



EPISODE 226 TRANSCRIPT

Jamie

Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere.

In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast.

Hello everyone, and welcome to another episode of Two Bees in a Podcast. Today, we are joined by Dr. Beatrice Nganso, who's a Research Scientist in commercial insects and the environmental health theme at the International Center of Insect Physiology & Ecology in Nairobi, Kenya.

Beatrice, thank you so much for joining us on this episode of the podcast. So, Beatrice, I know that you do a lot of different research on a lot of different topics. Today, we brought you on to talk about some recent research that you and colleagues have done with honey bee colony losses in sub-Saharan Africa. But Beatrice, before we even get there, our listeners would love to know more about you. Could you tell us a little bit about yourself and how you started with honey bee research?

Dr. Beatrice Nganso

OK. To the listeners, good afternoon or good morning from where you're tuning in. My name is Dr. Beatrice Nganso. Also, as Jamie said, I'm a research scientist in commercial insects at the International Center of Insect Physiology and Ecology based in Nairobi, Kenya.

And a little bit about myself and how I got into the beekeeping industry. This was mainly driven by my passion for bees beginning when I did my MSC studies in Ghana. Back then, I worked in sacred forest reserves, and it is true my MSC research that I got really passionate about bee pollinators and how we can leverage on their ecosystem services to transform livelihood in Africa, addressing major developmental challenges such as poverty, insecurity and malnutrition, but also conserving our biodiversity.

So, after graduating as one of the top students in my cohort back then at the University of Ghana, I waited for the right PhD opportunity and one that focused on bees to engage into any research opportunity. And this is what has really led me to study the honey bee Varroa host interaction at ECP in 2015. And since then, I've done a lot of work for the past 10 years exploring mainly pollinator health, both in Africa but also in Europe because I had the opportunity doing my PhD



to do a sort of comparative study and looking at comparing the survival of African bees in Kenya against Varroa against the susceptible bees in Europe, in USA.

So, I've been doing a lot of bee research and looking at their behaviors. And also, right now I'm doing ICIPE, also being in the conservation of insect pollinators, not only limiting myself to honey bees and how we leverage on like I earlier said, on their ecosystem services to support sustainable agricultural and biodiversity across Africa.

Amy

So, Beatrice, we're recording this right after coming back from Apimondia in Copenhagen. And we also had a conference called COLOSS, and you and I had met in person there and I was very interested by your work. I love that you are doing research, but also working with capacity building in Africa.

So, I really admire your work, and it was really great to meet you in person. So, I'm excited that we get to interview you on the episode. But you had mentioned something you said ICIPE, and you said that a couple of times. ICIPE, so you work at the International Center of Insect Physiology and Ecology and that's what that stands for. Can you tell us a little bit more about the center?

Dr. Beatrice Nganso

Yeah, thank you, Amy. ICIPE is a world leading research institution that focuses on studying insects and their ecological role, cutting across a program that we call 4H. That is, insect affecting human health, animal health, plant health and environmental health.

And we do also a lot of capacity building because we are an intergovernmental organization. So, we have been able to develop partnerships across more than 40 African countries, but also partnering with universities and research organization across the world.

And since we are a research-based organization, we do a lot of capacity building of MSC of BSC, MSC, PhD students partnering with, like I said, universities across the globe. And through our research, our training program and collaboration effort, ICIPE has been able to contribute significantly to the development of sustainable solutions that address key developmental challenges in Africa, thereby improving food security, poverty alleviation, disease control and even environmental sustainability.

And this is why this effort or the impact that we have been able to create across the African continent has enabled us to be awarded quite a number of awards. Like, in 2020, we won the Food Planet prize award, which was shared with another candidate.

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And currently we are also recognized as an FAO refresh center, but also as an award organization collaborative center for bee health in Africa. So, this is, in a nutshell, what ICIPE does across not only in Africa but the globe as well.

Jamie

Beatrice, I think that's fascinating and I'm so grateful that you guys also have a pollinator component of the work done at ICIPE, and I know that you are a partner in that. And I want to focus in now a little bit on a recent paper that you and colleagues published regarding honey bee colony losses and causes of those losses in nine different countries in sub-Saharan Africa.

So, I think it's really fascinating, right? We've been talking about honey bee colony losses in the United States for the last 20 years, Europe as well, and other places around the world, but there's not as much data on colony losses in countries in Africa. And you and colleagues were able to do a project on this topic.

So, could you talk a little bit about the background of this project? How did it come about? How did you get folks involved, things like that? We're going to ask you questions in a moment about how you did the research, but I'm curious how you guys came up with the idea for this topic.

Dr. Beatrice Nganso

Thank you so much, Jamie. You know, like you rightly said, a lot of work on colony losses and the drivers of these losses have been done widely in Europe, North America and even in the Middle East. But then, we knew very little at continental scale about what is happening in Africa.

So, while doing my postdoc studies in Victoria Soroker's lab in Israel, I got in acquaintance with COLOSS, and I got to know a couple of quite interesting activities that they were undertaking. So that is how I engaged with the colony monitoring group. And back then, in 2020, I initiated the first colony loss survey in my home country in Cameroon located in Central Africa.

Right now, I'm based in Nairobi in Kenya in East Africa, but I'm from Cameroon in in Central Africa. So, I did this survey and it gave me a quite an interesting insight on how the drivers that we have in Africa are completely different from what we have in Europe or in North America.

So quickly, when I joined ICIPE as a scientist within now managing the honey bee health unit and because the center has a very, very strong partnership across the continent with different institutions, different organizations, and earlier, I said we have been able to establish more than 40 partnerships with different organizations across Africa.

Then I decided to tap on this partnership to see how we can scale what I initiated in my home country. And I was amazed by the positive response I got from so many partners. And then COLOSS saw the impact that I've been able to drive on my own without any financial support.

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So, they saw that I've been able, through my drive, my passion to collect more than 1000 survey responses. So, they came in and awarded and gave me an award, which I'm really grateful for, which facilitated the collection of survey in Rwanda, located in East Africa, and Benin.

So, the whole idea behind this survey that I initiated, or this work, was to provide evidence-based insight that can guide intervention to reduce colony losses and strengthen honey bee health in Africa, knowledge which was really missing at a continental scale.

And I'm really proud of myself and the team I've worked with and the support I finally got from COLOSS, but also from our core donors at ICIPE.

Amy

Beatrice, I'm sitting here listening to you tell us about this entire project, and I'm just smiling because you sound so proud. And I would be so proud if I were you. You know, to be able to do the very first basically survey and surveillance of colony losses.

That's, that's amazing. And that's really cool. And it's just amazing to hear about the partnerships that you have and the connections that you made and the people that were really on board, you know, and were positive about this. And I really like projects like that. And I think it's really cool. You can tell that you're very passionate about it.

And I think that passion is contagious. I think that's what brings this kind of all together. I'm listening to you talk about the survey and I'm interested. And I guess the first question is really about how did you work with these partners to collect the data? You know, what were you looking for with colony losses?

Like how did you find all this information or how did you disseminate and how did you collect this information for the project?

Dr. Beatrice Nganso

Thank you so much, Amy, for your question. Yeah, you know, first thing, is that what our audience should know is that beekeeping, the way beekeeping is practiced in Africa is completely different from Europe and America. So that's the first line. Now, in order to achieve my goal, I had to adapt the COLOSS questionnaire, which works mostly for winter losses, to our context.

In Africa, because we don't really have winter, we don't experience winter in Africa. And also in Europe and in North America, when you are starting your spring, for instance, your spring season, when the colonies are building up, if you are starting with a fixed number of colonies, it doesn't change within the season, for instance.



Or if somebody starts with a fixed number of colonies during winter season, by the end of winter he knows exactly how many were lost. OK, but in Africa it's not the case. So, I had to design a questionnaire that fits into the Africa condition taking into account swarming, bee swarming, which occurs during when populations are building up.

So, a beekeeper can begin his operation with five colonies, but before honey harvest, he ends up with 15 or 20 colonies because he got many swarms during the swarming season. So, first, that was what we did, and it was successful.

So, we designed a question in the survey question. Then dissemination. Dissemination was true interviews, beekeepers interview. And that interview was in person. In person because the majority of beekeepers in Africa are not high tech.

There's an issue with Internet connectivity. They don't have access to smartphones to fill the survey online. I tried that online, it didn't work. So that is one of the factors that really brought down the participation of our survey of the people with whom I worked in this study.

So, we ended up having 9 participants. Those participants were willing to go and meet the beekeepers to collect the data. So that is basically how the data were collected. So, once it was collected, the data were then sent out to me to analyze the loss rate, the risk factors and then we also took into consideration the management practices because I wanted to know how their management practices will mitigate some of these losses. So, basically, this is all about the method of collecting the data for this project.

Jamie

So, Beatrice, it sounds like a lot of work. I mean, I know having to interview beekeepers directly is a lot of work. I'm curious, once you got all the data, what were some of the key findings from your interviews? What were some of the key factors? For example, loss rates and causes of losses?

Dr. Beatrice Nganso

Yeah. First, the loss rate was about 21% across the 9 sub-Saharan African countries which contributed into this study. But then this loss rate varied across different countries and varied from 9.7 to 45.3 during the active beekeeping season of 2022-2023.

And why focus on the active beekeeping season? Because this is the season when beekeepers maximize their profit in the beekeeping enterprise. So, this loss rate was mainly driven by, instead of calling it natural disaster, I decided to call it issue beyond the beekeeper control.



This was the first factor, this factor responsible for colony losses, and it was mainly driven by pests, drought and bush fires in the affected across the 9 participating countries. We also have issues with absconding. You know, African bees are very prone to absconding event.

We also have pests, and surprisingly, the pests that we identified are usually secondary pests like most of them pointed issue related to wax moth, the small and large hive beetle and Varroa mite, which we know are not really affecting the beekeeping enterprise in Africa.

So, this pointed to me an issue related to management practices, which I address in one of my papers publishing in the Journal of Agricultural Research. The gaps we are missing when it comes to best colony management practices in Africa.

So, the service supported my initial review on management practices by showing that for instance beekeepers, those beekeepers who received any form of training in beekeeping had reduced loss rates, and also those who practice migratory beekeeping into pollen rich landscape also had lower colony loss rate. And furthermore, those that use movable frame hives, whether a top bar hive or Langstroth hive, have reduced losses than the locally available hive that are prevalent in Africa.

So basically, this was what I opted out. And like I said, the loss rates in some cases were quite high, like in Kenya, loss rate of more than 40% in Kenya and Uganda, both located in East Africa and it was mainly due to drought because during the year when we undertake the survey, we had a long drought season. So that really affected the bees. And we also have issues with pesticide poisoning that was really prone in countries like Ethiopia.

So, what does this at the end tell us? It brings on the table the fact that we need to take into account integrated bee health management is key in Africa, and more importantly, capacity building our beekeepers because they don't really manage their colonies as do you.

Yes, the bees are wild, but then most of them don't adopt or don't know how to keep bees. What the bees need at a certain time of the year, when to feed the colony, when not to feed the colonies, what are the feeding types that you should bring on board?

All this knowledge they don't have, they don't have it. So, there is a need for us to build capacity for African beekeepers, and so far, I've been able already to address this gap in countries like Ethiopia, in Cameroon as well. A follow-up survey on this clearly shows that when beekeepers adopt these management practices, their losses were further reduced in the next survey period.

And also, true capacity building of communities in my home countries, but also in certain West African countries, I've been able to see a change. Beekeepers who could not clearly identify the causes of their losses were able to do in the following up survey that I initiated and that paper is already accepted in the Journal of Agricultural Research, it will be out very soon.

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So that is it about the key finding from this study and the steps we already put in or putting in place to address some of the challenges when it comes to the poor colony management practices that we have in Africa.

Jamie

Well, Beatrice, I think that's great. I think following up from those surveys will be really good. And before we segue to another topic, I just wanted to make the comment that we'll make sure and link the paper in our show notes so our listeners can have access to the original paper, could read it themselves. So, thanks.

Dr. Beatrice Nganso

Yeah, it's an open access paper, so you can get it online.

Amy

So, Beatrice, as you're talking to us about, you know, just beekeeping in Africa, I have two questions for you. And the first one is really, do you have an idea of how many managed colonies there are? You know, and the other thing I wanted to talk about was you were talking about management.

And so, I know that it's very different from North America and different from Europe. And so I'm interested to know, especially when you said that a lot of them are secondary pests, you know, what sort of management is available to the beekeepers? In particular, we talk a lot about Varroa around the world and what do beekeepers do there as far as management for Varroa?

Dr. Beatrice Nganso

OK. Thank you so much for your question, Amy. Now, regarding the management, like I said, the bees in Africa are wild and they are very aggressive. They have not been selected for good use, aggressiveness or absconding. So practically they are all wild colonies, that aggressiveness.

Beekeepers, yeah, they love the bees, they love keeping the bees. But they don't venture into checking, let's say, every two weeks or checking weekly or monthly. Weekly will be too much, maybe biweekly or every month how their colonies are faring.

They don't do that because of their aggressiveness. So, what most of them do, they set up the boxes during the swarming season. They get the swarms, they take the box to their apiary and that's it. They only come during the honey harvest to get the honey and when they're harvesting their honey within the hive.

Some, like those in Cameroon, would take everything, leaving nothing behind for the honey bees to survive on during the lean season when there are no flowers. So that's why they experience a lot

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of absconding. So, there's that gap as well as when we train the beekeepers to best management practices like knowing when to feed.

You can feed your colony with sugar syrup or with honey during the link season. Some of them are not willing to adopt the practice because it's all about profit. But this is changing in some African countries like Ethiopia, like in Kenya, mostly in East African country and Southern Africa, that pattern is changing.

And mostly in East Africa it's changing because of our intervention on the ground. We had so many donor-funded projects since 2014 when the African Reference Laboratory for Bee Health, where I'm sitting right now, was developed.

And through that initiative, more than 500,000 beekeepers will reach out with best management practices and also how to improve the local hive types that we have in Africa because they are prevalent. You have bamboo hives, you have lock hives that reduce even the quality of the honey so that we work on designing hives with movable frames with queen excluders and so forth.

And just to mention that in Africa, people look at beekeeping as a livelihood option. It's not about pollinating crops, no, it's about changing their lives, creating jobs for the youths. So those are some of the interventions that we are having on ground.

So, we have been able to change that in some areas, and now our goal is to move that to other African countries like the West and East Africa where beekeeping is still traditional, still relying on local hives and is not really easy to improve upon management when you are using local hives.

Now, coming back to the issue of Varroa mite in Africa, based on the research that I have done, I did do in my master's and my PhD, but my PhD studies were done in partnership with the University of Pretoria.

And also based on work done by my former PhD supervisor Christian Perk in South Africa and the current work I'm doing with him in Ethiopia, we are supervising a student still on Varroa mite. We are seeing clearly that there is no need for African beekeepers to treat their hive against Varroa mite because when we look at the grooming behavior, the expression of the grooming level of honey bees against Varroa is really high.

The damage pattern is severe, like they completely rip off the mite. So, because of that, and knowing fully well that beekeeping is a livelihood option, we don't want to, we advise beekeepers not to treat their colonies against Varroa because the bees have their natural way of dealing with the mite.



So, high combing behavior is really high. Hygienic behavior is also quite high. Even the Varroa sensitive hygienic behavior, we have seen it with *Apis mellifera scutellata* in Kenya, the levels are quite high. Higher compared to the levels recorded in Europe.

European honey bees. We also have, you know, because of the short developmental time of the worker brood cell in European honey bees, it takes about 12 days for the worker brood to emerge following capping. But here, it is less 11.2 to 11.5.

So that has a significant impact on Varroa population brood within the hive. Because of that, you find that the number of offsprings that a female mite produces in African beehives is very, very low. The mating success rate is quite low, 0.7, sometimes 0.3 in *Apis* colony in South Africa, yeah, in Kenya recorded 0.7.

So, it's really quite low, showing clearly that there's no need for us to treat the colonies to preserve the quality of the beehive product, honey bee wax propolis that our beekeeper community rely on to enhance their livelihood.

And coming back to the pests, I said they're secondary, like the wax moth. Wax moth is usually considered as a secondary pest because it comes in when maybe there are other causes that led to colonial death.

OK, but then you find that in Africa, it is very common. Most of the beekeepers across the nine countries complain a lot about the wax moth. And wax moth is related to their inability to check the colonies and how they manage, they keep their frames with wax around. They don't know that they have to be kept in airtight containers. They don't know that if you have, you don't need to leave the bee wax frame within the hive if the box is not full.

So those are some of the things that contribute to high infestation rate by this pest. But then through our training outreach, our outreach program, we are able to change the narrative, like I said, in certain countries in Africa.

Jamie

Yeah, Beatrice, it sounds like you and your colleagues are doing a lot of work on behalf of beekeepers there, and that's really exciting. I want to ask a different line of questions. So, you've talked a lot about your beekeeping research. We've highlighted the project on colony losses and all that you've done there. I really like this Varroa work that you're doing and the recommendations that you're coming up with based on that research, but you also have a bit of a history conducting research on behavioral ecology of honey bees. Can you talk about any of the projects you'd like to highlight in that field as well?

Dr. Beatrice Nganso



Of course, way back doing my PhD studies, I tried to look at the impact of propolis on Varroa and on honey bees, of course. So, I did some sort of exposure exposing the raw propolis and then the propolis extract on Varroa and the bees.

And I found that it was quite [inaudible] to Varroa mite, the doses reduced but not to the honey bee. And also, we quantify propolis at hive level and we're able to show that during the brood rearing period, the African bees deposit a lot of propolis within the hive, which could be adaptive because during that time they are rearing their young, so they need to be protected from pathogens and so forth.

As given that previous studies in Europe have shown that propolis has an impact on colony health, but also on the innate immunity of animals. Now, currently what we are doing, you know when I came back here as a research scientist, I had a quite a lot of ideas to work with African bees.

But the challenge African bees and the interaction with Varroa, the challenge I have is that within our colonies, it is very difficult to get a high number of Varroa, like what I was doing in Israel. And also, when you use sugar shake to collect the Varroa, at the end of the day, you are losing one or two colonies. And this is problematic, especially when you are working with farmers. You need to have a kind of compensation plan to compensate for the losses.

But then what I did, if you allow me to talk a little bit about my experience in Israel, because I did a lot of behavioral studies but also silencing, there, I was mainly interested to look at genes the genes in Varroa that influence or mediate their interaction with the honey bees.

So before coming and joining Victoria's work, they did an interest and fantastic work on transcriptomic analysis of the different genes in Varroa. My role when I came was to annotate these genes.

So, I did a lot of behavioral studies coupled with silencing. So basically, we will collect the mite through sugar shake and then I will synthesize the double strand RNA, then soak the mite within the double strand RNA over the night.

Then in the morning, for 12 to 15 hours if I remember, then the following day I will simply remove the mite from the solution and then allow them to revive themselves for like maybe 2 to 5 minutes.

And then having my Petri dish, glass Petri dishes with the filter paper in it, I was able to place the treated mite, compare the response of the treated mite with control mite. Are they able to recognize their preferred host, which is the nurse bees, compared to the forager?

By so doing, I was able to identify some carrier protein of the family MPC 2 that mediates influenza interaction. Because in mites, in which these genes were knocked out through

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silencing, the ability to detect their preference was significantly disrupted compared to the control.

So that is the push I was using to understand or to annotate genes, mitigate of our host interaction. But at the same time, I also did some transcriptomic analysis on the Nosema, which showed genes that are both expressing their mite sensory organ.

But then I left early to continue this interesting research. So basically, that's what I did when it comes to behavioral studies of honey bees and Varroa.

Jamie

Well, Beatrice, I want to thank you so much for joining us on this podcast. It's really been great to talk to you about all the research in which you've been involved. It sounds like you have a great, successful program in ICIPE. And you know, Amy and I and our listeners are wishing you nothing but the best. So, thanks. Thanks for what you've done on behalf of beekeepers, especially in Africa.

Dr. Beatrice Nganso

Yeah. Thank you so much.

Stump the Chump

It's everybody's favorite game show, Stump the Chump.

Amy

All righty, everybody, welcome back to the question-and-answer segment. Jamie, the first question is, maybe this is a 2-fold question, what are your opinions on treatment-free beekeeping, which I think we've actually done in a past episode, but I'll let you answer that again. And then they were asking about stocks of different types of bees.

So, for instance, we have VSH, which is the Varroa sensitive hygienic bees and just other stocks out there. What are your opinions on all this?

Jamie

This can be very contentious, right? The treatment-free beekeeping can be very contentious and there's treatment-free and there's variations of that Darwinian beekeeping, things like this. It's really difficult to talk about and be fair about it because, you know, I'm definitely a scientist and a data guy and I need lots of information before I can make a decision.

That's just one of the ways that I handle making decisions. And so, when I think about treatment-free beekeeping, here are my general thoughts. And fortunately, the person asked for my opinion.

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So that allows me to be a little bit freer than if I was trying to find the data associated with it. All right, what's my opinion on it. If you've got this – this is not a fair way to think about it, but I have to think about it this way and paint the picture this way to help us all understand it.

And this is probably not fair, but I'll do it anyway. So, on one end, you've got maybe what we'll call conventional beekeepers who use the conventional methods. They feed their bees, they treat when necessary with compounds that are available to them, some of them synthetic. Then you've got the other end of the spectrum where people just kind of have bees and they want the bees to, you know, I hate to say it this way, but it's kind of figure it out on their own.

If they're not resistant to diseases and pests, they die out. And then you select from the ones that survive. You know, you've got this idea, OK, you got maybe got that continuum. Maybe even to further pass the treatment-free, you've got true survivor stock beekeepers, right?

So, you've got this continuum and every beekeeper falls on this line somewhere. I would say probably the vast majority of beekeepers are kind of on the conventional method where they're doing the standard recommendations that you see coming out of universities and other beekeepers, etc. But there is this groundswell right now, Darwinian beekeeping and treatment-free beekeeping and survivor stock.

It's not new. People have been doing this for a long time. It's just got new names and a lot of it, though not all of it, it's hard to paint kind of a common thread through those styles of beekeeping. But a lot of it is like, again, let's just let the bees be bees, support what they naturally want to do, and we select from the winners and go from there.

I'm not against that, but I do see somewhat, I consider, logical flaws in some of these strategies. And I think that going this way is a slower method than some other ways of doing things. And I know we've kind of danced around this issue in the past but think about it.

Treatment-free means you're wanting the bees to develop on their own. Well, breeding bees is finding out what bees have done on their own and trying to amplify it in a population, right? So, you can still speed up the process even with human intervention.

And it seems like that's a better option to me than just kind of doing nothing at all. And I know in Darwinian beekeeping, smaller boxes, you know, less this, you let the bee swarm, those kinds of things and some of the styles of Darwinian beekeeping and treatment-free beekeeping. So I would say these are all things that are fun to do, worth playing around with if you're a hobbyist, maybe even a sideline beekeeper.

But it's really hard for the commercial beekeeping industry to be built on this strategy, to which people are going to say, well, it's commercial beekeepers having all the problems, so maybe they



should do it our way. But oftentimes, when I dig down into treatment-free beekeeping, the losses are as high, oftentimes the production is usually low because you're allowing bees to swarm.

And I know I'm over-generalizing here and maybe a lot of our listeners would disagree with me. So, I'm just kind of neutral on it. I'm OK with people doing it, but I don't think you can build a full-fledged commercial beekeeping industry on that strategy just yet. The scientist in me, you know, I just, I believe in science.

I believe that we can address these issues through breeding and your selection and safer alternatives and integrated pest management and things like that. But I'm not against people trying this. It's perfectly OK. So, the follow-up question the person asked, kind of is a natural segue out of, what about stocks of Varroa resistant or Varroa tolerant bees?

And I'm a huge fan of that. And this is kind of what we've talked about in the past. You know, every ag industry breeds, they breed better, taller, stronger corn, better, more productive chickens, better beefier cows, you know, things like that.

Amy

Prettier flowers.

Jamie

Yeah, prettier flowers, yeah. Exactly, exactly. Every other ag industry does this. Don't get me wrong, we've got people who are very invested in producing good stocks of bees, but it's kind of one of those things that the whole industry, all of us out there don't use it all the time, right? And I'm a huge fan of the resist of the tolerance stocks.

I love experimenting with Russian honey bees or Minnesota hygienic or VSH or Poland bees or things like that. In fact, I argue that the foundation of your beekeeping operation should be a resistant stock on which you build these other management strategies.

So, make a long story short, I'm not against treatment-free beekeeping or Darwinian beekeeping. I think those are niche beekeeping ways that can really work for people who are wanting to be very diligent and kind of hands-off beekeeping approach. But from a commercial perspective, I think we have to do more, and maybe, some way in the future, the two strategies, kind of the more hands-on beekeeping and the less hands-on beekeeping will be able to teach one another even better ways to move forward as groups.

Until then, I'm kind of a traditionalist in this regard, but from a Varroa stock perspective, man, I'm all about starting and using colonies that are headed by Varroa resistance stock.

Amy

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So, Jamie, anyone who knows me and has met me in person, knows that I usually don't have a filter and I will just sometimes do things that I'm not supposed to do. So, what I'm about to do is, we received a book recently. I have it right in front of me and I am going to give this shout out because this individual did e-mail us and asked if we received the book.

And it is Bartlomiej Maleta who wrote a book called Beekeeping in Harmony with Nature. And so, we received this book. And I remember you came in and you were like, oh my gosh, you have to read. I'm going to read this out to you. And it was what he wrote to us in the book. Should I read it, Jamie?

Jamie

I think, first of all, Bartlomiej, thank you for the book. Secondly, thank you that you listened to us at all and that you want – and third, I appreciate your motivation behind the book. And this is a classic example of what we're talking about, right? With treatment-free. I'm so grateful that you wanted to share your thoughts with us. So, thanks a million. In fact, I love what you wrote in the book.

Amy

I'm going to read this. I love this. Actually, this makes my day. So, it says for Jamie Ellis and Amy Vu, "I often disagree with your take home message. I find your podcast very informative and entertaining. Thank you for your work." And so, you came in and we were just both cracking up over it because, you know, we can disagree and that's OK. And I'm glad that we're here for information and pure entertainment.

Jamie

I love that.

Amy

Me too. Me too

Jamie

I listen to another podcast, Amy, and I won't say the podcast, but the host of that podcast really likes taking feedback on things that people disagree with him on. That's how we learn. And man, I love this. I love this. I would love, we'd all love to not have to use chemicals in our bee colonies and see bees die and not battle Varroa and not have to feed.

So, I just, we learn from one another and I'm so grateful that we have listeners out there who will take that next step and say, hey, I really appreciate what you guys are saying. I don't agree with it



all the time, but here's kind of my look on it, man, what a great way to do that. So, thank you. And I think that's going to inform future discussions that we have. Fantastic.

Amy

I totally, totally agree. And also, you know, I think, hopefully, we've made people feel comfortable enough to where they can tell us that they disagree, right? And so that's what I loved about it was just the honesty. And so, I appreciate it. I love it. So, I want to give a shout out. Thank you for sending us the book. You know, it's come across seas to come this way.

So, I'm excited to read it and I'll let you know how I feel about it when I'm done reading it. All right, Jamie, the second question that we have for today is about queen stocks. And so how much of quote unquote queen stocks are actually drones?

Jamie

A lot. So, this is important to think about. Drones get kind of a bad rap in the honey bee world because we all talk about all they ever do is just exist to mate and after they mate, they die. And if they don't get to mate, they just sit in the colony and get fed by their sisters. Which, OK, if that's all they do, then I guess they are bums.

But they are important because they are half of every worker in the nest. Now, it's a little tricky. No one drone has as much power as the queen. And that's because queens mate with multiple males, multiple drones.

So, if we just do simple math, let's say a queen mates with 10 drones. And let's just say she mates with and gets the same amount of semen from all 10, and when she lays an egg, there's a one in 10 chance that that egg is fertilized by any particular drone. So, I'm making this easier to discuss.

OK, that means every worker in the nest has the same mom, but there's only a one in 10 chance that any two workers have the same father. So, you could argue that a single drone is not as important to the colony as a single queen because the queen is the mother of everybody.

Whereas if 10 drones mate with the queen, a given drone is only the father of 10% of the workers. However, the queen herself came from an egg that was 50% genes from the mom and 50% genes from the dad.

So, the queen herself is already 50% reliant on her own father. And then her eggs, female egg, she's fertilizing with the semen from the males. And I think, as a result, drones are incredibly important in the nest.

Now, I suspect this questioner is actually maybe going a little bit further, how many of the traits that workers express come from the drones rather than the queens? And I say that varies, and I've



never seen specific numbers, but I can tell you that half of the genes of the workers, half of the DNA that workers have comes from drones.

And so, they're incredibly important. And that's why honestly, when we're mating queens, when we're producing queens, things like that, having good quality drones that aren't parasitized by Varroa when they're young, that aren't nutritionally or temperature stressed so that their semen is alive and vibrant, all these things are incredibly important to producing good quality colonies.

Amy

Awesome. So, I'm thinking, can you talk a little bit about just, you know, for people who are producing queens out there are like, how do you saturate the area to have drones of different, you know, traits that you want to see?

Jamie

Yeah, so oftentimes, people who are producing queens on a commercial scale, they'll have these small mating nucs, just small colonies and small hives and they'll have hundreds. Sometimes I've seen even mating yards with thousands of these things. So, the queen producer is selecting stock from which to graft to make good queens.

So just for the sake of easy math, let's say that this beekeeper has 1000 colonies and six of them were amazing producers. They were gentle, lots of honey last year, good strong colony disease and pest resistance. Three of them may be the source for the eggs or the young larvae that they graft and put into queen cups.

But the other three, they may produce drone source colonies from them, and they'll move those drone source colonies to the mating apiaries. And these drone source colonies will flank the apiaries or maybe even be put just outside of those apiaries so that they are saturating the area with these drones.

The idea is that you want those selected queens to mate with those selected drones, and therefore, choosing the drone source colonies is as important as choosing the colonies from which you're going to graft your queens. In a typical apiary that's being used for mating purposes, you might have a hundred or a thousand mating nucs in the apiary, and you may have 10 or 15 drone source colonies scattered at a right distance around the apiary to increase the chances that those drones mate with the queens.

And so, they're selecting those drone source colonies the same way they're looking at productive colonies that are disease and pest resistant, and they're doing things to those colonies to increase the production of drones.

They're giving them drone comb, you know, sheets of drone foundation, the bees pull out into drone cells. So those colonies are producing a disproportionate number of drones, so that they're even producing more drones than they would on their own, so that they can really flood that area with lots and lots of drones.

Amy

Awesome. All right. So, the last question, it seems like a very simple question, but I know it's not. So, if you have pollen, right, if the bees have pollen and they use that to feed larvae, but you, as the beekeeper, are only feeding sugar syrup, I guess what happens with that scenario?

And then if the colony is not increasing in brood because of lack of pollen, what happens? Does the colonies still survive? Are they looking for better forage? I'm not sure how to ask that question to you, but hopefully what I said just makes sense.

Jamie

Yeah, basically the questioner is saying what's the optimum nutrition delivery system to make sure the –

Amy

And for what stage?

Jamie

Exactly. So, the truth is, again, I answer questions in overgeneralities, but the truth is if you have incoming pollen, bees are going to want to produce brood. If they just have stored pollen, like for example, they store pollen through winter, they're not producing copious amounts of brood.

They'll produce some on stored pollen, but not a ton. So, you really need an incoming source of pollen to make bee colonies want to invest in the production of brood. You can solve carbohydrate issues so stinking easily. You just feed bee sugar syrup.

If they're low on honey, you can feed bee sugar syrup, but you can feed them until you're blue in the face. If there's no pollen coming in, they're not going to rear copious amounts of brood. It's not the feeding of sugar syrup that produces brood. It's the incoming pollen. Now, the questioner is saying, essentially, they're not going to.

Maybe if there's no pollen coming in, they're not making brood, but surely that sugar syrup's good for something. It is. It's good for energy source. It might increase the longevity of the bees that allows them to store stuff for dearths. But really, you need that incoming source of pollen. And Amy, this is just one of those topics that's near and dear to me.



You've heard me vent on this. You know, beekeepers feed sugar syrup for nectar deficiencies. They feed pollen substitute for pollen deficiencies. And you know my take on that. I've done lots of research, and in our research projects, we often fail to get a benefit from feeding pollen substitutes.

And you've heard me say before in the past stating this one time, I was on a job interview one time and stating this cost me, probably, that job because a beekeeper on the hiring committee just vehemently disagreed. I feed pollen subs all the time. Our bees do just great. Well, there's a growing body of evidence that the utility and efficacy of pollen subs varies significantly across the US and other places around the world to the point that a lot of times they're providing no benefit at all.

So, you're really just feeding these things for nothing. And I say all that to say, if we want bees to produce brood when they don't otherwise want to, you've got to provide that pollen. And I'm not convinced the way that we're providing that right now gets us the desired outcome.

And I've said this over and over and over, and I'll say it again on this podcast, probably the 50th time. To me, one of the greatest opportunities for the improvement in bee health is waiting to address nutritional deficiencies, how to feed them some sort of diet that makes up for little pollen coming in from the environment or low-quality pollen coming in the environment.

Someone out there listening, that is a topic waiting to revolutionize the beekeeping world. I say that because we can do better than what we've done. There will be a day that we can feed pollen subs, and unquestionably, we're getting the benefits that we think we're going to get, and it's predictable and you'll get brewed and all of that stuff.

But until then, the only predictable way to produce brood is to have that incoming pollen to provide the bees the motivation and desire to go through the process of rearing young.

Amy

We've probably talked about this in the past, but dogs and cats and horses and cows and poultry, they all have food that has been researched to see the benefits of it, right? The quality of it and what's needed and we don't really have that for honey bees.

Jamie

Amy, if I were a multi zillionaire, here's what I would do. If you're listening out there and you're thinking about a good project that you want to invest in, here's what I would do. I would build something called, you know, the Honey Bee Health Center, and I would hire 5 to 10 nutritionists whose only job was to address honey bee nutritional issues from every angle.



I would hire 5 to 10 Varroa specialists. I would hire 5 to 10 queen specialists, 5 to 10 virologists, 5 to 10 other pathogens, 5 to 10 toxicologists. We'd have 70 or so scientists working around the clock at all the major fields of bee stress to address the issues that beekeepers are facing.

So, nutrition would get a lot of attention in the perfect world because it is a low hanging fruit. It's a great opportunity to improve bee health. Anybody want to invest in that? Anybody out there?

Amy

A zillionaire out there.

Jamie

We need a kazillionaire to help us hire 50 to 70 scientists and a brand new bee care center that will do all this stuff.

Amy

A kazillionaire or a zillionaire?

Jamie

Whatever. We'll take either.

Amy

That's true. All right, well, don't e-mail us with questions. e-mail us if you've got, if you would like to fund this project.

Jamie

Yeah, don't e-mail us. CashApp us.

Amy

Jeez, I don't think we're allowed to ask that on this episode. We'll have to take that out. Just kidding. All right, listeners, you know what to do. Send us an e-mail. Send us a message on one of our social media pages. We love hearing from you.

Hey everyone, thanks for listening today. We would like to give an extra special thank you to our podcast coordinator, Jeffrey Carmichael. Without his hard work, Two Bees in a Podcast would not be possible.

Jamie

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