culture* magazine in 1985. Honestly, when writing this article forty years ago, I was trying to reassure myself as much as reassuring new beekeepers. The short article is reprinted below.

Do I have a future in beekeeping? (May 1985)

A major part of my job is beekeeping education. In that capacity, I talk with a number of potential students as a matter of course. Such conversations were much easier a few years ago. There was no honey surplus² then. The hybridized bee (*Killer Bees*) were far, if ever, in coming, and few beekeepers had any idea of what tracheal mites were – much less *varroa* mites. Sometimes it seems that when it rains, it pours.

When a potential student asks me, "Do I have a future in beekeeping?", what should my response be? I hear, as do all of you, the daily barrage of high interest rates, tight money and high incidences of agricultural default. Doesn't sound good, does it?

When I was an apicultural graduate student at the University of Maryland, I stood in long lines with all the other "Organic Food Freaks" to get my wholesome organic peanut butter and bean sprout sandwich. I would have no part of salt or sugar in my diet. I only drank aseptic fruit juices produced without the benefit of any chemical pesticides whatsoever (at least that is what I was told and that was certainly what I wanted to believe). And everywhere, people wanted pure organic honey. Most local honey markets boomed, touting no in-hive pesticides and no adulteration.

Those long lines waiting to buy all those organic products seems now to have moved to my local grocery store. The thrust of organic food market appears to be centralized in the organic food stores or specified areas in local grocery stores. But it's no longer the burning issue that it was.

So now with subsidized honey prices, Tracheal mites established here and more mites on the way, as well as killer bees, what do we do now? People, what should be done now? I really don't know and I'm not sure who does know. But I can tell you some things that I do know about beekeeping.

Most importantly, I still enjoy keeping bees very much. I love the hum of an active hive on a warm Spring day – a day that, in my memory, is always bounded by blue skies and pleasant clouds. I'll always enjoy the smell of foundation in a new pine frame, the aroma of a new crop of honey, the excitement of a big swarm, the satisfaction of producing nice, fat queen bees. Those things I am sure of.

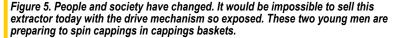
In some regards, things have changed and are changing in beekeeping. We often overlook the fact some of these changes may very well be for the better. The new world of computers is presently a vast untapped resource. Soon, they will help us manage our hives more efficiently, keep our financial records more accurately and keep us better informed.

Look at the improvement in extracting equipment. Not many years ago, there were belts and pulleys with levers everywhere. Now extractors have small compact motors controlled by electronic circuitry. It's safer and more efficient. On the near horizon is the developing concept of recombinant DNA. With all its potential problems, it offers tremendous promise. Possibly some of our old problems such as developing disease resistant bees or controlling bee temper may be resolved. Researchers are understanding the biology of viruses more and more. Solving that problem could allow our bees to live longer thus making the hive more productive.

However, none of this changes the fact that tomorrow morning, several states will still have tracheal mite infestations. Nor will the great surplus of honey evaporate. It's not hopeless though – not by a long shot. Beekeeping will survive. Admittedly, some aspects of the industry are going to change. And those changes may seem to be for the worst now.

Consider this. If the pressures our industry are now under results in a greater awareness of our industry by legislators, consumers and the public, then we have bettered ourselves despite the problem. If the tracheal mite arrival results in our industry being better prepared for the *varroa* mite, a far worse pest, then Acariosis³ served

³The tracheal mite, also known as *Acarapis woodi*, is an invasive bee hive parasite. Discovered in 1919 on the Isle of Wight, the mites cause a disease called Carine disease or Acariosis, which is deadly to bees. Without treatment, it can bring down an entire colony.





²The U.S. Government has supported the price of honey since 1950 by providing market price stability to honey producers to encourage them to maintain honey bee populations sufficient to pollinate important agricultural crops. When honey support prices moved above the average domestic price in the early 1980's, domestic producers found it profitable to forfeit their honey to the Government while packers and industrial users imported lower priced honey for domestic use. Changes made in the program by the Food Security Act of 1985 reduced forfeitures of honey to the Government and made domestic honey competitive with imports. Consequently, imports declined from 138.2 million pounds in 1985 to 55.9 million in 1988. At the same time, Government take-over of forfeited honey declined from 98 million pounds in 1985 to 1.1-3.2 million pounds from 1989 through 1992. Expenditures and takeovers will decline even further in fiscal years 1994 and 1995 with amendments to the Appropriations Acts, which eliminated deficiency payments and loan forfeitures for 1994 and 1995 crop honey. https://www.ers.usda.gov/webdocs/ publications/40618/50791_aer708.pdf?v=9286.4

at least one positive purpose. For the long run, things may not be as bad as they seem.

My effort here has not been to write a rah-rah article - to rally the troops, so to speak, but rather to address a difficult question that I'm frequently asked, "Do I have a future in beekeeping?" If one derives true enjoyment from beekeeping and understands the problems our industry faces, and if that person is aggressive, open-minded and creative, having the ability to take new ideas, techniques and technology and put them to work, then I can confidently and honestly say that from my experience, that person can have a promising career in beekeeping (Thank Heavens!).

In 1985, I was so naïve.

When I wrote that article in 1985, I was so naïve. All beekeepers of the time were unaware. Nothing could have prepared us for the wind-driven wildfire of the *Varroa* invasion of 1987. At the time, *Varroa* seemed to be killing every colony it invaded. Commercial beekeeping operations that were several generations old, were failing. People were dropping out of beekeeping on every turn. Why would anyone want to keep bees?



Figure 6. The effects of Varroa mites on a colony if not controlled in some way.

During sometime 1988, I attended an American Beekeeping Federation meeting somewhere in a western state. While I forget the exact date and the location, I do not forget the feeling I had at that meeting. During a Q&A session, concerning almost exclusively the new *Varroa* issue, a commercial beekeeper went the front of the session, and tearfully told the entire group of attendees goodbye. Predaceous mites had destroyed his business that he had inherited from

his father and grandfather. No lending agency would front him money to stay in the bee business. At that moment, readers, I had the very real, somewhat selfish thought, "Do I have a future in beekeeping?" This was the same question that I posed in 1985, but this time, the question felt much more personal. That was the first time that I truly wondered if our bee ship was going down.

We had nothing with which to fight Varroa

Initially, beekeepers had nothing to use to combat the *Varroa* mite. After *Varroa* arrived, Tracheal mites had faded from concern. Tracheal mites were annoying while *Varroa* mites were usually fatal.

On October 20, 1987, the Animal and Plant Health Inspection Service (USDA APHIS) approved (Section 18, Crisis exemption) plywood strips soaked with Mavrik or Spur (fluvalinate) for *detection* of *Varroa*. On December 30, 1987, a section 18 special exemption approved plywood strips soaked with Mavrik or Spur as *treatment*. March 21, 1988 – Use of Mavrik was *rescinded* and was replaced by the miticide, Apistan⁴.

Yes, it's a fact. For a year or so, we beekeepers made our own mite

control devices. Yes, before you ask, beekeepers everywhere were concerned about honey purity. The basic argument was that dead bees do not produce honey. Beekeepers were relieved to have Apistan become the grandparent of beehive chemical controls.

Interestingly, up until Varroa's arrival, beekeepers universally disliked pesticides. Since the end of World War II, pesticides had been killing our bees. But in 1988, our industry desperately turned to pesticide companies to make products that would help control mites. At this very moment, we still depend on some of those companies to make products to help with honey bees' predaceous mite problem.

The body count

was bleeding.

I am reminded of some of the lines from the *Ballad of Sir Andrew Barton*:

Fight on, my men,

I am hurt, but I am not slain; I'll lay me down and bleed a while, And then I'll rise and fight again.

During those years, beekeeper numbers declined. Bee colony numbers declined. Meeting participation dropped. It was difficult to secure officers for bee groups. Winter kill rates for colonies increased. Indeed, beekeeping didn't die, but it surely

Then Apiculture rose to fight again

Well, not quite that dramatically, but the shock of all we had been through began to wane. Beekeeping did begin to recover. Yes, we lost a lot of people. At the time, my two brothers and my dad were beekeepers, too. Dad grew too old for the work and my two brothers burned out. They quit.

But a somewhat unexpected effect of the Varroa invasion made itself felt. Many of the wild honey bees were eliminated. Commonly, growers did not feel the need for supplemental pollination. "Let the wild bees do it." Apparently, in some areas, there were few remaining wild honey bee nests. The absence of pollinators was noticed. Supplemental pollination programs grew in importance and interest. The Africanzied honey bee issue began to decline. Pollination fees increased. Honey prices rose. Interest in honey bees began to rebound. Then Colony Collapse Disorder (CCD) struck, but that is yet another story. If anything, CCD only increased the concern about the honey bee population decline.

Beekeeping today

In 1985, I wrote, "My effort here has not been to write a rah-rah article – to rally the troops." That is still true in this article. Do you have a future in beekeeping? I have no idea. When it mattered most to me, I didn't even know if I had one.

I do know this. Beekeeping came roaring back from its dark days, in a fashion that I never imagined. Women have become major participants in the bee industry. As I predicted, computers and electronic support grew in ways I did not have the ability to predict. The web. Smartphones. Educational videos. Bluetooth de-

⁴Dave W. https://www.beesource.com/threads/what-is-mayerick.200499/

vices. Quality publications, like this magazine, evolved. Beautiful bee supply catalogs have become common. Remote streaming sessions on bee management abound. Higher honey prices and support for supplemental pollination are available to beekeepers. Who could have foreseen this present state of apiculture in the dark days of 1990?

And I also know this. *Varroa* mites are still right here, in my colonies, killing my bees. I will have higher Winter kill due to viral diseases vectored by mites. My queens once lived three to five years. Now, I get one season out of them, and they are much more expensive. Herbicides seem to be eliminating my bees' floral sources. Time are much better, but we still have challenges.

But you should know this. Presently, beekeeping is absolutely beautiful when compared to what it was from 1984-1990. One of my stranger comments is that, with a few improvements, beekeeping today is better, more vibrant, more diversified and more inclusive than it was when I began to keep bees in 1973. Even with our present problems, we are in a good place. Enjoy it. Cherish it. It was a hard fight to get here.

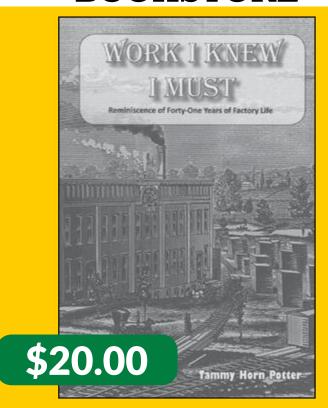
Dr. James E. Tew Emeritus Faculty, Entomology The Ohio State University tewbee2@gmail.com



Co-Host, Honey Bee Obscura Podcast

www.honeybeeobscura.com

Bee Culture BOOKSTORE

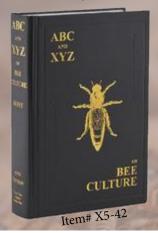


Jane Cole's "Reminiscence of Forty-One Years of Factory Life" and selections from A.I. Root's "An Eyewitness Account of Early American Beekeeping." A must have for every book collector. This book makes a great Christmas gift for your favorite beekeeper.

Order yours today at www.store.beeculture.com/books/

SKU: X228

Leading The Way To Successful Beekeeping Since 1811

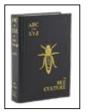


- Over 800 pages packed with information.
- Hundreds of color photos and illustrations.
- More than 50 contributors.
- A mix of reference, the how and why things are done and a history of how beekeeping got where it is today!
- A <u>MUST</u> for every beekeeper large and small.

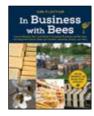
Order yours today at www.store.beeculture.com/books/

The Magazine of American Beekeeping

Bee Culture Booklist 2024



42nd Edition of ABC & XYZ of Bee Culture Since 1877 Leading the Way to Successful Beekeeping. Over 800 pages packed with information. Hundreds of color photos and illustrations . A mix of reference, the how and why things are done and a history of how beekeeping got where it is today! A MUST for every beekeeper.



Kim Flottum

\$26.00

SKU: X223

This book takes serious beekeepers past the beginning stages and learning curves and offers practical, useful advice to move your passion into a part-time or full-time career with measurable results. This beekeeping business how-to guide offers all of the in-depth advice you need, in one place.



AN EYEWITNESS ACCOUNT OF EARLY AMERICAN BEEKEEPING: THE AUTOBIOGRAPHY OF A.I. ROOT

\$10.00

Explore the birth of Modern Beekeeping from the perspective of Amos Ives Root. Beekeeping, Beekeepers, and a Profound Religious Conviction are all engaged. The first of many things we still do today!



\$20.00

SKU: X230

This absolute beginner's guide for first-time beekeepers will teach you how to set up and care for your first colonies, from choosing a location for your new bee colonies through natural bee care and harvesting beehive products.



THE NEW STARTING RIGHT

Kim Flottum & Kathy Summers

This book's primary intent is a learning tool for beginning beekeepers, but it is an exceptional source of information for anyone interested in the fascinating world of honey bees.



OUEEN REARING ESSEN

Lawrence John Connor

In this post-Varroa, post-Colony Collapse Syndrome era, beekeepers everywhere are developing localized, mite-resistant bee stocks. Key to this is their ability to raise queen cells and queens.



Tammy Horn Potter

\$20.00

Jane Cole's "Reminiscence of Forty-One Years of Factory Life" and selections from A.I. Root's "An Eyewitness Account of Early American Beekeeping."



Clarence H. Collison

\$25.00

A comprehensive study guide for every beekeeper, at any level. Test yourself to see what you already know, and what you need to know. Everything you've ever wanted to know about Honey Bees, Beekeeping, Beekeepers and the world they inhabit.



A CLOSER LOOK - BASIC **HONEY BEE BIOLOGY**

Clarence H. Collison

\$15.00

Collison has collected much relevant biology in one place, updating our knowledge of what makes bees so interesting and distinctive organisms. Suitable for master beekeeper programs, college-level courses and general knowledge beekeeping.



Ross Conrad

\$35.00

Whether you are a novice looking to get started with bees, an experienced apiculturist looking for ideas to develop an integrated pest-management approach, or someone who wants to sell honey at a premium price, this is the book you've been waiting

Find these books and more at Store.BeeCulture.com/Books

Oatmeal with Elderberry Honey

Fay Jarrett

Ingredients

- □ Oatmeal
- □ Water
- \sqcap Milk
- □ Honey (elderberry flavored honey was used here)
- □ Fresh fruit



Directions

Start your Spring morning with a warm, hearty breakfast that's packed with nutrients and flavor.

Step 1

Use two cups of water for every 1 cup of oatmeal.

Step 2

Put the water and oatmeal into an Instant Pot.

Step 3

Cook in the Instant Pot under the porridge setting.

Step 4

Once the oatmeal is cooked, put in a bowl with a small amount of milk.

Step 5

Add honey and fresh fruits. I recommend blueberries, raspberries, strawberries or bananas.



CALENDAR

PENNSYLVANIA

A Queen Rearing Intensive Program will be held at Delaware Valley University in Doylestown, PA on Saturday, May 18 and Sunday, May 19, 2024 from 9am to 4pm. Queen cell pick up will be Tuesday, May 28, 2024 from 4pm to 6pm.

The benefits of raising your own queen include: having queens adapted to your environment, avoiding southern queens that may have mated with Africanized drones and establishing your own nucleus colonies.

Designed for the experienced beekeeper, this course will include the basics of queen rearing, grafting larvae and using the Mike Palmer method of queen rearing. You will have the option of taking your queens home.

Prerequisites: Attendees must have some beekeeping experience.

Taught by Master Beekeeper Vincent J. Aloyo, Ph.D. For more information or to register, see https://vincemasterbeekeeper.com/courses/.

WEST VIRGINIA

The West Virginia Beekeepers Association is proud to announce their 2024 Spring Conference on April 5-6, 2024. The conference will be held at the Clarion Inn in Harpers Ferry, WV.

Larry Connor, Ph.D. will appear as the keynote speaker with presentations from Steven Cook, Ph.D. of the Beltsville Bee Lab in addition to numerous breakout workshops.

The American Honey Show Training Council will be hosted, offering their cutting-edge modified Welsh judging style in a parallel program as the introductory honey judging training class.

Also, the Beekeepers in Training (BIT) Children's Program, presented by the Mountaineer Beekeepers Association, is back at the WVBA Spring Conference.

Information and online registration is open on the https://www.wvbeekeepers.org/ website.

REGIONAL

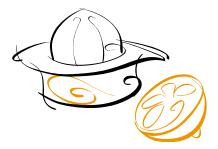
Eatern Apicultural Society's 69th Annual Short Course and Conference entitled "Think Like a Bee" will be held on August 5-9, 2024 at Turf Valley Resort in Ellicott City, Maryland.

The EAS Short Course (Monday to Wednesday) and Annual Conference (Wednesday to Friday) will be a time for beekeepers to gain and exchange knowledge, experience laboratory workshops and apiary inspections, attend speaker presentations, participate in day trips and dinners, meet new acquaintances, grow friendships and chance upon the latest and greatest products from our leading industry vendors.

Keynote speakers include Dr. Michelle Flenniken (Virus Impacts on Honey Bees), Dr. Jeff Pettis (Beekeeping in a Changing World) and Same Droege (Honey Bees versus Native Bees and Microphotography).

In addition to the keynote speakers there will be courses on beekeeping practices and practical skills, interactive, hands-on workshops in EAS on-site apiary, groundbreaking presentations on a spectrum of topics essential to beekeepers, a tour of the USDA Bee Research Laboratory, a honey show, a children's program, a bee olympics, a vendor trade show of beekeeping supplies and equipment and a resort venue close to attractions in Maryland, Washington DC and Virginia.

Watch for updates at: https://easternapiculture.org/conference/eas-2024/. See you in Maryland!



CLASSIFIEDS

FOR SALE

- Five frame nucs \$165. Overwintered \$190. Also hives and supplies, call for shipping and discounts. (717) 548-0330, 244 Soapstone Hill Rd., Peach Bottom, PA 17563
- Five frame nucs with Ohio queens. Very good survival and honey production \$175. Summer's Gold Apiaries, Wooster, OH (330) 641-4307

Contact Jen Manis to place an ad: Jen@BeeCulture.com



Do you know about our daily email newsletter?
It's all about current news in the beekeeping industry.
Each article is new and different every day.

Interested? Subscribe at this link or scan the QR code!
www.BeeCulture.com/Catch-Buzz/
Subscribe-Newsletter

Celebration of Kim Flottum's Life

April 13, 2024 12:00 Noon

at

Medina Community Church 416 South Broadway Street Medina, Ohio

Please come and help us as we honor Kim's amazing journey and share memories with each other as we try and manage life without him.

If you are coming from out of town or state please let Kathy know so we can help with any questions or details.

There will be a meal served after the service.

Questions or messages you can contact Kathy **kathyksummers@gmail.com**330.461.1081

Display Advertisers ABC and XYZ of Bee Culture......91 Gardner Apiaries78 R Weaver Apiaries......52 All My Bees......85 Global Patties17 Rayonier Land License......28 American Bee Journal......65 Resilience Queens......77 Roberts Bee Company......39 American Honey Producers 39 Hansen Honey Farm38 Autobiography of A.I. Root 75 Hardeman Apiaries32 Honey Bee Health Coalition...... 52 Ross Rounds......29 B & B Honey Farm......78 Humble Abodes85 Rossman Apiaries38 JZs BZs Honey Company......77 Bee Culture Advertising......74 Simple Harmony Farms – Hive Tool Bee Culture Bookstore.....92 Kona Queen......2165 Bee Culture Magazine.....4 Simple Harmony Farms - Uncapper Bee Culture Subscriptions......16 Liberty Tabletop......2478 Bee Smart Designs......14 Simpson's Bee Supply......77 Beekeeping Insurance Services ... 15 Mann Lake Back Cover Spell Bee Company......78 Maxant Industries53 Strachan Apiaries39 Beeline Apiaries46 Beetle Jail – Swarm Trooper...... 64 Sullivan's Queens78 Betterbee36 Sunshine Honey Bees33 Blue Sky Bee Supply Misco......38Inside Back Cover Swarm Catcher 53 Bucko Gloves53 NOD79 B-Z Bee Queens and Packages 24 Tauzer Apiaries......41 Olivarez Honey Bees Inc......53 UMT Master Program.....46 C. F. Koehnen & Sons......32 Olivarez – Help Wanted41 Catch the Buzz94 OxaVap......46 Complete Bee......46 Paradise Queen Hawaii.....21 Dadant - Kits......20 Dadant - Mite Treatments.....5 Pierco Frames.....Inside Front Cover Project Apis m......47 Wicwas Press......65 Wilbanks Apiaries36 Dakota Gunness......65 Propolis etc......29 Winters Apiaries78 Ernst Seeds45 *Work I Knew I Must.....* 91 Farming Magazine......85 Forest Hill Woodworking......47

Image Contest – Splitting & Nucs

We've started an image gallery! This month, we want to see any and all pictures you have of your **Splitting Hives** and **Making Nucs**. Please make sure that your image is nice and big! We may pick your image for the gallery, or you have the chance to get on the cover! So get creative.

How To Submit:

Email your images to **Jen@BeeCulture.com**Use the subject "**Image Gallery**"

Please include in your email:

- The image as an attachment (we will not consider it if it is embedded)
- Your First and Last name
- Your mailing address
- Your renewal code (if you know it)

If your image is chosen:

For the Gallery:

You will get three months added to your current subscription.

For the Cover:

You will get twelve months added to your current subscription.

learned a lot about pain management over a lifetime working on the Aspen ski patrol. Basically, pain's not a problem, as long as it's not yours! Nowadays the patrols I'm familiar with have paramedics licensed to administer drugs, including fentanyl, for pain. They can brighten an unlucky skier's day, sometimes literally within seconds.

It wasn't always so. Back in the day, we'd simply "load and go." Let's say the unfortunate patient (we called them "victims") had a "boot-top" leg fracture. The knee might be pointing north and the toe of the ski boot south. Ouch! This is not good. So I, one of generally two patrollers on scene, might say to the victim, "We're going to have to straighten your leg to get it in this splint. This will hurt a little, but then it'll feel better, okay?" The "okay?" was rhetorical. The victim had no choice. We had no pain drugs and no plan B.

In a single, ideally smooth move, I'd cradle the victim's calf above the break with my left hand while simultaneously pulling traction on the ski boot and straightening the leg with my right. Meanwhile another patroller would slip a foam-padded wooden splint under and around the leg to immobilize it. The victim might cry out with great vigor, but nine times out of 10, they'd feel enormous relief as soon as their leg re-assumed its natural alignment, the screams sometimes followed by the most sincere gasps of "Thank you, thank you, thank you!"

I felt I became very competent at instructing other people to bite the bullet, for their own good.

Of course pain is nothing if not personal, and me telling you to "Toughen up, Buttercup!" has no bearing on my own ability to take a punch.

I've had a bum knee and a hitch in my git-a-long for 30 years, and I thought this past December $21^{\rm st}$ might be a good date to get it replaced. The surgeon took x-rays and assured me that my old knee was all used up. The cushioning cartilage between the bone ends was basically gone. I was an ideal candidate for a total knee replacement. He laid out a convincing case.

He did not tell me that I might experience abnormal swelling that would retard my healing, nor did he foretell that I might not be able to tolerate my NSAID pain medications. He never warned that the opioids that became the mainstay of my pain control would make me too stoned to write my *Bee Culture* column.

Then six weeks post-op the gal Marilyn and I caught COVID. Let's just say I'm not making a model recovery. To make matters worse, I'm inclined to feel sorry for myself when things don't go my way.

Of course I got all the medical treatment Medicare can buy – the doctors, the nurses, the pain drugs that worked and the ones that didn't, the antibiotics. I had Marilyn at my side and the prospect of a new knee that might actually work better than the old one. But for a time, I was incapacitated and uncomfortable, and I wasn't happy about it.

We can forget how good we have it. Every day, halfway around the world in Gaza, scores of children are killed or maimed – their little arms and legs blown off, with no painkillers, no antiseptic, no antibiotics, no mothers or siblings to comfort them, little to eat, no clean water to drink. This is an unspeakable horror. It puts my own pathetic miseries to shame, and it should yours as well.

Count your blessings, beekeepers! It's early February as I write. Tina emailed me a piece she sent out to her bee club warning that late Winter is crunch time for our little darlings and that we all ought to be out there making sure they have sufficient honey stores. I wrote back that my bees were going to have to make it on their own, owing to my ongoing knee rehab.

The following day was bluebird but without the bluebirds! They haven't arrived yet. The mercury hit 50, and despite what I just told Tina, I looked at 19 overwintering nucs here on the farm. They're mainly singles stacked two-high so they can share the heating bill. I didn't have to do much lifting. I fed one. I did it the easy way. I put a one-inch spacer on top of the brood super, spread a sheet of newspaper over the top bars, and dumped dry sugar on top of that. This is your "mountain camp" technique. I have no idea why they call it that, but it's quick and easy. Bees won't build up on dry sugar, but it'll keep them from starving.

Some beekeepers like to make things complicated, but not me. There's always a hard way to accomplish any task, and there's generally an easy one.

Some guy has a ranch out west of here, and he wants bees. He has no idea what keeping bees alive entails, but I'll give him some credit. He signed up for an online beekeeping course through Penn State. I told him to call me back when he finishes the course. Then he wants me to meet with his ranch manager. I told him I'm not for hire. It's just not the way I roll. I said I'd talk with them on the phone. I can make it succinct. It's not what anybody wants to hear: To succeed you first need to fail.

And I agreed to sell him a couple of nucs this Spring. Everybody wants to be a beekeeper.

Gentle reader, contact Ed Colby at Coloradobees 1@gmail.com. Ask him to promptly mail you an autographed copy of A Beekeeper's Life, Tales from the Bottom Board – a collection of the best of his Bee Culture columns. Price: \$25.

Pain Management Ed Colby

BOTTOM BOARD

Block Hall Beprepared for splits bee supply®

DEEP 1-FRAME FEEDER WITH CAP & LADDER \$13.95

New cap and ladder system prevents drowning and comb build-up in the feeder.





ORDER A PRO NUC
7-PACK AND RECEIVE
A "BEES" SIGN

PRO-NUC 7-Pack for \$122.50 Excellent transport box! Great for selling nucs!



PARADISE POLYSTYRENE 3/6 FRAME NUC KIT

Includes screened bottom board with 2 entrances on opposing corners, 2 entrances reducers, deep nuc body (unassembled), and cover. (frames & foundation not incl)

When operating as a 6 frame colony, one entrance can be closed completely. When used with the optional corrugated divider board, each 3 frame nuc can have its' own entrance on opposing corners.





6 FRAME CORRUGATED DIVIDING BOARD \$7.95

ALL PRICES IN THIS AD ARE SUBJECT TO CHANGE

Caps



PRINTED **METAL CAPS**

Available in 2 designs & 2 sizes! 58mm to fit our 12 oz. skep jar or 12 oz. hex embossed cylinder. 43mm to fit our 3 oz. skep jar.



a PLASTIC PANEL BEARS

2 oz Panel Bears \$70.21 / 160 Ct. Case WITH Caps 12 oz Panel Bears \$129.95 / 365 Ct. Case No Caps 16 oz Panel Bears \$98.95 / 200 Ct. Case No Caps

Plastic



DECO EMBOSSED JUGS

5 LB - \$103.95 / 72 Ct. Case 3 LB - \$127.95 / 126 Ct. Case No Caps 1 LB - \$140.44 / 300 Ct. Case No Caps CLASSIC PLASTIC JARS

32 oz - \$79.95 / 110 Ct. Case

No Caps 16 oz - \$96.95 / 225 Ct. Case No Caps

SOUARE PLASTIC

16 oz - \$259.95 / 343 Ct. Case With Lids



QLASS 3 OZ. MINI MASON

\$17.95 / 24 Ct. Case Lids now available in Gold, Black or White

🕜 GLASS 12 OZ. HEX EMBOSSED CYLINDER

\$11.95 / 12 Ct. Case Gold Metal Lids Included

12 OZ & 3 OZ GLASS SKEP JARS

12 oz Skep Jars \$16.95 / 12 Ct. 3 oz Skep Jars \$14.95 / 24 Ct. Gold Metal Lids Included

MUTH JARS

4 oz - \$31.95 / 36 Ct. Case 8 oz - \$14.95 / 12 Ct. Case 16 oz - \$22.95 / 12ct. Case Includes Corks

CLASSIC GLASS JARS

8oz - \$19.10 / 24 Ct. Case 16 oz - \$10.60 / 12 Ct. Case 32 oz - \$15.75 / 12 Ct. Case

ALL PRICES IN THIS AD ARE SUBJECT TO CHANGE

FOR BEES. FOR HONEY. FOR EVERYONE. (877) 529-9BEE

WWW.BLUESKYBEESUPPLY.COM



Quality Nutrition



Higher Honey Yields



Ready to Use



Protein Rich



HONEY BEE FEED IN CONVENIENT PATTY FORM









ULTRA BEE ROCKET FUEL

Scientifically Formulated Complementary Bee Feed

SAME GREAT FORMULA AS ULTRA BEE PLUS WITH THE INCLUSION OF 5% NATURAL POLLEN AND APIS BIOLOGIX MAKING IT THE ULTIMATE POLLEN SUBSTITUTE.

Apis Biologix Bio-Activator fills the gap between pollen substitutes and natural forage for bees. It contains vital nutrients from natural pollen: vitamins, carotenoids, amino acids, enzymes, and trace minerals aiming to offer a balanced alternative for bee health.

Natural Pollen Substitute with APIS BIOLOGIX BIO-ACTIVATOR.

Bio-Activator is intended to bring the nutritional profile of pollen supplements into alignment with that of floral pollen.





High protein content to promote brood rearing



Contains 5% natural, **USA** pollen, irradiated to prevent the spread of honeybee diseases



Made with high-quality ingredients







800-880-7694



locations

