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PESTPRO

From Pest Management Education, Inc. to Landscape and Pest Managers

Taking a Better Look at the Termite Queen

Celebrating the UF Bee Lab's Anniversary

OFFICIAL MAGAZINE OF FLORIDA PEST MANAGEMENT ASSOCIATION

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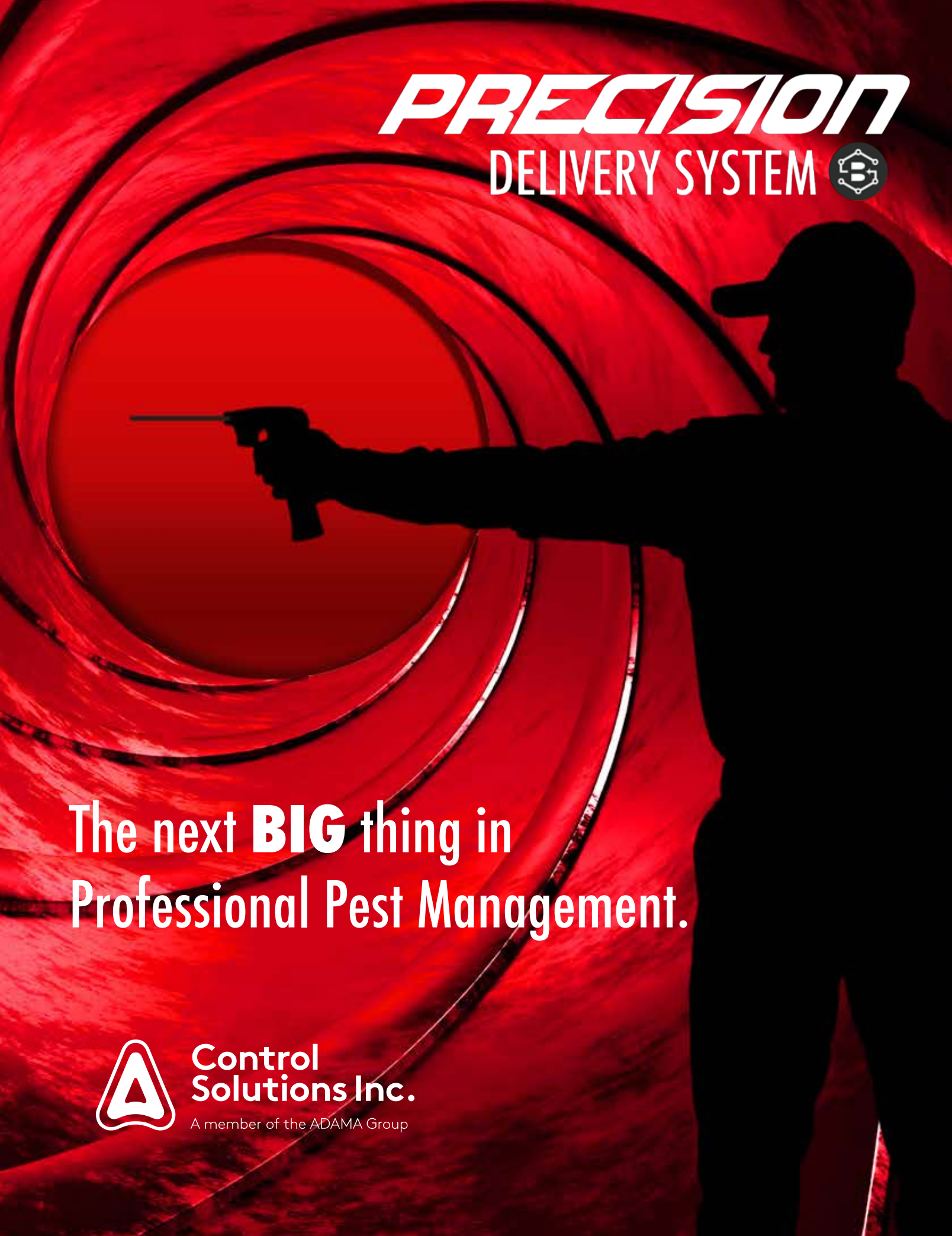
ON THE COVER

Honey bees are vital workers in the Florida agricultural sector. No wonder the UF Honey Bee Research and Extension Lab works so hard to understand bees and their pests. Help *PestPro* celebrate the lab's new digs at the one-year mark.

Photo by UF/IFAS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Network at FPMA Winter Events

Message from the President of FPMA

Eric Hoffer

I AM VERY fortunate to have just returned from California, where I attended the NPMA Pestworld conference. This is a great conference, where I am surrounded by some of the brightest and most innovative pest control operators in the world. Not to mention that I can attend classes taught by the greatest technical minds in our industry.

My theme for this year, "Knowledge Through Networking" held strong and benefited me greatly during this trip. I always try to go out of my way to meet new people and hear their stories on how they succeed in this industry.

I know our executive vice president, Leslie Herren, also benefited from this vast network of knowledgeable people. She met with several individuals who also provided input that will help her continue to drive our association forward. I know she views this event as fertile ground for recruiting Allied members and vetting possible future speakers for FPMA events.

Envision YOU at FPMA EXPO

As members of FPMA we are very fortunate that our EXPO is certainly of the same caliber as PestWorld. Although it's not the same size, we too have people from all over the country and world come to participate as exhibitors, speakers and attendees.

If you cannot make it to PestWorld, you will find you can gain just as much by attending our January Expo in your own backyard in Orlando. Our state has some of the greatest minds and companies in the industry, and the No. 1 urban entomology program in the world. It is safe to say that FPMA is in a league of its own when it comes to state associations.

Speaking of EXPO, we are in full marketing mode, and conference and hotel registration are open. Our theme this year is "2020: Envision Excellence." And who better exemplifies this in our industry than Harvey Massey, our keynote speaker? To get more details about our great lineup of speakers and activities, go to our NEW website at www.flpma.org, click the box titled Events, and select an EXPO Attendee option.

We are already expecting a sold-out event in terms of sponsorships and booths. If you haven't already signed up, please contact Stacey Miller at fpmaevents@gmail.com.

By the time you receive this issue, we will have completed our third "Behind the Scenes" program. I already know that we have achieved our highest attendance for this event since its inception. This is a great way to learn from your peers and we will keep you posted on the input and interchange that occurred during the visits through our monthly newsletter. FPMA Members can now see the newsletter online, but must be logged in to see this members-only content. If you are a member and have problems logging in, please call us at headquarters at (407) 293-8627.

We are also set for the Region 5 Annual Clay Shoot, scheduled for December 3 in Jacksonville. This event has a great turnout every year. I have heard a lot of people have learned to shoot for the first time at this event, so even if you have never done this before, don't let that stop you! You can register online, also under Events, and select a Clay Shoot Tournament option.

I look forward to seeing everyone at one of these great events! PP

Eric Hoffer
President, FPMA

Five Years of *PestPro*

WE ARE approaching our fifth year of publishing *PestPro* magazine at Pest Management Education, Inc. January 2020 also marks the fourth year of the magazine serving as the official publication of Florida Pest Management Association and the fifteenth year in the line of *PestPro* magazines.

The story of *PestPro* is a quite interesting history of us trying to keep the publication going to serve the needs of the urban pest management industry.

WHERE IT ALL BEGAN

Fifteen years ago, Ernie Neff, editor of *Citrus* magazine, approached me about starting a magazine called *Florida Pest Pro*. He wanted to repeat the successful approach he had used with *Citrus*, *Vegetable*, and other agricultural magazines to bring the most current information to the industry. His approach was to use all UF College of Agriculture/IFAS authors and researchers to produce articles for the magazine.

Also, his economic formula was to provide the magazine for free to everyone in the structural pest control industry by having the advertisers pay for the printing and mailing. It sounded like a great opportunity to produce a high-quality magazine for the industry. So almost 15 years ago, the first *Florida Pest Pro Magazine* was authored, printed and delivered to the entire industry. Eventually, Southeast AgNet Media purchased the group of magazines and produced them. *Florida Pest Pro* became, simply, *PestPro*.

Everything was going along smoothly with *PestPro* magazine until about five years ago, when Southeast AgNet called and scheduled a lunch for us close to the Thanksgiving holidays. Usually that lunch was to plan the following year's feature articles. But that year, at the end of the lunch when we usually discussed articles, we were informed that Southeast AgNet was going to stop producing *PestPro* magazine. *PestPro* was the only publication they produced that was not commercial agriculture. The advertisers for *PestPro* were not the same ones that supported their agricultural publications. I asked when they were going to discontinue *PestPro*, and learned that the final issue was being printed as we ate lunch.

I thought about the situation and asked if they would consider transitioning the magazine to us in Urban Entomology at the University of Florida. Their response was, "It is yours." We had no idea how to publish a magazine. So it was shocking to us that the transition was immediate. They gifted us the magazine and its mailing list, and now we were responsible to get it out to the industry.

We did not want to have a lapse in shipping *PestPro* to the industry, so that meant we had to get our first magazine to the printer in less than a month. We had no advertisers lined up and no time to do that.

We also needed a nonprofit corporation to produce the magazine and receive the advertising dollars, because the University of Florida is not set up to do that. So we formed Pest Management Education, Inc., a 501c nonprofit corporation that is allied with the University of Florida. All profits are used to support urban entomology education and scholarships for students at UF. We are indebted to Sandee Weston, who joined us as CEO of Pest Management Education, Inc. She used to be an owner-operator in the pest management industry until she retired and closed the business.

Our first issue was printed without any financial support from the manufacturers and distributors to the urban pest control industry. The first year we produced the magazine, we went almost $40,000 in the red and were faced with the harsh reality that we might have to quit producing the magazine.

PESTPRO GOING THE DISTANCE

To save the magazine, we approached FPMA to cooperate with us. FPMA had a contract with another publisher for their magazine. At the end of the year, we had to bid on the magazine production against the other publisher. We won the bid and the ability to serve as the official magazine of FPMA. This was huge, because up to that point the available advertisers were asked to support both the FPMA magazine and *PestPro*, so it was difficult for both magazines to survive. By combining our efforts, we were able to produce one high-quality magazine for the industry.

In our fifth year operating *PestPro*, we are proud that the magazine is still going strong. We have close to 12,500 pest management professionals who receive the magazine every other month. As far as I know, *PestPro* is the only urban pest control magazine produced solely by university researchers.

Jane Medley is the graphic design and journalism grad who designs and lays out the magazine and coordinates with the printing and mailing company. She is a former University of Florida employee who retired after working for us in the Entomology Department for about 33 years. The magazine looks good because of her efforts. In addition, we are lucky and proud to have Sandra Krempasky ably managing our esteemed advertisers, without whom *PestPro* would not exist.

Lastly, *PestPro*'s managing editor is Dr. Roberto Pereira. Roberto handles all the details on articles from the researchers at the University of Florida. He makes sure the articles are well written to help the industry and are not just filling space. Roberto's salary is supported by grant and endowment funds, and those are no longer sufficient to continue his salary. We need all the help we can get to keep him at the University of Florida. The FPMA Foundation is starting a fundraiser to provide funding to keep Roberto at the University for three more years. At that point, we hope IFAS will be able to put him in a permanent position. PP

— Dr. Philip Koehler,
Managing Director, *PestPro*

What's the BUZZ? Celebrating the UF/IFAS

Honey Bee Research & Extension Lab

1st ANNIVERSARY

Amy Trang Vu

#BuildTheBeeLab is a social media hashtag that buzzed through Florida a couple of years ago.

Well, guess what?

The bee lab was built!

THE UF/IFAS Honey Bee Research and Extension Laboratory, or HBREL, led by Dr. Jamie Ellis, recently celebrated the one-year anniversary of the grand opening of the new honey bee facility on the University of Florida main campus in Gainesville, Florida.

Florida is known for many of its *"Fresh From Florida"* commodities such as citrus, tomatoes, blueberries, strawberries, watermelons, beans and sweet corn. What role do honey bees play in the production of the many crops here, nationwide and abroad?

Around one-third of the food we eat in the United States results directly from pollinators such as honey bees. Furthermore, honey bees are responsible for 25 percent of the world's food production. Bees contribute nearly $20 billion to the crop industry by providing pollination services all over the United States.

Here in Florida, there are nearly 5,000 registered beekeepers with more than 650,000 managed colonies. In addition, because of our climate hundreds of thousands of colonies and their beekeepers from elsewhere make a stop in Florida during their travels across the country. This means serious business for the honey bees and the hard-working beekeepers.

Unfortunately, high colony-loss rates of honey bees have been reported throughout the world. Researchers have been trying to identify best methods and management practices to mitigate these losses. The HBREL's goal is to be at the forefront of research and education on this issue.

Where There's a Will There's a Way: A Brief History of HBREL

The University of Florida apiary program dates back to the 1920s, when research was conducted on various control methods for pests

Photos, from left:

Workers put the finishing touches on the lab exterior near the main entrance in summer 2018. The lab is east of Steinmetz Hall on the University of Florida main campus at 1881 Natural Area Drive, Gainesville, Florida.

Dr. Jamie Ellis, Gahan Endowed Professor of Entomology in the Entomology and Nematology Department, leads the bee lab.

Dr. Glenn Hall removes honey-laden frames from a super as part of a hive demonstration.

Photos by UF/IFAS

and pathogens of honey bees. American foulbrood, nosema, and the *Varroa destructor* mite are just a few of these pests and pathogens.

Dr. Ellis joined the University of Florida in 2006 as an Extension specialist and research scientist in apiculture. He made an effort to expand the facility infrastructure of the program. In 2013, Dr. Ellis met with beekeepers to discuss the idea of having a world-class bee lab in Florida.

This lab would be a considered a small "bee campus" where scientists, beekeepers of all experience levels, and the general public from around the world could visit to conduct research, education, and instruction on honey bees. The members of the lab would specifically address the needs that beekeepers had to improve bee health and help decrease the loss of honey bees around the world.

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Cameron Jack instructs a student during a University of Florida Beekeeping course.

Cameron Jack, HBREL lecturer and distance ed coordinator

UF/IFAS

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AFTER THREE YEARS of trying, the Florida State Beekeepers Association and partners received funding through the Florida legislature, with the caveat that the University of Florida and FSBA would contribute $500,000 and $200,000, respectively.

State funds became available, and a single beekeeper in Florida contributed the $200,000 required from FSBA. The lab project was off and running. Word spread, and hundreds of beekeepers, beekeeping associations, industry businesses, and general supporters from across the country came together to fundraise for the lab, exceeding the proposed amount. Simply put, the identified need, interest, and now funding were there.

Following five years of planning and fundraising, the lab had grown to a $4.5-million, 16,000–square foot facility, demonstrating the huge success of a public/private partnership.

It is projected that the lab will contribute $89 million back to the state of Florida through the dedication of teaching, research and Extension initiatives to help honey bees around the world.

The HBREL Facility

Everything in the facility is strategically designed, honoring those individuals and organizations who donated time and money to make the building of the lab possible. The facility is landscaped with pollinator-friendly plants outside. The inside is filled with $30,000-plus worth of artwork donated by beekeepers to make the facility not only functional but beautiful.

The mini campus is composed of three buildings: the Honey Bee Research and Extension Laboratory, the Gordon Clauss Teaching Pavilion, and the Amy E. Lohman Apiculture Center. The HBREL main building houses faculty, staff, postdoctoral researchers, visiting researchers, graduate students, and volunteers. The main building contains office space, a research and instruction laboratory, conference room, computer lab, and observation hive room

The Amy E. Lohman Apiculture center houses the Florida Department of Agriculture and Consumer Services' Apiary Inspection team, a beekeeping museum, workshop, and honey-processing facility. The Gordon Clauss teaching pavilion is utilized for outdoor education. The HBREL provides education, research and Extension for all.

Teaching, Research and Extension Under One Roof

As part of one of the land-grant institutions in Florida, HBREL focuses on a threefold mission: teaching, research and Extension.

HBREL TEACHING

Cameron Jack is the apiculture lecturer and distance education coordinator for the UF Entomology and Nematology Department. His goal is to create educational programs that prepare students for challenges associated with beekeeping and train those interested in entering the beekeeping workforce.

Jack, Dr. Ellis, and their teaching team primarily support and teach undergraduate students beekeeping courses at UF.

The HBREL started with one online beekeeping course and one in-person course. It now provides the most for-credit beekeeper courses available to undergraduate and graduate students in the nation, making it a premier apicultural education program.

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UF Bee Courses

Over 450 students take a beekeeping course yearly. *Practical Beekeeping, Beekeeping I, Beekeeping II,* and *Insect Research: Scientific Engagement Through Honey Bee Health Research* provide students the opportunity to learn about beekeeping equipment, extraction of honey, development of strategies to add value to their products, how to conduct their own experiments, how to control honey bee pests, and how to run a beekeeping business.

In summer 2020, students will be able to take part in a study-abroad program called *UF in Thailand: Beekeeping in Asia.*

Taking a Better Look *at the* Termite Queen

Sang Bin Lee, Thomas Chouvenc, and Nan-Yao Su

ABOVE:
A Formosan termite queen and king size one another up. Termite size differences can be used to researchers' advantage, according to scientists who work at the UF/IFAS Ft. Lauderdale Research and Education Center.

MOST beekeepers are familiar with a well known device, the queen excluder. It allows worker bees to pass through but contains larger individuals such as the queen and drones at a specific location in the hive.

The honey bee queen excluder is widely applied not only in apiculture but also in research. By using the excluder, researchers can observe the role of the queen and/or drones with better visibility. The device has contributed to a growing body of literature on bee behavior, physiology, and our overall understanding of their biology.

In addition to scientific findings, the queen excluder is useful in beekeeping — for example, aiding some queen breeding methods, increasing honey productivity, and making it possible to easily find the queen.

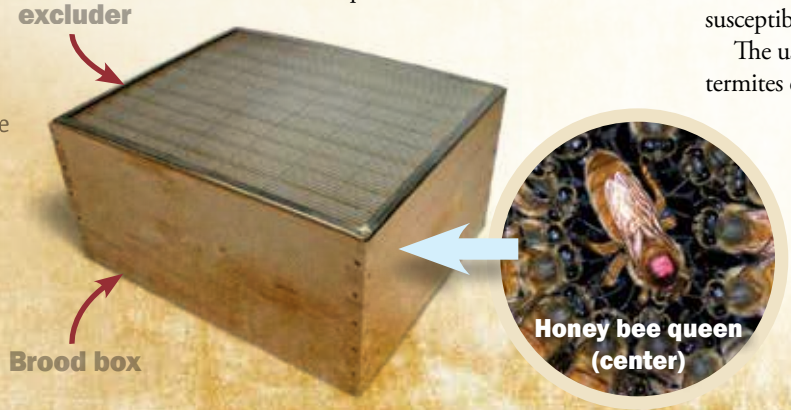
The Need for Excluders in Termite Research

Like honey bees, all termites are social insects. There are castes, or different classes of individuals within a colony. Castes are divided into workers, soldiers, and reproductives, which are kings, queens and supplementary reproductives.

However, unlike honey bees, the study of termites at the colony level is difficult. The nests of economically important, invasive termite pests such as the Formosan subterranean termite and the Asian subterranean termite are often difficult to find since they reside underground or within trees.

Termites are also difficult to study because of their large colony size. To observe subterranean termites, a 2D planar arena has been widely used in laboratories to study their behavior, biology, and susceptibility to toxicants.

The use of 2D arenas for termites enabled us to study



The queen excluder confines the queen to the brood box. The smaller worker bees can fit through the excluder to enter any supers placed on top.

Scott Bauer, USDA

Sorting the termite castes

This excluding device measured the smallest gap possible to allow Formosan sub termite castes to pass. Workers fit through 0.7 mm, soldiers fit through 0.8 mm, and reproductives fit through a 1.0 mm gap.

the colony as a whole rather than only foraging populations. However, the problem of defining the central nest — including the reproductives and brood — in the arena setting still remains.

Without a queen excluder, reproductives can freely move anywhere in the arena. Therefore, there was a need to develop a reproductive excluder for termites so that we could answer some fundamental questions about the role of the king and queen in a termite colony.

Sorting Termites In the Lab

In termites, each caste is morphologically different. For example, soldiers have hardened heads, sometimes with elongated mouthparts specialized in defense. King and queen abdomens and head capsules are larger than other castes.

We hypothesized that either head width or head height could be used as a limiting factor to exclude reproductives from certain areas in planar arenas. We designed a small device, shown above, to find the smallest gap that termites could pass through.

The results showed that for Formosan subterranean termite laboratory colonies, different castes were able to pass through gaps ranging from 0.7 mm to 1.0 mm.

Then we measured the head widths of the termites and found that head height was the primary limiting factor, rather than head width. Therefore, 0.7 to 0.9 mm gaps should exclude reproductives but allow all other castes to move freely within the system. This setup would confine the king and queen in a certain location within the arena.

Using such values for the gap distance, we were able to apply an excluder using whole colonies of the Formosan subterranean termite. We confirmed that reproductives were not able to move between two compartments, while workers and soldiers could move freely.

Final Thoughts

We measured only the Formosan subterranean termite, so the gap size of the excluder may have to be modified depending on the studied species.

The result of this study also confirmed that the minimum passing width of workers was only 0.7 mm, which is similar to the thickness of a credit card, shown at right. This means termites can get into a structure through very thin cracks or crevices.

Another chapter in termite biology is possible with the reproductive excluder, since it can provide a chance to closely look at the royal chamber, the most secretive place of the termite colony. We will keep investigating the role of the queen and king in termite colonies using the reproductive excluder in future research. PP

Sang-Bin Lee is a Ph.D. Candidate, Dr. Nan-Yao Su is Distinguished Professor, and Dr. Thomas Chouvenc is Assistant Professor at UF/IFAS Ft. Lauderdale Research and Education Center.

Dr. Humberto Boncristiani, HBREL researcher

Honey Bee Research and Extension Laboratory and the Gordon Clauss Teaching Pavilion

HBREL, continued from Page 11

HBREL RESEARCH

Dr. Humberto Boncristiani works with Dr. Ellis as the honey bee husbandry applied researcher. He conducts research that is directly applied to commercial beekeeping operations in Florida and beyond.

Dr. Boncristiani travels around the state to different commercial beekeeping operations to identify needs and potential research projects. The HBREL's research focuses on honey bee husbandry, honey bee ecology and conservation, and pollination ecology. Many of the lab's research is published in peer-reviewed manuscripts. The research team is composed of staff, graduate students, visiting professors and volunteers.

Honey bee husbandry research projects include the behavior, biology and control of pests and pathogens. Specifically, research focuses on the major honey bee stressors: *Varroa*, nutrition, and queen quality.

Honey bee ecology and conservation research projects include understanding the biodiversity of honey bee colonies through sequencing genetics, nesting habits, and interactions between honey bees and other species.

Pollination ecology research projects include integrated crop pollination methods to increase crop pollination by managed and unmanaged bees, while examining modern farming and environmental management in the same area.

In the future, HBREL would like to have a honey bee pathogens diagnostic lab. This would encourage a partnership between commercial beekeepers and the University of Florida to identify and diagnose major honey bee pest and pathogens. *Continued on page 16*

Hometown: West Palm Beach, Florida
Where you live now: Tequesta (Jupiter), Florida
About your company: My father started the company in 1951, focusing on great service. My father, Ken Nolen, was also a past president of FPMA, then known as FPCA. My mother was the first woman to be certified in the state. This year we were voted Best Pest Control company in Palm Beach County, and we also won the Torch Award for Ethics from the BBB. I am humbled by and proud of how far we have come. My wife, Lynn, is my EVP, and our daughter Mandy is our regional manager.
First paying job and what you learned from it: My first paying job was a paper route. Although it was part time, I did well in tips. My first full-time job was working for my neighbor. My neighbor, a painting contractor offered to pay me 50 cents more an hour than my father was willing to pay so I went to work for him. It was not the best environment unless you like to drink beer at 7 AM. I learned that the extra 50 cents an hour was not worth it. The paints we used back then had a strong odor. I also learned to appreciate working for Nozzle Nolen even more!
First break in the pest business: We were fumigating a large church. I hit a wet spot on the tarp and started sliding down the roof. An alert coworker saved me by sticking out his hand as I slid by. It was a very lucky break, as I would have broken some bones had I fallen.
Best business book: My wife says I read too many business books. I have over 100 business books in my office. The book that I am reading right now is *A Complaint-Free World.* Our Leadership Team is reading *The 15 Commitments of Conscious Leadership*.


Mickey Nolen

Best piece of business advice you received: The customer is not always right, but they are never wrong!
What you would tell someone new to the pest business? Join the FPMA and find a mentor.
Where can we find you when you are not at the office? Either on the tennis courts, camping in Alaska above the Artic Circle, or underwater by Big Pine Key.
What is the most important trait you look for when hiring? A cultural fit along with a winning attitude! PP

Amy Vu, HBREL Extension coordinator

Extension activities often focus on observing bee colony health.

UF/IFAS

HBREL, continued from Page 14

HBREL EXTENSION

Amy Vu is the Extension coordinator for HBREL. Vu and the Extension team work with Dr. Ellis to organize outreach and educational workshops. All strive to provide the most up-to-date honey bee research education to beekeeping and nonbeekeeping citizens around the state.

Workshops and courses include presentations to county and state beekeeper association meetings, support to county UF/IFAS Extension faculty, the University of Florida spring and fall bee colleges, Caribbean Bee College, the University of Florida Master Beekeeper program, and more.

The lab also collaborates with Florida Department of Agriculture and Consumer Sciences staff members to conduct workshops with mosquito pest control and veterinary medicine to provide general honey bee education. The lab leads a monthly tour for the general public on the first Thursday of every month and private tours with advanced notice.

The team receives phone calls, e-mails and inquiries on social media on a daily basis and responds to questions from nonbeekeepers, small-scale, sideline and commercial beekeepers — mainly questions responding to beginner beekeeping courses and questions related to bee and wasp removal.

Using the questions and concerns received, lab members promote further education through blogs, EDIS publications, and educational videos. Future plans include incorporating podcasts into the mix.

What does this mean to Florida and pest management in Florida?

Florida is a great place to live, with the warm weather year-round. Honey bee pest populations thrive. Unfortunately, the very conditions that make it a great place to keep bees is also the reason bee colonies suffer with pests and diseases without a break. *Varroa destructor*, African honey bees, and small hive beetles love to stick around where we do not want them.

The teaching, research, and Extension programs at HBREL aim to reduce the amount of honey bee pests in Florida and encourage best management practices in every apiary. From small-scale to commercial beekeepers, the Honey Bee Research and Extension Lab is dedicated to provide the best education and dissemination of information as possible. PP

For more information, please visit our website, http://entnemdept.ufl.edu/honey-bee/

Amy Trang Vu is Extension Coordinator at UF/IFAS Honey Bee Research and Teaching Laboratory.

Telephone pole beetle adults and larvae


Adult


Larvae


Large group of larvae

Photos by Lyle J. Buss at high magnification

Telephone Pole Beetle

Lyle J. Buss

ONE OF the strangest insects I encounter is called the telephone pole beetle. Its scientific name is *Micromalthus debilis*, and it is the only species in the family Micromalthidae.

Telephone pole beetles develop in rotting wood and have been known to attack telephone poles. In nature they typically are found in decaying oak logs, but occasionally they show up in buildings, often in huge numbers.

I have received samples from all over peninsular Florida up to Jacksonville, but I haven't had any from the Panhandle. Most of the samples I get are just larvae, but occasionally adults or both adults and larvae are found. People tend to find them on the floor or near baseboards or windows.

The adult beetles are black, shiny and only about 2 mm long, with a wide head and short forewings. The larvae are white and about 1 mm long.

Since they develop in moist, decaying wood, their presence in buildings is an indicator of a moisture problem. The wet wood tends to be in hidden or inaccessible places, such as beneath flooring or behind walls. Elimination of the beetles is best accomplished by fixing the moisture problem. If the wood can't be easily replaced, then drying out the wood by making ventilation holes or using a dehumidifier may help.

The strangeness that I alluded to earlier is in the development and reproduction of the telephone pole beetles. Their life cycle is too complicated to describe in detail here, but it includes development of several different larval forms, and capability of the larvae to reproduce before becoming adults! PP

Lyle J. Buss, Scientific Photographer, manages the Insect Identification Lab at the UF/IFAS Entomology and Nematology Department.

Cameron Jack: *Honey Bee Pest Pro*

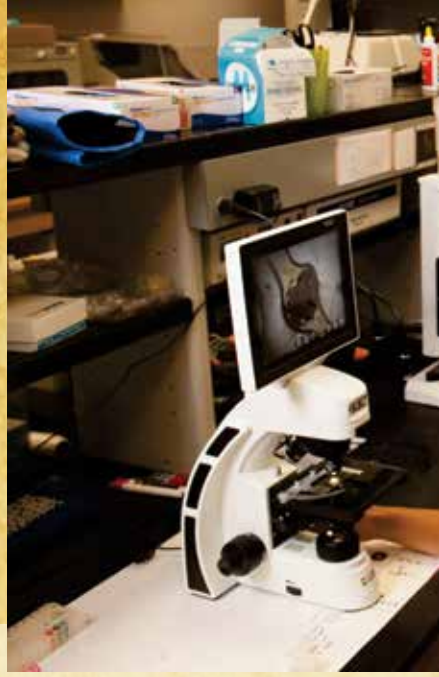
CAMERON JACK grew up in a small, rural farm town just outside the lights and glitter of Las Vegas, Nevada. He spent most of his youth focused on becoming the best athlete in football and wrestling. When he wasn't training, he spent nearly every minute outdoors exploring the vast wilderness of Nevada and Utah.

After high school, Cameron studied biology at Southern Utah University. After just one semester, he decided to take a break from school to serve a two-year church mission in Taiwan, speaking Mandarin Chinese. After returning from Taiwan, he realized that he really enjoyed teaching, which helped him later to decide to pursue it as a career.

After marrying the love of his life and graduating from SUU, Cameron moved out of Utah to pursue his master's degree at Oregon State University, where he researched the honey bee gut pathogen *Nosema ceranae.*

While some beekeepers were really interested in his research, Cameron knew that he wasn't addressing the No. 1 threat to honey bees: *Varroa destructor,* a mite that vectors a host of honey bee viruses (mite shown at right). Once again, the entire Jack family picked up and moved, this time to the University of Florida.

Cameron started as a Ph.D. student of Dr. Jamie Ellis in the fall of 2015, working on projects focused on controlling the mite. Two and a half years later, he was hired as a lecturer in the Entomology and Nematology Department at the University of Florida. He is now focused on creating a premier beekeeping education program while desperately trying to finish his Ph.D.



When were you first exposed to honey bees and beekeeping?

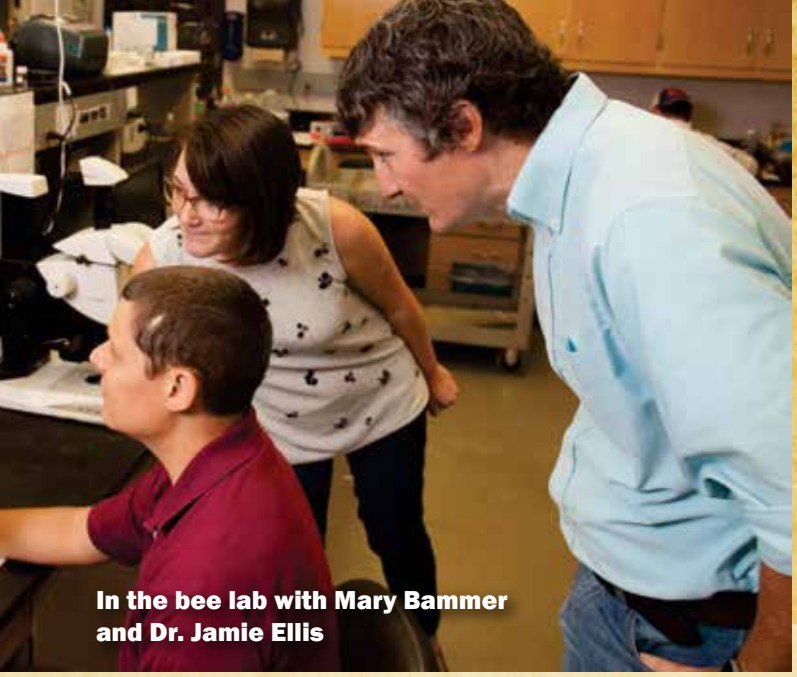
I've been around honey bees my whole life. My grandpa was a high school principal, but supplemented his income through beekeeping. He managed about 150 hives that he rented out for pollination, but he made most of his money selling honey.

As a kid, I just thought it was a weird thing my family did, so it wasn't something I took an active role in until I was in college. When my grandpa retired, my cousin bought his beekeeping operation and I started going out into hives again. Now that I was old enough to appreciate the amazing biology of the honey bee, I became hooked and haven't stopped playing with bees since.

At what point did you decide to focus your career on honey bees?

It was definitely a strange road getting here. I started college as a pre-med student because I knew I liked science. At the time, I thought if you did science, the medical field was pretty much your only option.

I had a great professor at SUU that showed me that you could do science outdoors,



In the bee lab with Mary Bammer and Dr. Jamie Ellis

Jack family portrait

which combined both of my loves. I volunteered to help him catch bats and record their echolocation calls all night at national parks throughout Southern Utah.

I had a blast catching bats and the research was fascinating, but my wife hated that I was gone all night, so she suggested a change before I got in too deep. It was about this same time I got back into beekeeping with my cousin, so I thought I might explore my options with honey bees. Honey bee colony losses started making headlines all over the news, and instantly honey bee researchers had funding for students.

I was fortunate enough to be accepted into a Master's program with Dr. Ramesh Sagili at Oregon State University. About three weeks into my master's, I knew that honey bee research was where I wanted to stay.

What would you say has been the hardest part of your job?

I guess the hardest and possibly the most fun part of my job is that I am basically starting from scratch. There is no other full-blown beekeeping education program for university students anywhere in the country.

You can come to UF and study anything agriculture-related. If you want to go into poultry production, you take a series of poultry courses, do an internship and then enter the industry. If you want to go into dairy, horticulture or cattle, it's the same pattern. Nothing exists like that for honey bees and beekeeping. I'm starting something new, which is partly terrifying, but mostly really exciting.

So, what do you have planned to educate students who might want to enter the beekeeping industry?

When I was hired as a lecturer in May 2018, Dr. Jamie Ellis was already actively teaching two courses, which is already one more than most land grant universities. He was teaching an online course called *Beekeeping* and a hands-on course in the summer called *Practical Beekeeping*.

My first order of business was to create a new research course that used honey bees as a model organism to learn how to conduct publishable scientific research. It has been a very valuable course, not only to students but also to us by attracting top-notch students to the honey bee lab.

Because you can't cram a whole agricultural industry into a single course, I am now splitting Dr. Ellis' original *Beekeeping* course into two courses titled *Beekeeping I* and *Beekeeping II*. I am adding new material to both.

I am currently creating a study-abroad course that will be taught in Thailand. Students will be able to spend a full month in the country, studying the amazing honey bee diversity that is found in southeast Asia.

Next year I also plan to create a new course focused on the fascinating biology of honey bees. The following year I am planning a course focused on commercial beekeeping as well as creating an internship program for students interested in entering the industry. So, a lot of new and exciting additions are coming down the pike.

What impact do you think the new laboratory will have on beekeeping education?

We've already seen an amazing increase in interest around the state and university since the lab officially opened. The new lab has been incredibly helpful in terms of facilitating the teaching and has brought a lot of attention from students.

We have 30-plus bee hives right outside our classroom and 12 observation bee hives inside the building. If I am teaching about the honey bee dance language, we can walk 20 feet and observe live bees actually doing the dance. It's amazing!

Outside of the traditional classroom, I get a lot of opportunities to educate students in informal settings. I am also the faculty advisor for the UF Honey Bee Club. The attendance at Honey Bee Club meetings has skyrocketed after the opening of the new lab. A couple of years ago, only four or five students were attending the meetings. Now, we have 30-plus students coming each week to learn about bees.

The new lab gives the students space to manage their colonies, extract honey and be creative with their wax all in one place.

What is your favorite part of the job?

I am incredibly fortunate to combine my passion with an unbelievable work environment. I love beekeeping, I love working with students, and I have amazing colleagues in a world-class facility. There is truly nowhere else I would rather work than the UF Entomology and Nematology Department. PP

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Educate Your Website Visitors

To Drive Repeat Business

Alain Parcan

REMEMBER when just having a website for your company was enough to drive more business? It's a different story nowadays, considering most if not all of your competition has a presence on the web.

To drive repeat business, your site needs to be more than just visually appealing and easy to navigate; it needs to give potential customers the answers they're looking for.

What Is It?

Educational content is an essential part of having a quality site that gets your phone ringing. Before customers know whether they're ready to request an appointment with a pest control professional, they want to understand their problem and what it'll take to fix it.

Therefore, your website needs to tell a story about your business. Don't limit your story to just a list of your services and your phone number. Use a blog to address pest concerns that you often hear from customers.

Create an FAQ page to ask and answer questions in the language that prospects are using. Add a video to your "About" page that shows your technicians tackling inspections or maintenance treatments. All of these pieces of content together expand your company's story from a simple service provider to an industry leader that has the answers your customers are looking for.

Why Is It Important?

Educational content does more than just make your company look smart. It yields a variety of benefits that not only get your company new customers, but also bring the same customers back for continued service:

It guides customers to a decision. It's not always the case that people searching for pest maintenance services are looking for help right away. A lot of the time, online searchers, or researchers more accurately, like to learn as much as they can before they make a decision. So when a prospect finds a site that doesn't offer much in the way of helpful information, they'll jump to a site that does — and eventually take their business elsewhere.

Educational content keeps users engaged while they're in research mode. Pest control plans aren't signed every day, and it's important to remember that your customers are making a substantial investment in their homes. With this in mind, make sure you are making an equal investment in them by providing information that helps them make an educated decision.

It gets you noticed online. Google keeps its cards close to their chest in regard to the complex way they rank online search results. Their mission, however, is simple: Show searchers the most valuable results possible. Google and other search engines "crawl" sites on the web to get a feel for how valuable content is to any given search. They want to make sure that when someone looks up "termite control" or "bed bug control," the results are related and useful.

Educational content is a fantastic way to get noticed by Google and make it easier to get noticed online. Quality content about your services, products and company history will spell everything out to search engines.

The easier you make it on search engines to understand what you do, the higher you'll show up in online searches. The higher you rank in search results, the more site visitors and phone calls your company will get. After all, think about the last time you searched for something online. Did you look beyond the first page of results, or even look at the bottom of the first page?

It sets you apart from the rest. Like we said earlier, most of your competition has a website that features their services and contact info. If your company's site is the same, it's going to be hard for customers to tell you apart from the pack. Educational content will allow you to stand out and get noticed.

Some pest control companies get nervous about sharing valuable knowledge pertaining to the industry. They fear that this knowledge could lead to a "teach a man to fish" situation where the customers know enough to finish the job on their own. The truth is, especially in the pest world, customers are just curious and want to make educated decisions for themselves. If they can't find the information that they're looking for on your site, you end up losing business when they find a competitor with site that does.

BUSINESS OWNERS know better than anyone that customers move fast. The same is especially true of prospects online. In order to hold the attention of potential clients and drive them back to your site when they're ready to make a deal, load up your site with quality content that helps users make choices they can feel good about. Your website is the foundation of your online marketing strategy, so reinforce your foundation with quality educational content! PP

Alain Parcan, Director of Marketing for Market Hardware, Inc., contributed this article. Alain brings nearly 10 years of experience in educating businesses so they can market themselves more effectively. Market Hardware helps small businesses compete on the web and offers special discounts for professional association members. You can reach Alain's team at 888-381-6925.

INTRODUCED **Rhesus Macaques** *in Silver Springs State Park*

C.J. Anderson, S.A. Johnson, M.E. Hostetler, and M.G. Summers

Adult male rhesus macaque in Silver Springs State Park. *C. Jane Anderson, UF*

Rhesus macaques were introduced into what is today Silver Springs State Park in the mid-1930s.

LOCAL folklore suggests the monkeys were released while the 1939 movie *Tarzan Finds a Son* was filmed at the site. However, macaques were present in Silver Springs prior to filming, and no rhesus macaques appear in this film.

In truth, today's thriving population descended from monkeys intentionally released in the 1930s in an effort to increase tourism to the area.

Silver Springs became a tourist attraction in the 1870s. The clear waters generated by natural springs led to glass-bottom boat tours shortly after tourists began visiting the site. In the 1930s the manager of the glass-bottom boat operation, Colonel Tooey, is reported to have released approximately six rhesus macaques in hopes they would attract tourists and increase revenue for the boat tours.

Not knowing rhesus macaques are proficient swimmers, Colonel Tooey released the macaques on an island in the Silver River. The monkeys quickly swam to the surrounding forests, where their numbers began to increase. Boat operators used food to lure the macaques to the shore to entertain tour patrons.

In an effort to increase the population, Colonel Tooey purchased an additional six macaques and released them on the north shore of the river around 1948.

Adult female and juvenile rhesus macaque in Silver Springs State Park. *Craig O'Neal*

Postcard of Silver Springs glass-bottom boats, ca. 1930 – 1945

A 1968 study estimated the population of rhesus macaques in the park to be 78 individuals spread between two groups. By the 1980s, the macaque population along the Silver River had grown to nearly 400 animals, and the population had spread to the forests adjacent to the Ocklawaha River.

In 1984 short-term permitted trapping was initiated in an attempt to reduce the population, during which 217 individuals were captured and sold for biomedical research. In 1985 an additional 20 were trapped and removed by permitted trappers, and in 1986 it is believed an additional 59 animals were removed from the property by trappers without permits.

In an effort to slow population growth, 20 female macaques were sterilized in Silver Springs between 1986 and 1990. By the early 1990s rhesus macaques had been sighted as far as 11 miles north and 18.5 miles south of the junction of the Silver and Ocklawaha Rivers.

From 1998–2012 a private trapper, permitted by the state of Florida, captured approximately 830 rhesus macaques between Silver Springs and lands along the adjoining Ocklawaha River and sold these animals to biomedical research facilities. This practice generated a great deal of public controversy and has since halted.

The fall 2015 population size within Silver Springs State Park was estimated to be 190 macaques, but the size of the population along the Ocklawaha River was unknown.

Rhesus Macaque Ecology and Natural History

Rhesus macaques vary in color from brown to gray and are lighter in color above the waist than below. They have little to no hair on their faces or rumps. Their tails are relatively short, and like all Old World monkeys, their tails are not prehensile.

Adult males are larger than adult females, standing at about 1¾ feet tall, compared to females at 1½ feet. They are quadrupedal, meaning they move on all four legs, but will stand on their hind legs for better visibility.

Rhesus macaques adapt to an exceptionally wide range of habitat and climactic conditions, which has allowed them to establish populations at elevations from sea level to more than 13,000 feet in their native range in Asia. They are both arboreal and terrestrial. They are primarily herbivorous but will supplement their diets with bird eggs, invertebrates, honeycombs, and small vertebrates.

Rhesus macaques live in groups. Each group contains a single alpha male. Females remain with their natal groups their entire lives. Most males leave their group after reaching sexual maturity, after which they remain solitary, join a bachelor group, or join another established macaque group. Females typically have one infant per year, although they occasionally have twins.

Rhesus macaques thrive in human-dominated areas. These monkeys frequently raid crops and in many areas are regarded as agricultural pests.

Craig O'Neal

Adult female and juvenile macaque in Silver Springs State Park.

Rhesus Macaques as an Invasive Species

Rhesus macaques introduced into other parts of the United States have caused environmental and economic damage. A population of over 3,000 free-ranging rhesus macaques is maintained on Morgan Island, South Carolina, for biomedical research. Tidal creeks surrounding this island have been found to have elevated levels of *E. coli* and fecal coliform bacteria due to the monkeys.

Laboratory animal supply company Charles Rivers Laboratories introduced rhesus macaques to two islands in the Florida Keys in the 1970s. These animals destroyed red mangroves growing on the islands, which led to shoreline erosion and incited long-standing legal battles between Charles Rivers Laboratories and the state of Florida. The animals were subsequently removed between 1999 and 2000.

Rhesus macaques were introduced to the Isla Desecheo National Wildlife Refuge, Puerto Rico, in 1966 to study their adaptations to a novel environment. They were considered a significant ecological threat by 1970. By consuming bird eggs and chicks, the macaques decreased populations of four species of shore birds.

A study by the US Department of Agriculture found introduced rhesus macaques and patas monkeys in southwest Puerto Rico cause nearly $300,000 in crop damages annually and over $1 million in management costs. The Puerto Rico Department of Natural Resources and Environment and the USDA currently trap and euthanize these animals as a precaution against further ecological and economic destruction.

Management and Potential Impacts in Silver Springs State Park

The rhesus macaques in Silver Springs State Park have been documented consuming nearly 50 species of plants. The macaques were also observed consuming quail eggs placed in artificial nests during an environmental impact study, indicating they may be a threat to breeding birds. It is unknown whether or to what extent they are currently threatening native wildlife by predation or competition.

In addition to the potential threats to native natural resources, introduced rhesus macaques may pose risks to human health. The

Rhesus macaque in aggressive stance to a woman attempting to feed it. *C. Jane Anderson, UF*

rhesus macaques in Silver Springs have tested positive for herpes B virus. This virus is mostly asymptomatic in macaques, who only shed the virus intermittently. Infected animals must be actively shedding the virus to spread it to others. The virus is spread by transmission of bodily fluids, which is possible through bites and scratches or other contact with bodily fluids. There are no reports of other wildlife species contracting the virus from macaques.

The risk of transmission of herpes B from macaques to humans is uncertain. There has never been a confirmed report of a human contracting herpes B from a macaque in the wild, despite at least 18 reports of macaque bites or scratches in Florida and countless incidents in the macaques' native range. However, there have been 50 incidents of human herpes B virus infection from macaques in laboratories, almost entirely from bites and scratches from infected animals. Nearly half of these cases were fatal, and other infected humans suffered permanent neurological damage.

It is unknown why there has only been documentation of human infection from macaques in laboratories and not from wild macaques, despite prevalence of herpes B infection in both captive and wild macaques. Future research is critical to better understand the ecology and threats of this virus in and around Silver Springs State Park as well as other locations where macaques occur.

For the safety of humans and macaques alike, visitors to Silver Spring State Park and boaters on the Silver and Ocklawaha rivers should avoid contact with macaques and only observe them from a safe distance.

Visitors should never feed the macaques, as feeding them may cause them to become aggressive towards humans. Anyone bitten or scratched by a macaque should seek immediate medical care and follow the guidelines provided by the Center for Disease Control.[1]

Purchased in 1985 by the state of Florida, the 4,685-acre Silver Springs State Park is now publically owned with a mandate to preserve natural resources, including native plant and animal species. Managers of the park are thus in the difficult position of determining the best strategies for managing the population of nonnative rhesus macaques.

Many park visitors enjoy observing the macaques and support their continued presence in the park. However, research on the behaviors, potential for population growth, threats to human health, and environmental impacts of this population is needed to make informed management decisions. PP

C.J. Anderson is Assistant Professor of Research, Texas A&M University – Kingsville; S.A. Johnson is Associate Professor, M.E. Hostetler is Professor, and M.G. Summers is Research Assistant at UF/IFAS Wildlife Ecology & Conservation Department.

[1] http://www.cdc.gov/herpesbvirus/firstaid-treatment.html

Recruiting
The Right Candidates

Laura Simis

AS A business owner, you've likely already felt the pinch of not having enough employees and how it affects short-term growth. When you're short-staffed, it's easy to abandon high-level planning and accountability in favor of more urgent day-to-day needs. It also impacts your ability to keep up with production, forcing you to make sacrifices between delivering quality service to existing customers or taking on new ones.

Not having enough employees can send business owners scrambling, sometimes settling for a lackluster hire just to bring in a warm body — but not having the right employees affects your long-term growth.

A bad fit can damage your customer relationships. They can mess up the dynamics of your team, even sending other good employees packing. Bad hires can cost you a lot of time and money.

The right fit can make a huge positive impact on your business. Employees who are committed to your mission are the ones who can help you achieve big goals, innovating new ways to deliver excellent service and engaging with purpose. Finding these top performers requires you to understand what appeals to these job seekers, and how to make your business irresistible.

Whether you're looking to find more applicants in general or hone your applicant pool to bring in more qualified candidates, the most successful business owners know that investing in your recruiting marketing efforts is just as important to your growth as marketing your services to customers, if not more!

WHERE ARE TOP APPLICANTS LOOKING?

You already know that an old-school help-wanted sign probably isn't going to get you far, but do you know where your best applicants come from?

There are a number of platforms available to job seekers: Indeed, ZipRecruiter, Glassdoor, LinkedIn, Monster, and CareerBuilder.

Most of your applicants are starting here, and many of them are doing it from their phones. Some of them are beginning their search on Google Jobs, which aggregates listings from all of the other major job boards except Indeed.

Whether you're looking for one all-star at a time or hiring for multiple positions across multiple branches, Forgely helps business owners see which platforms are delivering their most qualified applicants. Forgely reports on metrics like:

- Time to fill, by position
- Applicants by organic listing vs. paid listing
- Applicants per position, by platform.

WHAT ARE TOP APPLICANTS LOOKING FOR?

A job seeker's first interaction with your business is often with your job listing — are you just listing off details and responsibilities, or are you painting a picture of what it's like to be on the team?

A weak job listing brings you weak applicants, and weak applicants result in wasted time and money.

Your audience, especially a younger generation of job seekers, have different demands of a workplace than job seekers 15 years ago. Technology has made it imperative that employers step up their game to compete for talent.

Consider the following as you review your job descriptions:

- **Company culture:** Younger job seekers are more likely to prioritize job satisfaction and making a difference over salary and benefits. Share (true!) information about the mission at hand, and how each position plays a role in the success of the company and the team.
- **Unique value:** Flexibility, freedom, and daily problem-solving are some of the unique characteristics of the job.

Think about the characteristics of your top-performing technicians. They probably enjoy working outdoors, getting to work with their hands, and having some level of autonomy in the field. A job description that explicitly

Continued on Page 31

PCO Pointer

Pesticide Concentrates

IT AMAZES ME how often this chapter is broken in the field:

Chapter 5E-14.106(3) All pesticide concentrates used in the field shall be kept under lock when in unattended service vehicles. They shall be kept in leakproof containers legibly tagged or labeled for identification and providing information required by EPA regulations or recommendations.

(4) Pesticides kept in containers other than application equipment shall be accurately identified by permanent, durable label or tag, showing the common or chemical name(s) of principal active ingredient(s) and providing information required by EPA regulations or recommendations.

ON ONE pest control vehicle inspection while training another inspector, we followed a pest control truck into a gated community. He then stopped in front of a house. We stopped about 150 feet back from where he had stopped and observed him.

The owner of the house came out holding a toddler and spoke to the pest control technician. The technician then opened his pesticide storage box and took out what appeared to be ant bait and proceeded to treat around the house.

When he was out of sight, we drove up to the truck and observed the tool box still open, which contained pesticide concentrates and rodent bait. The rodent bait was not labeled.

Did I mention that the owner of the home was holding a toddler? The technician didn't even close the pesticide storage box! Not only is this a violation, but it is also a liability.

I asked the technician what he thought would happen if the toddler had gotten a hold of the red, apple-flavored rodent bait? He said he didn't know. I told him whatever the child's parents' attorney wanted him to do!

I then asked him why he didn't even close the pesticide storage box. He said he was only away from it for a short time. Which was long enough for us to drive up to his truck, get out, and photograph the open pesticide storage box. PP

Report by Paul Mitola, Environmental Consultant

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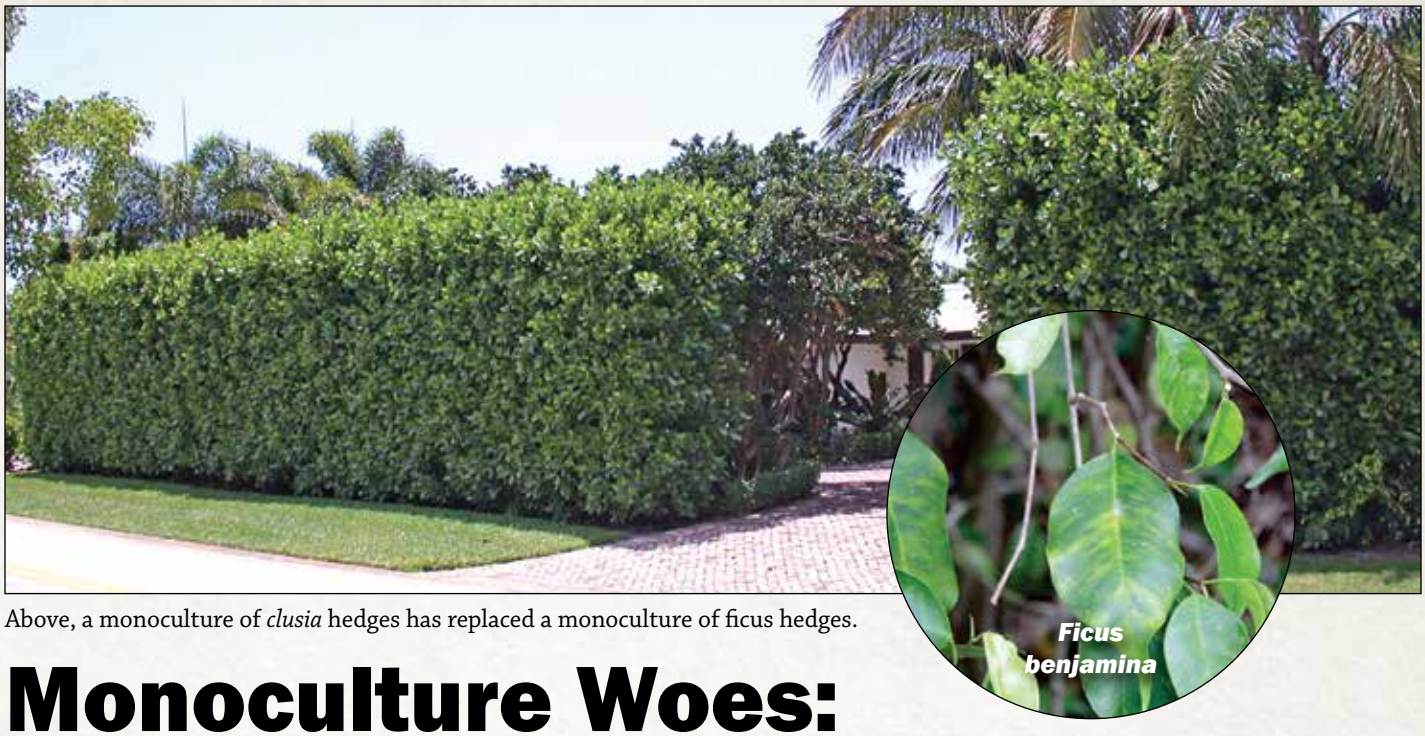

Doug Caldwell

Above, a monoculture of *clusia* hedges has replaced a monoculture of ficus hedges.

Monoculture Woes:
One-Species Hedges Invite Pest Disasters

Doug Caldwell

WHO would have thought that the bullet-proof, decades-long standard of South Florida shrubbery, *Ficus benjamina*, would ever be decimated? Well, as many of us know, in 2009 a small whitefly going by the common name of the fig or ficus whitefly, *Singhiella simplex*, did just that.

This unwelcome immigrant resulted in millions of dollars worth of damage and gut-wrenching trauma. I wish there was an economic impact statement including costs of removing miles of dying ficus hedges and costs to replant and/or costs for the expensive pesticide treatments for the ficus whitefly (shown at right).

There's also a concern for environmental risk of using soil-applied neonicotinoids. Remember, the annual maximum application dose per acre for neonics is equivalent to about five 1.6 ounce packets of Merit 75 WSP — and I repeat, per acre! Plus the emotional stress in dealing with a large hedge replacement can be overwhelming.

These potential failure variables should be included in landscape design planning. Plant diversity and plant-pest susceptibility are also tools in the war chest of landscape pest maintenance managers and designers, known as IPM — integrated pest management.

BUT WHAT ARE WE doing to try and minimize the possibility of another hedge debacle? Look around, what are hedges composed of now? Mixed species of similar textured shrub species? No, we have miles of *Clusia* — either *C. fluminensis* or *C. flava,* depending on the plant taxonomist.

I'm not certain if a major *Clusia* insect or disease exists, but if there is such a pest, eventually some will regret going along with another monoculture and repeating the ficus whitefly disaster. Shouldn't we be more adventuresome and creative in our plant selection?

Landscape Aesthetics Foster Potential for Destructive Pests

Is it feasible and visually acceptable to install hedges of different species? Or is it like sour grapes? Is there an inherent prejudice to variation in texture or different growth rates in a line of shrubs? I don't think there would be a pruning maintenance issue with a well matched, aesthetically compatible, mixed-species hedge, since landscapers are frequently servicing properties. *Continued*

Doug Caldwell

A whitefly-infested, defoliating *Ficus benjamina* hedge at left meets an intact Sandankwa viburnum, *Viburnum suspensum*, hedge in Naples, Florida, May 2015.

Akos Kokai

Natal plum, *Carisa macrocarpa*

Homer Edward Price

Seagrape, left, and cocoplum pair well in a hedge

Monoculture, continued

I WOULDN'T plant the "wild-hair" silverthorn, *Eleagnus pungens*, in the same row — or any row for that matter — along with the tidy natal plum, *Carissa macrocarpa*. And I don't mean those high-maintenance, close rows with three shrub species jammed into a 6-foot-wide bed, which seems all too common in the Naples area.

Someone once said, "a diversity of species allows the designer and owner to create rhythm in the hedge design, as well as contrasting colors and textures for more interest."

When asked about the hedge monoculture trend, Windham Studio landscape architect Aaron Denton replied, "We often alternate between cocoplum and seagrape for the back row of a double required-native hedge, *clusia* and viburnum and others when we don't have to be 100-percent native. Then, the second required row we alternate between silver buttonwood, firebush — the dwarf one that isn't actually dwarf — copperleaf, muhly grass, thryallis, carmona, panama rose, etc.

"Usually 40 feet is the minimum section of the same plant, 70 feet or so for the maximum section of the same plant. Typically, the alternating pattern is directly tied to our tree planting. For example, three canopy trees needs about 60 to 70 feet. That could be paired with seagrape in the back, firebush in the front. Then a group of three or five sabal palms (about 40 feet) paired with cocoplum in the back and muhly in the front."

So get out there and think outside the (hedge) box with selections to promote longer-term sustainability. PP

- ✔ Also see Stephen Brown's fact sheet on shrubs for Florida hedges, https://tinyurl.com/SFL-hedges
- ✔ And also this by Mary Misitis, https://tinyurl.com/ornamental-hedges

Youtube videos:

- ✔ Ficus whitefly, https://tinyurl.com/yydb9pax
- ✔ Overlooked native shrubs at NBG, https://tinyurl.com/yxm4lj6t

Doug Caldwell is Commercial Landscape Horticulture Educator, Collier County Extension, University of Florida, IFAS, Naples, Florida, dougbug@ufl.edu

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Trapping Two Formidable Foes in Low-Income Housing

Ben Hottel

BED BUGS and German cockroaches can both be serious pests in low-income, multiunit housing facilities. Both pests can be particularly problematic in multiunit housing environments because they can spread from one infested apartment to another.

Infestations can go undetected by residents, and they may never even be reported to landlords. In one study done by researchers at Rutgers University, 53 percent of residents in low-income housing never knew that their apartments were infested with bed bugs.

These potentially unknown infested apartments can spread their infestations to adjacent units. Because of these unknown infestation sources, the apartment complexes will have continual bed bug issues. Proactive inspection and monitoring can help counteract some of these problems.

Our Goal: One Trap for Two Species

Is there any single way to detect both bed bugs and German cockroaches in multiunit housing environments? If the infestation is high enough, both German cockroaches and bed bugs can be detected pretty easily with a typical visual inspection. When infestations are light, though, using traps becomes more effective.

Current bed bug pitfall trap designs do not work well at capturing German cockroaches, and standard German cockroach sticky traps don't work well at capturing bed bugs. Bed bug pitfall traps rely on smooth plastic moats that bed bugs can't climb out of. German cockroaches have tiny pads on their legs that can allow them to climb up smooth surfaces such as plastic and glass, so a bed bug pitfall trap won't work well at entrapping them.

A typical German cockroach sticky trap consists of glue placed on top of cardstock. The cockroaches get caught in the glue and can't escape. Bed bugs have sharp claws that can grip the rough cardstock base and pull themselves out of the glue. If you combine the features that capture each pest into one trap, you can make a trap that captures both pests.

One trap that we found that will capture both bed bugs and German cockroaches is a modified M330 Victor Roach Trap. Instead of placing the glue on a rough cardstock base, the glue is placed on a smooth plastic film. The smooth plastic film reduces bed bugs' ability to grip the base around the glue if they are caught. Trapped bed bugs and cockroaches are unable to escape. This trap can be used to monitor for both pests in multiunit housing facility.

How Well Does it Work in the Field?

In a study done in Tallahassee in low-income multiunit housing units, we tested the efficacy of these trap. We placed M330 traps under couches, recliners and beds inside apartments. All of the apartments had known bed bug infestations.

The traps were able to detect both bed bugs and German cockroaches in these apartments. All of the German cockroach infestations detected were unknown to the landlord. Pest control could now treat for not only bed bugs but also the German cockroach infestations.

Using these traps when there is suspected bed bug activity could also end up detecting unknown German cockroach infestations and vice versa. Monitoring for both pests and making any necessary treatments would be expected to reduce the spread of these pests throughout an entire multiunit housing facility. PP

More information on the research can be found on the journal *Insects* website at **https://doi.org/10.3390/insects10060177**

Ben Hottel is Assistant Professor at the Center for Biological Control, Florida A&M University.

German roach and bed bug

The trap

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Recruiting, continued from Page 25

mentions those things is more likely to attract the right people.

- Training: If your job posts ask for "three to five years of experience," you could be turning away some rockstar applicants. Consider outlining some of the things you can't train for — customer service, problem solving — and removing technical requirements. In fact, explicitly stating your willingness to train new hires could open up the opportunity to applicants that might not have applied otherwise.
- Salary: A salary range can help your applicants self-qualify themselves, so you'll spend less time screening candidates that aren't willing to work within the range you're offering.

Recruiting the right people is a critical component in growing your business; and competing for top employees has changed rapidly, along with technology and the resulting shift in expectations from modern job seekers.

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Laura Simis is Communications Manager at Coalmarch.

UF/IFAS Researchers Work to Save Avocados

HOMESTEAD, Fla. — Our guacamole needs some help these days. A team of researchers from University of Florida Institute of Food and Agricultural Sciences have been in South Florida at ground zero of a pest problem that is endangering the sustainability of guacamole's key ingredient — the avocado.

Laurel wilt disease, or LWD, is a lethal disease in the southeastern United States spread by a fungus transmitted by the ambrosia beetle. The disease wilts and then browns tree leaves, killing entire trees in only a few weeks. Since 2003, it has killed millions of native forest trees and has impacted commercial avocado production in South Florida, said Jonathan Crane, a UF/IFAS professor of horticultural sciences and Extension tropical fruit specialist stationed at UF/IFAS Tropical Research and Education Center (TREC) in Homestead.

Given the destructive nature of this disease, there have been major concerns over the future of the Florida avocado industry, which provides an annual economic impact of nearly $100 million USD, adds Edward "Gilly" Evans, a UF/IFAS professor of food and resource economics and director of TREC. Since 2012, the disease has been responsible for the death and destruction of more than 120,000 trees — the equivalent loss of about 16.5 million pounds of potential guacamole.

There are more than 500 registered commercial avocado producers operating on about 6,250 acres, with close to 99 percent of the production occurring in Miami-Dade County. The industry is valued at $21 million with an economic impact of $100 million. Roughly 65 percent of the crop is sold outside of the state.

Help is on the way

The IFAS Tropical Research and Education Center has been at the forefront of the research to find pest management and eradication methods for the disease. An area wide management program centered on early detection and destruction of affected trees has slowed down the spread of the disease as research continues.

Research results indicate that the benefits of the program far exceed the costs. The program has played a significant role in minimizing the rate of spread, thus providing time for scientists working around the clock to continue their effort towards developing a more cost-effective treatment, added Evans.

"A cost–benefit analysis shows that our modeling of the disease spread at that time and indicates that in a 'do-nothing situation,' meaning if growers did not adopt some aspects of our recommendation in about five years, the industry would become nonexistent," he said.

Continued on Page 34

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Emily Eubanks

LEFT: Retired Florida Pest Control entomologist and entomology photographer Daniel Dye III (front) joined 4-H youth at Ordway-Swisher Biological Station in September. The 4-H members learned about macro photography, how to photograph in the field, and where to find interesting species.

Young Entomologists *Gather for a Conservation Experience*

Erin Harlow, Kelsey Haupt, Taylor Dykes and Will Eubanks

ACROSS FLORIDA each year, 4-H youth interested in entomology gather for bug camps and classes. 4-H programs focus on developing young leaders and providing projects in different areas of interest for students.

We found that many of our students have a passion and love for entomology that they have nurtured through the years through their 4-H projects.

The majority of our teens discovered their passions for entomology and environmental sciences after attending a week-long bug camp organized and facilitated by the University of Florida Department of Entomology and Nematology, or at their local Extension office.

A New Opportunity

This year we developed the Teen Conservation Experience to provide an opportunity for our 4-H youth that are getting to the end of their high school and 4-H careers and want to make a difference in the world.

The first Florida 4-H Teen Conservation Experience was held in Jekyll Island in early October. It encouraged youth to go beyond just collecting insects and develop a deeper understanding and appreciation for why conservation is important.

Teens ages 14–18 who had previously participated in entomology-related projects were invited to attend from across north Florida. Funding was provided through industry partnerships.

Our first trip to the Georgia 4-H Jekyll Island Camp was attended by youth from Alachua, Clay, Columbia and Duval counties. The three-day, overnight trip exposed the teens to careers in conservation, ongoing research, and local ecology.

Teens attended CoastFest, a local conservation festival, collected insects, and tracked rattlesnakes through the marsh while learning about the ecosystem and the importance of field research. The teens hope to bring back some of the ideas they learned to Florida and start some of their own projects.

These teens, who have participated in environmental education projects for multiple years, came together for the inaugural 4-H Teen Conservation Experience weekend and decided to create a statewide Teen Conservation Corps/advisory board. This board will be youth-led and youth-focused.

Youth from around the state will work together to focus on curriculum development, conservation implementation, and service project expansion. As active 4-H youth leaders, the conservation corps will consist of innovative thinkers exploring ways 4-H youth, families and community members can come together to educate others and preserve our natural ecosystems locally and abroad.

You Can Join In

These teens are the movers and shakers, educators, and ambassadors for the future of pest management and related industries.

To continue their effort, the teens will be seeking financial support from the industry and also, at times, technical guidance. If you are interested in providing monetary support for future experiences or to help fund their projects, please contact Erin Harlow at eeeck@ufl.edu or Dr. Rebecca Baldwin, baldwinr@ufl.edu.

If you would be interested in serving as a mentor in an advisory capacity, especially from the lawn and ornamental sector, please contact us.

The faculty and volunteers that have worked with these kids for the last several years cannot thank the industry enough for the support they have provided. We can easily say that we have seen each and every one of these kids grow through their entomology projects. It has influenced them not only in their career path decisions, but as they become young adults.

We are excited to see what the future holds for these teens and the Conservation Corps, and how they influence our state. PP

Erin Harlow is the Residential and Commercial Horticulture Agent III for UF/IFAS Extension in Columbia County. Kelsey Haupt is the 4-H Youth Development Agent for UF/IFAS Extension in Duval County. Taylor Dykes is the Florida 4-H State Council President, an Alachua County 4-H member, and a high school senior. Will Eubanks is an Alachua County 4-H member and a high school junior.

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Avocados, continued from Page 32

Thank the Aztecs for inventing guacamole at least 500 years ago in what is now Mexico.

In the meantime, UF/IFAS scientists at TREC and throughout the state are committed to developing ongoing integrated pest management practices to protect Florida's avocado industry.

Daniel Carrillo, assistant professor in tropical fruit entomology, and biological scientist Rita Duncan conducted work at TREC for avocado growers that compares an integrated pest management system involving common chemical pesticides and an entomopathogenic fungus, *Beauveria bassiana*. Entomopathogenic fungi infect and kill only insects, and so pose no harmful threat to humans, noninsect wildlife, or plants. The fungus not only kills the ambrosia beetles that carry the disease-causing pathogen, but also inhibit the pest's ability to bore into the wood, where it can spread the plant pathogen.

Another new tactic to manage healthy, productive avocado trees involves growers maintaining healthier soils and even considering adjusting the pH in their groves. Because the fungus that causes laurel wilt is halophilic, it shows a dramatic decrease in growth at high-pH values. This could help in reducing persistence of the pathogen in soils, although effects on beetle-vectored transmission are likely to be minimal.

Florida has a rich history with guacamole's main ingredient. The Florida avocado industry is the state's third-largest fruit industry, behind citrus and blueberry. The first avocado varieties in the United States date back to Florida in the 1800s.

"When we think of diseases that we have yet to find a cure for, we have learned that steps are taken to manage the disease. We continue to learn more about the pathogen each day and are drawing closer to a solution," said Evans. "While as scientists we are not happy with the fact that we have yet to come up with a cure for the LWD, the truth is that without our recommendations and research that we do have, the Florida avocado industry would be history." PP

— Lourdes Rodriguez
UF/IFAS

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