

Wolfpack's Waggle

NC State Apiculture Program Newsletter

Dedicated to the dissemination of information and understanding of honey bee biology and management

Issue 3 | Jul 2020

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What have we been up to?

We have been adjusting about as well as can be expected under the circumstances. The campus at NC State has slowly been loosening the restrictions for personnel and spacing, which has allowed for more work to be done in the lab versus remotely. Nonetheless, we have taken this time to catch up on some much-needed manuscript writing and data analysis, since the last few years have been so productive that we've gotten really far ahead of ourselves! Joe Milone successfully defended his thesis and has moved on to greener pastures, leaving Hannah as the sole graduate student at the moment and busily writing up her own thesis on the pollinator communities of North Carolina. Jen has been doing all of the beekeeping by herself this season, but at least she hasn't been scrambling with as many research projects! Sharon has been continuously updating our BEES offerings, and Brad and Esmaeil have been writing at a furious pace. Nevertheless, like everyone, we can't wait to get back to normal...



Multiple options for online learning about bees and beekeeping

In addition to our Beekeeper Education & Engagement System (BEES), we have grown the number of options for beekeeper education online (see Page 3).





HONEY BEE QUEEN AND DISEASE CLINIC | BETTER DATA
BETTER BEES

Quality Assurance

Morphometric Analyses: multiple measures of queen or drone, body and reproductive tract (rearing quality)

Semen Quality: total sperm count, and sperm viability in queens (mating success), or drones (mating potential)

Quality Report: a "grade" report of a queen or drone's reproductive quality for your quick interpretation



Strong Research Foundations

Established as a natural extension service leveraging basic and field honey bee research at NC State, the clinic has worked to improve colony health for over 10 years.

Troubleshooting

Mitotyping for Africanization: genetic analyses of maternal ancestry as African or European using population genetic techniques and markers

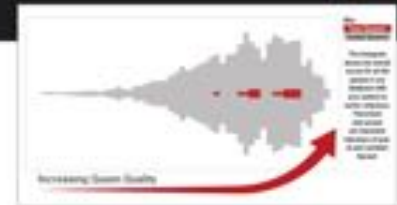
Pathogen Screening: identification of presence and relative levels of ABPV, BQCV, DWV(A&B), IAPV, LSV, Trypanosomes, and both Nosema species. Additional and custom pathogen targets available upon request.

Genotyping Analyses: full assessment of paternity for up to 48 workers and an estimate of queen mating frequency

Custom Collaboration

This highly-tailored collaboration involves custom experimental design, analyses, and interpretation. This unique partnership between science and industry has been utilized to:

- Test the impact of various agrochemicals
- Assess the effects of banking on queen quality measures
- Evaluate novel management practices' improvements in queen mating quality
- Observe the effects of shipping on queen health and sperm quality



Queen and Disease Clinic Pricing

Five Sample Minimum • Bulk Pricing Available

ANALYSIS	PRICING (per sample)	SAMPLES TESTED		
		QUEEN	DRONE	COLONY
Reproductive Quality	\$24.00	✓	✓	
Standard Pathogen Screen	\$55.00	✓	✓	✓
Apiary Pathogen Screen	*\$220.00	SEE US IN COUNSELING PHASE		
Mitotyping (Africanization)	\$35.00	✓	✓	✓
Genotyping (Mating Number)	\$120.00			✓

Custom Disease Screening

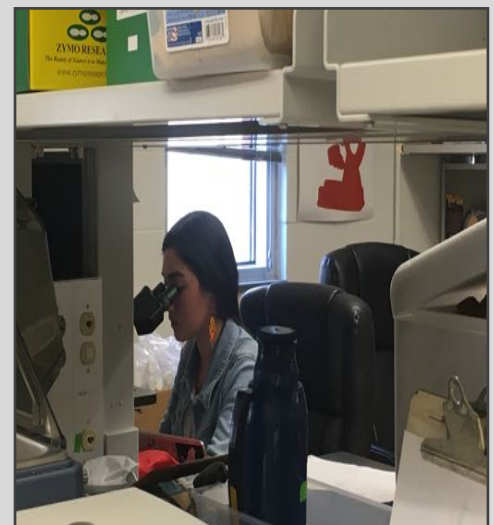
Additional and custom pathogen targets available upon request.

Your Bees • Your Data

Any results or interpretations from our work is held in the strictest confidentiality and anonymity

Lab Spotlight: April Sharp

April is an undergraduate researcher in the lab working on the series of pollinator community projects. April is a rising senior in Applied Ecology who is interested in the foraging ecology of native bees. She has been working on an independent research project quantifying the proportion of pollen from soybean (versus non-soybean) on bees in agricultural pollinator strips, and in fact has attained a competitive grant from the Office of Undergraduate Research (OUR) to do so this summer. April's plan is to continue her work in graduate school when she graduates in 2021.



FALL SEMESTER GOES ONLINE: BEEKEEPING AND DISTANCE EDUCATION

With all of the uncertainty surrounding the fall semester at NC State, we made the decision quite early in the summer to move our large beekeeping course entirely online. With ~200 students every year in a room with a max capacity of 210, it was fairly obvious that we weren't going to be able to socially distance, and I didn't want to have to scramble to make a distance education (DE) section. So we've spent much of the summer recording, editing, and crafting the course for the online environment.

ENT 203 is titled "An Introduction to the Honey Bee and Beekeeping," and it has been offered at least once a year for over 40 years, initially by my predecessor Dr. John Ambrose then me starting in 2006. Importantly, it is not a traditional beekeeping course—it is geared towards non-science majors as an appreciation course for science and biology using honey bees as a vehicle. As such, the intent is not to teach students how to keep bees but give them an appreciation about them, what beekeepers do, and how important bees are to our society in general. I offer it each fall semester, and up until now it has been an in-person lecture course only.

This isn't the first time we've had a DE beekeeping course, however. Dr. Ambrose has a DE version of his section of ENT 203 for several years, but that version is no longer available. Moreover, about 10 years ago I created ENT 401 "Honey Bee Biology and Management" to provide an online option for our "advanced" beekeeping course. ENT 401 was developed as a "one-stop-shop" for an entire semester's worth of fairly detailed information about honey bee biology and hands-on beekeeping. While the lectures and tests were all online, we held three separate field days at our Lake Wheeler Honey Bee Research Facility on consecutive Saturdays for each student to build a hive, install a package of bees, and maintain it for the semester. Because it was an advanced biology course, it was fairly demanding for some students but we were amenable to students of all backgrounds and level of experience. The original idea was that the course could serve both NC State students as well as beekeepers from NC and beyond, so we were disappointed when only on-campus students ended up taking the course and enrollment never really took off. We've therefore discontinued it after four offerings over 6 years, and it remains on hiatus.

I suspect that ENT 401 didn't get rolling because many beekeepers were not interested in official NCSU credit or want to take a whole semester's worth of material (not to mention don't wish to pay ~\$600 for tuition). As a result, we developed the BEES network (Beekeeper Education & Engagement System) in an effort to provide many (but certainly not all) of the similar content that was provided in ENT 401 but as individual mini-courses (~1-2 hours each) that could be taken a la carte. That way, beekeepers can pick and choose exactly what they want at the level that they want



without any time constraints because the courses are **asynchronous** (that is, there is no interaction with the instructor). Since 2013, the BEES network has slowly been gaining enrollment, adding new courses, and updating content. At the time of writing this column, the Beekeeper Education & Engagement System (BEES) has served 2,399 students who have collectively taken 12,656 lectures for a total of 4,696 hours of instruction.

We have had several offerings of online BEES courses where we have offered them in a **blended** format (that is, students **asynchronously** watch recorded lectures but then **synchronously** convene online for live interaction with course instruction in real-time). For example, once the coronavirus hit this past spring, we offered an online 'Beginner' BEES School for anyone who had their local short course cancelled. Each week for 3 consecutive weeks, the students' "homework" was to learn the content from one of the mini-courses, then we would meet using the Zoom webinar platform to discuss, answer questions, and talk about bees and beekeeping.

Last year (2019), we took the BEES network to the next level by offering several 'Intermediate' BEES Academies. These were intensive, 2-day trainings held in collaboration with local extension agents across the state. The idea was to hold in-person workshops but incorporating recorded BEES content, so that we could take advantage of both live and recorded content. Because it was all in-person, the content was all **synchronous** and in real-time even if some of it was streamed from online. The response was overwhelmingly



Apiculture Online (Continued)

positive, and we plan to continue and expand these going forward.

Since COVID hit with a vengeance, we’re also offering bi-weekly live webinars called Apiculture Online—Hive Chat with NC State. Each is roughly broken into four segments: “Bees in Season” (what bees are doing right now and what beekeepers need to do); the “Timely Topic,” a presentation from someone in the lab on the work we’re doing; a “Guest Interview” of a prominent figure in the beekeeping world; and an open Q&A where we select some of the typed questions from the audience. These are **synchronous** webinars, but we also post the recordings on our YouTube channel for **asynchronous** viewing.

*All of this is a long way of saying... Now that we’ve all been forced to interact online way more than we ever imaged, there are a lot more options for beekeeper education available to us. **Distance Education will never be a perfect substitute for in-person learning, but the flexibility and diversity of these offerings afford us with an increased number of options available.** The more options we have, the more we can learn about bees and beekeeping, and the ultimate consequence is that the bees will be better off with better beekeepers.*

	BEES network	BEES school	Apiculture Online	BEES Academy
Format	Asynchronous	Blended	Synchronous (live webinar) and Asynchronous (recording)	Synchronous
Environment	Online	Online	Online	In-person
Duration per course	~1-2 hours	Variable	1 hour	2 days
Cost per student	\$35/course	Variable	Free	\$150

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Hannan Levenson - PhD Student
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Undergraduate Researchers
Gaven Bell, Danyelle Reiskind, April Sharp, Rachel Laminack

Support the NC State Apiculture Program!

The Apiculture Science fund-raising efforts operate under the auspices of the North Carolina Agricultural Foundation, Inc. a 501(c)3 organization. You will receive an official receipt for your donation.

A Gift Toward Emerging Needs

Consider supporting the program with a gift that would go toward the current area of greatest importance. Flexible funding enables the Apiculture Program to address critical needs as they emerge, often enhancing the program beyond what would be possible through restricted grant funding. Funding of any amount, from \$10 to \$10,000, will be extremely helpful.

Gift-In-Kind

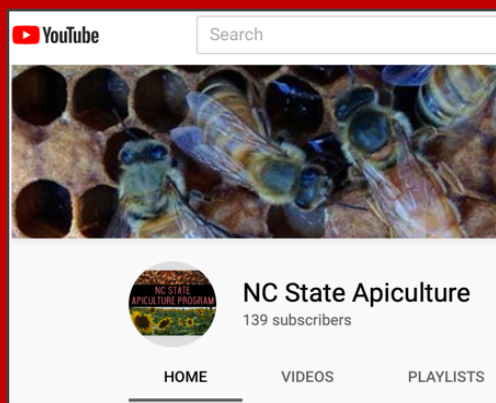
The Apiculture program is always seeking creative solutions to its material needs. If you have surplus equipment or other non-monetary assets to give (e.g., gently used honey extractors, microscopes, even vehicles), please consider donating them to the program. You will receive credit for the monetary value of the gift and the gratitude of our faculty and students.

Estate Gift

If you are interested in planning an estate gift to benefit Apiculture, please let us know! We can provide you with the tools you and your attorney will need to ensure that your wishes are fulfilled. Please go to our website for more information: www.ncsuapiculture.net

go.ncsu.edu/apiculture





Try us on YouTube!

For several years now, we've been adding video content onto our very own YouTube channel. From beekeeping advice to some of our latest research, this *free* resource is perfect to plug into your monthly beekeeper meetings or to watch during your downtime. Subscribe and view us today!



Congratulations Joe!

Joe Milone has officially graduated and has already started what he calls his "dream job" with the EPA in Washington DC. We are continuing to collaborate with him on a couple of final side research projects on the sublethal effects of pesticides on queens and drones, so expect a slew of his papers to be coming out in the next few years. Congrats again, Joe, and we'll miss having you around!

Random Notes

New Publications

Tarpy, D. R. (2020). Beekeeping guide. In: *Hurricane preparation and recovery in the Southeastern United States*. McNulty, S., Gavazzi, M., and Matchett, K., eds. Gen. Tech. Rep. SRS-xxx. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station.

Kevill, J.L., K. Lee, M. Goblirsch, E. McDermott, D. R. Tarpy, M. Spivak, and D. C. Schroeder. (2020). The pathogen profiles of queen honey bees does not reflect those of their colonies workers. *Insects*, **11**: 382; doi:10.3390/insects11060382.

Presentations

Because of COVID, we aren't allowed to hold any face-to-face events. Instead, we've been quick to move everything online through Zoom and other platforms. Importantly, we're holding bi-weekly webinars called Apiculture Online—Hive Chat with NC State and posting their recordings on our YouTube channel (see Page 3). Between the live-stream and recordings, we've been averaging ~650 people and over 1,000 in some weeks.

In addition, David has given two presentations to the Maryland State Beekeepers Association's summer meeting, as well as the Tech Transfer Team of the Bee Informed Partnership. Brad was a featured speaker at the online Great Plains master beekeeping virtual fun day (~230 attendees) and Durham County Beekeeping Association.

Amazing 360° video of our swarm demo

Check out this incredible footage taken by the folks over in DELTA, the distance education unit at NC State. Last year during our annual ENT 203 swarm demonstration, they set up special cameras and microphones to capture what it's like to stand in the middle of an active swarm of honey bees! You can use your computer mouse to move the perspective around to look in all directions, which is simply amazing.

<https://www.youtube.com/watch?v=bhoTThrzlJU>



Teacher's Corner: Courses at NC State

As outlined in our main article, ENT 203 is moving entirely online this fall semester. This constitutes a significant amount of work up front, and the asynchronous delivery will require a lot more individual interaction with students as they progress through the semester, but we're looking forward to the challenge and hope to make it a regular DE offering in future years.

go.ncsu.edu/honeybees



Tarpy's Back Page

Control does not equal treat...

We're getting into the height of the mite season, so pretty much all of the conversation around beekeeping right now is about varroa mites. What was your last mite count? How high is too high? What do I do about it?!

The answers to each of these questions is critically important and complicated, far more than can be covered here. But suffice it to say that options abound to keep the mites in check, and what works best for different beekeepers can vary widely.

The "traditional" approach to controlling mites is to use synthetic acaricides within beehives to kill them off and keep their numbers down. It's less "traditional" than it is "economical, convenient, and easy," but nonetheless somehow in our beekeeping vernacular we have equated **controlling** mites (that is, keeping them at populations that don't hurt our bees) to **treating** for mites (that is, using chemical methods). However, these are not the same.

There are many ways to control mites without using chemical treatment. In fact, the ideal approach to beekeeping is to control mites so that you don't *have* to treat for them. Genetic stocks, screened bottom boards, brood breaks, drone-brood trapping, and several others are all at our disposal to knock those pesky mite populations back. They just all take a lot of work, timing, and know-how.

So if you don't wish to use chemical miticides, no problem, but doing nothing is not an option. So treating mites is optional, but controlling them is not.

