NEBEEC
The Beekeeper's Digest

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Welcome to the NEBEEC Beekeeper's Digest!

NEBEEC (Northeast Beekeepers Education Collaborative) brings beekeepers the best available and most current knowledge for practical beekeeping success. This monthly newsletter provides summaries and highlights of:

- Presentations to local bee clubs
- Journal articles
- YouTube videos
- Podcasts
- Research updates

NEBEEC also has an opt-in, collaborative Slack-based community for members to interact in. This community also has an embedded and customized AI chatbot for answering members beekeeping questions.

Forward this newsletter to other beekeepers you know! Spread the word.

To subscribe, find previous issues or join the NEBEEC Slack community — visit nebeec.org

Suggestions or feedback? Write us at nebeec@gmail.com

Russ Holden — Reporting

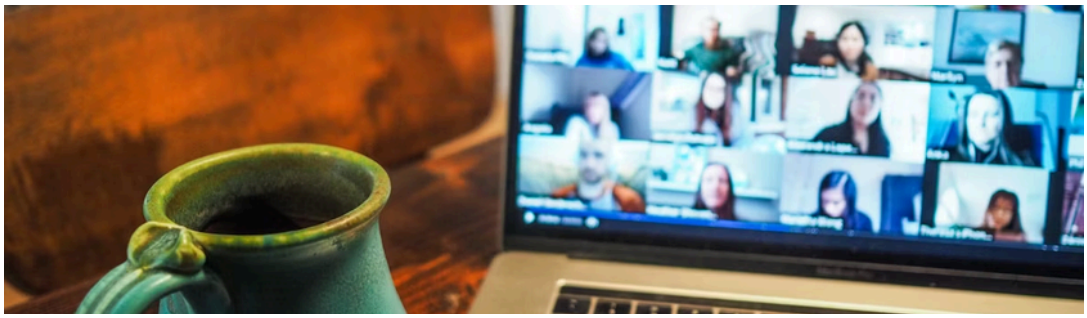
Beekeeping Nuggets

Honey Honey Bee Health Coalition has published the 9th edition of their Varroa Management Guide. I suggest giving it a thorough read - https://honeybeehealthcoalition.org/wp-content/uploads/2026/06/HBHC-Guide_Varroa-Mgmt_9thEd.pdf

Kamen Reynolds has announced dates for the 2027 North American Honey Bee Expo. It will be January 7-9, 2027, in Louisville at the same venue as last year. I attended it for the first time in 2026 and highly recommend it. See https://www.nahbexpo.com/. I'm registered!

The 2026 Eastern Apicultural Society conference will be in Shepherdsville Kentucky (just a bit south of Louisville) from July 26-31st. I will be making my first attempt at the EAS Master Beekeeper Exams there. Send good thoughts! Though I will effectively miss the first 3 days of the conference because of the exams I'll do what I can to report on talks on the last 2 days.

Upcoming Events



Connecticut Beekeepers Association – July 9, 2026, 6:30-8:00pm EDT. Bill Hesbach leads the CBA monthly Q&A for members on Zoom on the 2nd Thursday of each month. https://www.ctbees.org/upcoming-events. These meetings are also recorded and are available for replay via the CBA website and (currently) made public on their YouTube channel.

MDAR Honey Bee Education Days – July 17, 2026, 1-3pm. "Pests, Parasites and Pathogens". University of Massachusetts Agricultural Learning Center Farm, 911 North Pleasant St, Amherst MA and Bristol County Agricultural High School Standish House Admin Building, 28 Center St, Dighton MA.

At Home Beekeeping Series **-** July 28, 2026, 7:30-8:30pm EDT, R. Tokach, North Dakota State University, will be presenting on "Varroa Control: Understanding what to treat with and when". See https://www.aces.edu/blog/topics/bees-pollinators/at-home-beekeeping-series/

MDAR Northeast USA Honey Bee Update Lunch & Learn Series – August 7, 2026, 12-1:30pm. This excellent series is back for 2026. It brings together apiary inspectors across the northeast to talk about the state of bees and beekeeping in the region. Registration required. https://us06web.zoom.us/webinar/register/WN_y5hKOVHyTuep7N7BoovQvA

Connecticut Beekeepers Association – August 13, 2026, 6:30-8:00pm EDT. Bill Hesbach leads the CBA monthly Q&A for members on Zoom on the 2nd Thursday of each month. https://www.ctbees.org/upcoming-events. These meetings are also recorded and are available for replay via the CBA website and (currently) made public on their YouTube channel.

At Home Beekeeping Series **-** August 15, 2026, 7:30-8:30pm EDT, Amy Vu, University of Florida, will be presenting on "Honey Bees of Thailand". See https://www.aces.edu/blog/topics/bees-pollinators/at-home-beekeeping-series/

Notes From Recent Live Events

At Home Beekeeping Series - June 30, 2026, Dr Juliana Rangel, Queen Management Essentials. Dr Rangel is one of the great speakers around. If you enjoyed this presentation, you can also see her in person at the Worcester County Beekeepers Association Fall Speaker's meeting on October 7, 2026.

Takeaways:

- Queen health is influenced by genetics, environment, nutrition, pathogens, and beekeeping practices.
- High genetic diversity is needed to avoid inbreeding, which leads to problems like diploid drone production.

- Diploid drones are the result of a fertilized egg having 2 copies of the same CSD gene allele. But these are inviable and removed by workers, resulting in a "shot brood pattern". If this happens significantly, replace the queen.
- Queens need access to a large and genetically diverse drone population for healthy mating.
- Drone quality is affected by rearing conditions. For example, Amitraz in wax can reduce drone sperm viability.
- Queens lose sperm over time - after two years, sperm stores are greatly reduced.
- Colonies with younger queens produce more brood and are less prone to swarming.
- Recommendation - track queen age and replacement history
- Supersedure is caused by worker-perceived decline in queen quality (e.g., pheromone changes).
- Failed supersedure can lead to queenlessness or poor-quality queens if larvae selected are too old.
- Recommendation – proactively requeen every 1-2 years instead of waiting for natural supersedure.
- Queen Mandibular Pheromone (QMP): Regulates worker behavior, suppresses worker ovary development, and signals queen presence.
- Recent research shows other pheromones (e.g., cuticular hydrocarbons) also play roles in reproductive regulation.
- Queens reared in contaminated wax have reduced egg-laying and attract fewer attendants.
- Varroa mites, Nosema, and viruses can affect queen health and pheromone output.
- **Nosema infection seems to increase queen egg-laying** but reduces retinue size.
- Colonies fed real pollen outperform those fed substitutes in brood production.
- Adding natural pollen to diets increases brood area and overall colony health.
- Habitat fragmentation and urbanization is leading to increased pathogen pressure and increased mortality.
- Temperature extremes are affecting queen development and long-term health.
- Regularly inspect for signs of queen failure (e.g., shot brood, multiple eggs per cell, queenlessness).

Podcasts

Beekeeping Today Podcast – July 6, 2026, **"Building Better Bee Nutrition and RNAi Tools",** Vincent Ricigliano, PhD, USDA Pollinator Health Lab in Davis, California.

Takeaways:

- Bees require more than just protein; they need a balanced diet including amino acids, lipids, vitamins, minerals, and antioxidants found in pollen.
- Monoculture agriculture leads to unbalanced bee diets; pollen substitutes are often nutritionally incomplete.

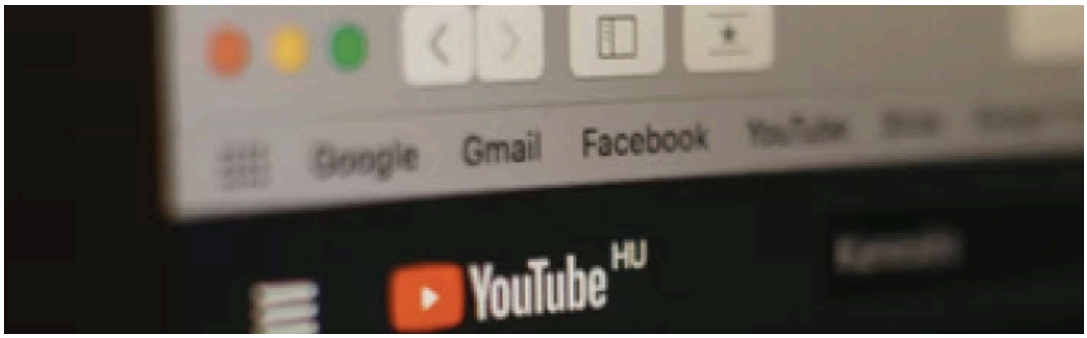
- Algae species like spirulina and chlorella have nutritional profiles similar to pollen—rich in bioavailable protein, essential amino acids, and micronutrients.
  - Algae can be grown efficiently, using little water and non-arable land, without competing with human food sources.
  - High concentrations of algae reduce palatability for bees – they stop taking it if the algae percentage in feed is too high. Research is ongoing.
  - Algae protein is highly bioavailable - bees can consume less algae than pollen to get the same nutritional value.
  - Other industries (e.g., poultry) already use algae in feed.
- In addition to being a potential pollen substitute, algae can be engineered to deliver double-stranded RNA (dsRNA) for RNA interference (RNAi).
- Engineered algae fed to bees reduced DWV virus levels and improved survival in lab trials simulating mite transmission.
- Algae-based RNAi is potentially a cost-effective and sustainable delivery method compared to purified pharmaceutical RNA.
- Research is expanding to target multiple viruses and Varroa mites, including combating miticide resistance.
- Plans are underway for commercial-scale field trials, pending funding and production capacity.

UFHoneyBeeLab - Laying Workers: Queen Related Stressors, June 26, 2026.

Takeaways:

- The queen emits pheromones that suppress ovary development in workers. Without this some workers develop ovaries and begin laying eggs.
- Only drones are produced, leading to colony failure as drones cannot perform essential worker tasks.
- Signs: (1) Only drones are produced after the queen's brood emerges. (2) Drone cells scattered randomly across, (3) Multiple eggs per cell, often placed on cell walls, bottoms, or tops, (4) Eggs laid in inappropriate places, such as on pollen.
- Newly mated queens may lay multiple eggs per cell, but these are on the back wall, and the behavior corrects itself in 4–6 weeks. Workers continue erratic egg-laying indefinitely.
- The best method for resolving a laying worker situation is to use a queen-right nucleus colony to requeen the laying worker colony.
- Simply introducing a new queen often fails as laying workers mimic queen pheromones, causing the colony to kill introduced queens.
- Shaking bees out and away from the hive is less preferred but may reduce the number of laying workers and improve the chances of rescue. Laying workers are flying age, can fly but often are not well oriented to the colony location and may not be able to get back.
- If a colony is too far gone, combine remaining bees and combs with a strong, queen-right colony to preserve resources and prevent comb destruction by pests.
- **Apis mellifera capensis** have a unique trait - workers of this subspecies can lay diploid eggs via "thelytokous parthenogenesis", enabling them to produce female offspring without fertilization. This is an exception among honey bee subspecies.

YouTube Channels



National Honey Show – Lynfa Davies, "Beekeeping when the weather and conditions don't play ball" – July 3, 2026. https://www.youtube.com/watch?v=xv4jpTmPsNA. The major changes to the timing of flowering of various plants and trees as well as more extreme temperatures and, in our area, later flying weather, are all having significant impacts on bees and beekeeping. This talk is about the changes in the United Kingdom (the speaker is from Wales) specifically, but the general observations apply to many places.

Takeaways:

- Across the world there are more extreme weather events and less predictable seasons.
- Warmer Junes, more days of rain, increased sunshine in some areas.
- Effects differ by location; droughts in some areas, increased rain in others.
- Harder to predict or plan beekeeping activities and training.
- Spring Scenarios:
  - Warm, early Spring - Bees forage more, bigger honey crop, early queen rearing, but higher risk of early swarming.
  - Cold, wet Spring - Bees rely on winter stores, have higher disease risk, poor nutrition, delayed queen mating, harder inspections and swarm control.
- Unpredictable springs and wet autumns can shorten or disrupt the productive season.
- Bees that have evolved in local conditions cope better with extreme weather.
  - Prioritize winter hardiness and local stock.
  - Studies show local queens outperform imported ones in survival and productivity.
- Manipulations (Splits, Shook Swarms, Queen Rearing):
  - Only perform when colonies are strong and conditions are suitable.
  - Monitor forecast; avoid manipulations in poor weather.
  - Queen rearing: Spread risk by doing multiple rounds; ensure drone presence.
- Forage Crops: Encourage clover-rich pastures, pollinator strips, and green manures.
- New Crops: Soya bean, buckwheat, and lucerne (alfalfa) are potential future bee forages in the UK.
- Engage with Farmers: Discuss planting beneficial crops; may offer honey as incentive.
- Pollen Diversity: A variety of pollen colors in frames indicates good nutrition.
- Plant Selection: Bees tend to focus on four main plants in an area, but access to diverse forage improves health and productivity.
- Daylength: Principal driver of spring buildup; weather modifies the rate but not the trigger.
- Adapting Management: Be guided by colony conditions and environmental cues, not just calendar dates.

Recent Journal Articles of Note

Bee Culture, July 2026 – "A Closer Look – Sublethal Effects of Pesticides on Honey Bees", Clarence Collison, pages 15-17. Dr. Collison goes through many of the studies showing the myriad of sublethal impacts on honey bees by pesticides. The article provides the actual citations – I haven't included them for brevity.

Takeaways:

- Neurotoxic insecticides reduce bees' learning and memory, impairing foraging and navigation.
- Neonicotinoids and fipronil suppress bee immunity, increasing vulnerability to parasites and viruses.
- Sublethal exposure contributes to colony declines by weakening individual bees and facilitating disease spread.
- Poor nutrition combined with low-level pesticide exposure drastically reduces survival, food intake, and energy reserves.
- Bees from colonies exposed to imidacloprid show higher susceptibility to *Nosema* infections. Combined exposure to pesticides and pathogens increases mortality.
- Not just insecticides, but also herbicides (e.g., glyphosate) and fungicides can have sublethal effects.
- Chronic exposure to multiple pesticides during larval stages reduces survival and alters development, including gene expression related to detoxification.
- Chronic exposure to imidacloprid and glyphosate impairs olfactory learning in young worker bees.
- Sublethal imidacloprid disrupts bees learned color preferences, likely due to memory loss, affecting foraging efficiency.
- Developmental exposure to neonicotinoids damages queen reproductive organs and sperm storage, reducing queen success and colony viability.
- The traditional LD50 metric underestimates risk, as it ignores sublethal, chronic, and synergistic effects.
- Probiotics may mitigate some negative impacts but require further study.
- Proper management is essential to minimize pesticide contamination.
- Young worker bees are sensitive to sublethal effects and can indicate hive health.

Bee Culture, July 2026 – "It's Ok to Love All the Bees (The Honey Bees, Too)", Christina Grozinger, Andony Melathopoulos, Clare Rittschof, Harland Patch and Jay Evans. There has been backlash against beekeepers of late based on the claims that honeybees are non-native, hence bad and are doing damage to native pollinators. I had a personal experience of trying to get help from a local land restoration organization to help me figure out how to convert a large hay field into a pollinator-friendly space. They wanted to make sure I wasn't planting forage for honeybees with the obvious implication about their beliefs. This paper talks to the scientific reality of such claims.

Takeaways:

- Evidence does not support the claim that managed honey bees are causing native bees to disappear. Populations of many species of bees, including honey bees, are struggling.

- One-fifth of pollinators in North America are at risk of extinction due in large part to habitat loss, rising temperatures, extreme weather, diseases and pesticides.
- About 75% of the world's agricultural crops benefit from pollinators
- In the United States, pollination by insects contributes $34 billion to the economy and honey bees are the most important for agriculture crops.
- Managed honey bees are particularly essential in intensively farmed areas that lack the natural habitat to support wild bees.
- A common concern is that honey bees will outcompete wild bees for pollen and nectar. So, the logic goes, if resources are limited, the more bees present on the landscape, the less food there is to go around.
- Managed bees can also carry viruses and other pathogens that may infect native bee species.
- Meaningful data examining the effects of honey bees on other species is scarce. In a recent analysis, the authors found that only 15% of 116 published studies on resource competition involving honey bees measure how competition from honey bees affects the survival of native species.
- About half of the research suggests that honey bees don't change the way native bees forage at all.
- An analysis of bee communities found the abundance of honey bees and the abundance of native bees were positively associated about five times as often as they were negatively associated.
- Calls to restrict honey bees from certain locations also often miss a key reality - native bee hot spots and urban and commercial beekeeping rarely overlap.
- The top drivers of pollinator declines are (1) Land use – the spread of cities and agriculture, as well as the way land is managed, (2) Rising temperatures, (3) extreme weather and (4) pesticide use.
- Modern agricultural reduces the amount and diversity of flowering plants, and droughts can reduce plant flowering, and the resources bees rely on. Pesticides can reduce bees' ability to lay eggs and care for their offspring, or they can kill bees outright.
- A study using data in the mid-Atlantic region found that urbanization and weather changes have been the major drivers of changes in wild bee abundance and diversity. And, as temperatures rise, wild bee populations are expected to decline in this area.
- The western bumblebee was once widespread and abundant across western North America, but it has been in decline since the late 1990s.
- The biggest threat to pollinators is the disappearing variety of flowering plants. You can help reverse this by filling your garden with more flowering plants, trees and shrubs to give bees, butterflies and other pollinators a variety of food sources.
- You can also advocate for bee-friendly behavior in your community, such as creating pollinator habitats in public and private spaces and reducing the use of harsh pesticides and herbicides.

American Bee Journal, July 2026 – "Two Queen Systems", Bill Hesbach, pages 769-773. I love the idea of two-queen systems and have tried them in small amounts. But the challenge of working a tall stack in a vertical system will quickly dampen my enthusiasm. Maybe I'll try a horizontal system next year.

Takeaways:

- Temporary coexistence of two queens can occur:
  - *Supercedure*: A daughter queen may coexist briefly with her aging mother before the older queen is removed, usually with minimal direct conflict.
  - *Swarming*: Multiple virgin queens may emerge at once, and direct combat may be delayed, allowing more than one queen to survive temporarily.
- During queen duels, one queen may spray rectal fluid on her rival that can interrupt fighting. This may allow weaker queens to retreat and survive, occasionally leading to temporary multi-queen colonies lasting weeks to a year.

- Research shows that queens can assess their fighting ability (e.g., queens with clipped mandibles are less likely to fight).
- Two-queen colonies produce more brood, resulting in larger populations. Larger colonies allocate a higher proportion of workers to foraging (up to 9.5% vs. 4.3% in small colonies).
- In two-queen systems, increased brood and worker emergence alter the nurse-to-larva ratio. Reduced brood pheromone and nutritional demands accelerate worker development, with some bees becoming foragers as early as 7-10 days old.
- Two-queen systems increase pheromonal signaling, possibly reducing swarming by ensuring more uniform distribution of queen pheromones.
- Studies show two-queen colonies can yield up to twice as much honey as single-queen colonies, with less equipment and labor per pound of honey.
- Managing two-queen systems enhances beekeeping skills, aids weak colonies, helps manage swarming, and supports requeening.
- **Vertical Two-Queen Systems**
- *Structure*: Stacked brood chambers with queen excluders and honey supers.
- *Challenges*: Tall stacks are heavy and difficult to manage.
- *Equipment*: Double-screen boards are used for control and manipulation.
- **Horizontal Two-Queen Systems**
    - *Structure*: Two brood chambers side by side, sharing honey supers.
    - *Advantages*: Easier access, flexibility, and frame redistribution between colonies.
    - *Queen Excluder*: Prevents queens from crossing; must be flat and well-fitted to avoid gaps.
- Half-covers are needed to protect brood chambers when supers are stacked between them.
- Modifications may be required to ensure tight fits and prevent water intrusion.
- A two-queen system is best started with strong overwintered colonies, split early.
- Accurate prediction of main nectar flow is crucial.
- Maintaining a bloom calendar helps track local floral resources and optimize preparation timing.

Research Updates

Hristov, Y.V., Koev, K., Tsvetanov, T. and Balkanska, R., 2026. Major Honey Bee Diseases and Possibilities to Control Them with Essential Oils. *Insects*, *17*(6), p.634.

There are a decent number of peer-reviewed showing benefits of various essential oils at least in controlled cases with thyme oil showing widespread benefits in particular.

Takeaways:

- Infectious and parasitic diseases are central drivers of colony decline and reduced productivity.
- Antibiotics are limited by regulation, resistance, residues and do not eliminate persistent spores of AFB.

- Synthetic acaricides create resistance and chemical residues are growing concerns.
- There is no effective chemical treatment for chalkbrood.
- Fumagillin for Nosema is restricted in some regions.
- Essential oils are volatile, lipophilic plant extracts with complex mixtures of terpenoids and phenylpropanoids (e.g., thymol, carvacrol, eugenol, cinnamaldehyde).
- Chemical composition varies by plant species, origin, extraction, and processing.
- Minor constituents can significantly affect biological activity.
- **American Foulbrood (AFB)**
- In vitro: Strong evidence for inhibition of vegetative *P. larvae* by cinnamon, thyme, clove, oregano, thymol, eugenol, carvacrol, cinnamaldehyde.
- Field/Semi-field: Limited, inconsistent results; no evidence for reliable spore inactivation or long-term disease control.
- Conclusion: Essential oils are promising as adjuncts, not replacements; need more field validation.
- **European Foulbrood (EFB)**
- In vitro: Some oils inhibit *M. plutonius* and secondary bacteria.
- Field: Sparse evidence.
- Conclusion: Preliminary; needs more EFB-specific, colony-level studies.
- **Varroa destructor**
- Lab studies: Many oils show acaricidal activity (thymol, oregano, citrus, mint, eucalyptus, etc.).
- Field: Thymol-based products have the strongest field evidence (efficacy up to 90%+), but efficacy depends on formulation, delivery, temperature, colony status.
- Conclusion: Thymol is best supported; delivery method is crucial; other oils need more robust field data.
- **Nosema**
  - Lab/Field: Thymol and some plant extracts reduce spore load and improve bee survival, but mechanism is unclear.
  - Field studies: Efficacy varies (e.g., thyme oil up to 84% reduction), but outcomes depend on many confounding factors.
  - Conclusion: Promising, but mode of action and field reliability need clarification.
- **Chalkbrood**
- In vitro: Many oils inhibit chalkbrood (camphor, citronellal, cinnamon, coriander, basil, thyme, etc.).
- Field: Cedar oil and thymol show high reductions in some trials, but environmental and colony factors strongly influence outcomes.
- Conclusion: Moderate evidence but need more field studies.

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