



Inside this issue:

Summit	1
Noelani Waters	1
Trac Lab	2
Prof Lu	3
Dean's Corner	5
Directed Studies	7
Dr. Singer	8
Ag Students Give Back	9

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UH Hilo hosts 6th Annual Sustainability in Higher Education Summit

By
Alexis Stubbs

Tis the season to be 'susty'! It's that time of year again when student and faculty delegates from all 10 campuses of the University of Hawaii join together for extensive breakout sessions, brainstorming,



AG 230 students work on food production areas

during [AY17-18's Many Minds, One University](#) focus on addressing the *Grand Challenges of Water*; share best practices and lessons learned from across the broad & diverse field of sustainability in higher education; and recognize remote interaction. This will include *virtual keynotes* from the Worldwatch Institute's **Erik Assadourian** ("*Is Sustainability Still Possible?*") as well as the annual "*State of the State Climate Update*" from UH climatologist **Dr. Chip Fletcher**.

strategic planning and more. The 6th Annual Sustainability in Higher Education Summit was hosted on Hawaii Island at UH Hilo and Palamanui on February 8-10, 2018, for the first time. The year's summit aims to learn from indigenous ancestral knowledge systems; share examples of integrating indigenous ancestral knowledge into contemporary practice; support faculty in developing sustainability courses across the curriculum; share best practices in applied learning and campus operations to meet energy, water and waste reduction targets; feature curriculum, teaching, research, community & cultural engagement activities; feature student and faculty work conducted

Continued on page 7

CAFNRM Alumna Noelani Waters joins Apiary Program of HDOA



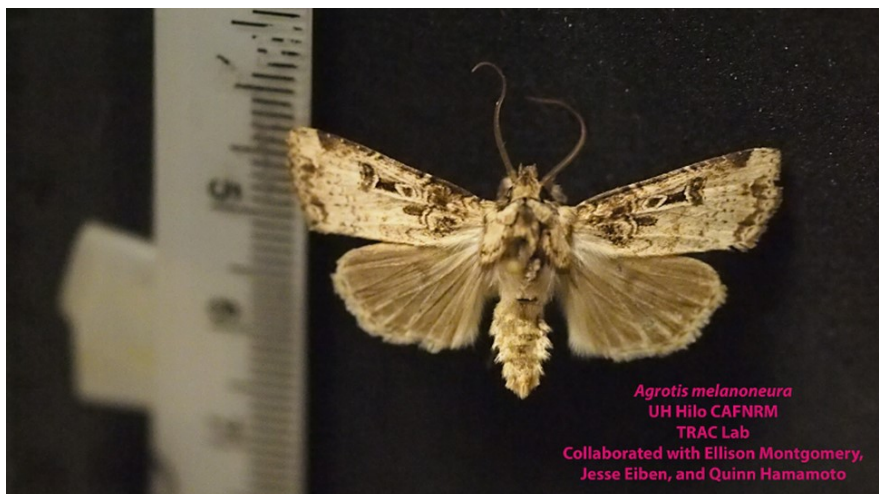
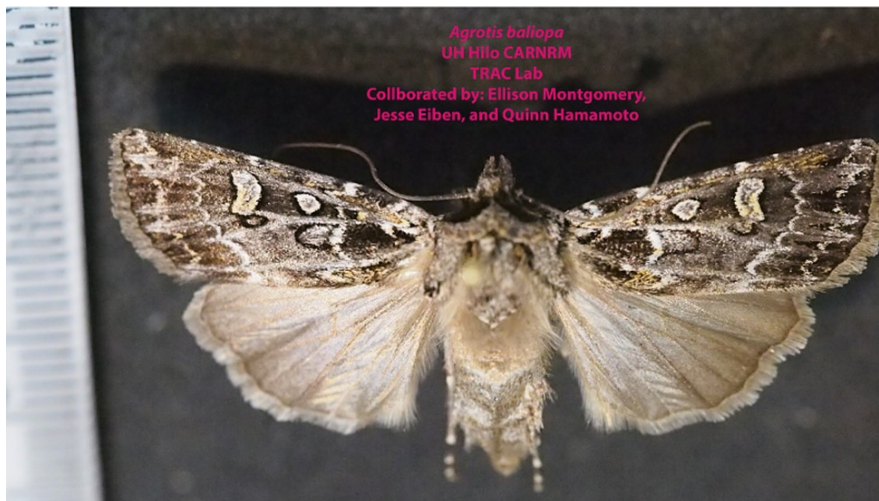
Aloha, my name is Noelani Waters and I am a CAFNRM alumna who graduated in fall 2014 with a degree in Agroecology and Tropical Plant Science with a certificate in Beekeeping. Just before graduating, in October 2014, I was hired as an Apiary Technician with the Hawaii Department of Agriculture's (HDOA) Apiary Program under the direction of the state's head apiary specialist at the time, Danielle Downey. The mission of the Hawai'i Apiary Program is to safeguard the beekeeping industries of Hawai'i through the application of science-based regulations, regular monitoring and prevention of invasive honey bee pests, interactive educational opportunities, and open communication with beekeepers throughout the state.

Continued on page 5

CAFNRM Students and volunteers assist with digital museum resources in the TRAC Lab

By Quinn Hamoto

Quinn Hamamoto (UHH Alumni, BA in English), Ellison Montgomery (UHH Alumni, BS CAFNRM) and Dr. Jesse Eiben (Asst. Prof. Entomology; Teaching and Research Arthropod Collection (TRAC) Lab leader), collaborated to curate and digitize pictures of endemic Hawaiian insects. These insects were donated by Mr. Jon Giffin, a retired Department of Forestry and Wildlife employee. Mr. Giffin worked with research entomologists for many years as the go-to DOFAW employee assisting with access and research permits for Hawaiian insect research. The TRAC lab was overjoyed to receive the donation for continued entomology research and teaching. Ellison photographed a large portion of the collection and created a digital accession database of the unique wing pattern diversity observed within endemic *Agrotis* species. Endemic Hawaiian Noctuidae moths, in the genus *Agrotis* (commonly known as “Owlet Moths,” “Cutworm Moths,” etc.), are a diverse group of moths that can be easily mistaken for their closely related, but introduced pest counterparts (ex. *Agrotis ipsilon*, the black cutworm moth). Due to this confusion, Quinn volunteered to work with the TRAC lab on a project for her graduate school program (Masters of Library and Information Science, UNC-Greensboro campus). These combined efforts resulted in a Wix-hosted website aimed to increase public and scientific awareness of these endemic Noctuidae moths. The wing pattern diversity shown on the website is intended to help the public, agriculturists, and scientists to identify better the endemic Noctuidae moths. Other goals for this website include an increase public appreciation for them, as well as distinguish them from superficially similar pest moths. If you would like to see these moths, please feel free to visit the website through the link: <https://hiloinsecttrac.wixsite.com/trac-agrotis>.



Professor Christopher Lu delivers plenary speech at a Conference in Mexico City

CAFNRM Professor Christopher Lu delivered a speech at the plenary session of XXIX Reunión Nacional sobre Caprinocultura. The biannual event hosted by AMPCA, National Association of Goat Production in Mexico was held in October 2017 at Cuautitlán campus of Universidad Nacional Autónoma de México. Universidad Nacional Autónoma de México is the premier institution of higher education in Mexico. The objective of the conference was to disseminate and exchange recent research information among professionals involved in goat production. Hundreds attended the three-day conference.



Prof. Lu (Center), the organizing committee and faculty members of the host institution

Dr. Lu presented a paper entitled “Ethological Observations Associated with Feed and Water Ingestions in Goats”. He stated: “Ingestion behaviors in goats can be both innate and learned. While the nerve and endocrine controls are apparent, goats acquire their ingestion behaviors through learning and experience. Environmental factors further modify ingestion behaviors in goats; as differences in ingestion behavior can be observed in goats under intensive feeding systems versus those under extensive grazing systems. With a circadian rhythm, water ingestion is brief while feed ingestion occurs in two major bouts in the morning and before sunset. Goats exhibit both greater discrimination and tolerance toward bitterness that is prevalent in secondary plant compounds with anthelmintic and protein binding properties. These properties have health and nutritional implications in goats.

Continued next page...

Professor Lu continued...



Prof. Lu answers questions from the participants of the XXIX Reunión Nacional sobre Caprinocultura



Prof. Lu held an open forum with faculty and students of National University of Mexico

Universidad Nacional Autónoma de México
 Facultad de Estudios Superiores Cuautitlán
 Asociación Mexicana de Profesionistas en Caprinos (AMPCA)
 Consejo Nacional de Ciencia y Tecnología

Invitan a la
XXIX REUNIÓN NACIONAL E INTERNACIONAL SOBRE CAPRINOCULTURA

11, 12 Y 13 DE OCTUBRE DE 2017
SEDE: FES CUAUTITLÁN, CAMPO CUATRO

OBJETIVO GENERAL
 Promover la difusión de la investigación en el área de la caprinocultura y la actualización e intercambio de conocimientos entre profesionistas, estudiantes y personas relacionadas con la producción caprina.

CUOTA DE RECUPERACIÓN	PONENCIAS MAGISTRALES AMPCA
• Profesionistas y productores \$1,000.00	Beth Miller / USA / IGA Sanidad
• Socios AMPCA \$ 700.00	Christopher Lu / USA / IGA Alimentación
• Estudiantes posgrado \$ 800.00	Felipe Torres / México / UADY Sanidad
• Estudiantes licenciatura \$ 500.00	Jean Paul Dubeuf / Francia / INRA Sistemas de Producción

TALLERES PRE-REUNIÓN
 9 y 10 de octubre de 2017
 • Elaboración de productos lácteos
 • Curtido de piel de cabra
 • Cortes de valor en la canal caprina

CURSOS PRE-REUNIÓN
 9 y 10 de octubre de 2017
 • Inseminación artificial
 • Transferencia de embriones
 • Estrategias para el control de parásitos gastrointestinales

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Logos: UNAM, IGA, UANL, ACP, Yo soy IGA, Mederilab, IGICAN, ogo milk, Bayer HealthCare, PRODUNET, MINELAZA, zoetis.

With mobile lips, prehensile tongue, agile front legs, and strong hind legs, goats are able to expand their feeding dimension and employ desirable nutritional strategies. Selectivity, browsing, long distance traveling, bipedal stance, aerial positioning, and adaptability set goats apart from cattle and sheep in ingestion behaviors. Ruminating is perceived as an important index of welfare. With a wide range of variation, a goat typically spends 7 to 8 hour/day in ruminating. Leverage of ingestion behavior can contribute to biological control of weeds, optimal utilization of feed resources through mix-species grazing, and maintenance of landscape diversity; while negligence can lead to environmental degradation. Understanding of ingestion behavior as both an art and a science has practical implications in meeting goals of ethological needs, animal welfare, perceptions of societies, productive performance, consumer acceptance and economic return.” The article at its entirety is available at <https://www.researchgate.net/publication/320427832>.

During his visit to Mexico, Professor Lu held two open forums with faculty and students at Cuautitlán campus auditorium of Universidad Nacional Autónoma de México where Dr. Lu was awarded with Professor Honorario in 2008. Dr. Lu answered questions pertaining to food and Agriculture, research, and higher education and exchanged views with the near capacity audience.



Dean's Corner

Some Academic and Industry Trajectory Aspects of Career Preparation for CAFNRM Students

By: *Dr. Bruce Mathews*

A Fall 2017 UH Hilo Student Association (UHHSA) survey of CAFNRM students was recently shared with me by Alexis Stubbs. The survey indicated that nearly 60% want a government job, a little over 25% will seek a career in some aspect of farming, about 5% want to work in the agricultural/landscape service sector, and the rest don't know. This information may be a bit concerning particularly if one means a government job in agriculture as the number of annual entry level openings in permanent governmental agriculture positions are very limited in Hawai'i relative to the numbers of graduates. In terms of further graduate studies nearly 40% indicated that they definitely want to attend graduate school while nearly 35% indicated no intention of further studies. These data are also concerning given that quite a few students that I visit with seem to lack much of an idea about how to best prepare themselves for graduate studies and how to optimize their competitiveness for graduate school assistantships and scholarships.

In today's highly competitive world students need to realize that graduate programs in agriculture are increasingly looking for students with greater preparation in the natural sciences, biotechnology, statistics/predictive analytics than the minimum requirements for a B.S. degree in agriculture. The advice here is for students to be wise in how they choose to fulfill their elective requirements if they plan to go onto graduate school. As a junior in CAFNRM over 30 years ago I was advised by several of the faculty to take at least a semester of organic chemistry, biochemistry, more genetics and breeding, and more math (calculus 1 and 2) just in case I ended up applying to graduate school. This was solid advice as I was only required to take make up one lower division undergraduate class in graduate school (analytical chemistry). Lower division undergraduate classes cannot be used to fulfill graduate level credit requirements. Too many B.S. graduates in agriculture are only informed that they will have to take more support classes in natural sciences/math after they are admitted to graduate school on a provisional basis.

Next I will explore some trajectories in agriculture to take into consideration with respect to career planning. There is no doubt that profitable farming is becoming more technical and efficient and that if an operation is too small the financial returns are often insufficient and one must seek income from non-farm sources. A major contributing challenge to the farm gate profitability is that technological developments in production have increasingly reduced the price of crop products relative to the prices of other goods. This decline has been of major proportions with real food

comparative prices at the end of the 20th century being less than half their levels in the 1950s despite huge increases in demand. As they tell you at the International Rice Research Institute (IRRI) the primary impact of the Green Revolution was to reduce the share of household income spent on food in half thereby reducing poverty of the masses. On the other hand for the farmer this means that farm size increasingly impacts economic viability. And for many small farmers it means being on a constant niche product treadmill once their product is efficiently scaled up by others in regions with lower operational costs. If farms grow bigger at the expense of small farms there are also often serious economic consequences for displaced farmers.

In CAFNRM we believe in the future of farming in Hawai'i. However the promise of better days and sustainability is through resiliency based on innovation and willingness to adapt to change. The past can inform the future however it is not the overarching basis for the future because what is sustainable changes with time and new challenges and technologies. Our goal is to lay the groundwork for students to have a bright and productive future but it is up to them to run with the ball.

Future farmers and agricultural professionals will have to become more knowledgeable of sensor technologies, automation and robotics, predictive and decision analytics, sustainability analysis, integrated farming systems, nutrient cycling and microbial processes, molecular and synthetic biology, etc. Critical thinking coupled with a solid science and business background will be key in assessing the pros and cons of the next wave of novel biotech inventions that could bring great benefits to society and the environment (Van Acker et al., 2017). New technologies such as CRISPR gene editing avoid some the characteristics of GMO technology that are often criticized by the general public (such as insertion of foreign DNA) while offering even greater potential for desirable crop modifications. Much of the above may make uncomfortable reading for some however the goal is to challenge students to start thinking more seriously about their future and positioning themselves with the requisite skill sets to remain competitive throughout their careers.

Reference

Van Acker, R., M. Rahman, S.Z.H. Cici. 2017. Pros and cons of GMO crop farming. Oxford Research Encyclopedia of Environmental Science. Oxford Univ. Press, UK. <http://environmentalscience.oxfordre.com/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-217>

Noelani Waters *continued...*

Our program was officially established in 2011 and became a permanent part of HDOA in 2014. Though honey bees are not native to Hawai'i, they have been here for over 150 years, providing a variety of excellent honey and, most importantly, critical pollination of local agricultural goods. Primary beekeeping industries in Hawai'i include honey production (worth ~\$3.1 million/ year in export), queen bee rearing (worth ~\$10 million/year in export) and agricultural pollination services (worth ~\$212 million/year in export).

Currently, I am one of two apiary specialists based in Hilo dedicated full-time to bio-security, honey bee health, and pollinator education statewide. After the recent departure of our head apiarist, Lauren Rusert in July 2017, I have been leading the Apiary Program in our efforts across the state. Here are a few of primary things we work on:

Biosecurity: We monitor over 100 swarm traps near ports of entry statewide to survey for new pest detection and invasive species. We also monitor for any suspicious or unlawful behavior. Bringing bees, queens, or contaminated used equipment into the state of Hawaii has been illegal since 1908.

Queen Certifications: We inspect all queen breeders in Hawaii (12 operations on four islands) quarterly for shipment certificates to ensure disease-free export of queen bees.

Outreach and Education: We provide free, technical hive-side assistance with all aspects of colony health, upon request. We also teach classes for free or at low cost, covering a variety of practical beekeeping topics including: Beginning Beekeeping, Honey Bee Health, Swarm Behavior, Queen Rearing, & Products of the Beehive. We present at fairs and classrooms to educate about pollinator importance and protection, including safe spray practices for home owners and beekeeping best management practices.

Hawaii Beekeeper Registry: We maintain a statewide beekeeper registry that provides participants with new pest & disease advisories, locally relevant bee information, swarm removals, our quarterly newsletters, and new product updates. There are currently close to 400 registered beekeepers statewide with nearly 20,000 colonies. We also provide referrals to beekeepers for honey bee swarms and hive relocation from Hawai'i residents who request removals.

Needless to say, our work varies widely and keeps us ex-

tremely busy. We love the work we do and are passionate beekeepers, eager to share information about our precious pollinators. To learn more please visit our website: <http://hdoa.hawaii.gov/bees>, or contact me at noelani.waters@hawaii.gov. Mahalo!



Noelani inspects a beehive.



Apiary Program team.

CAFNRM Students Engage in Practical Work and Research Experience Through Directed Studies

Directed studies in CAFNRM provide opportunities for students to engage in some of the most interesting and rewarding educational experiences while in college. The following is a glimpse of some of the activities our students in CAFNRM are doing to fulfill their requirements in Directed Studies while producing useful research data and significant community service:

- ◆ Ellison Montgomery is a recent graduate of CAFNRM, who came back to get more experience in applied sciences. She is working on acclimatizing native plants that was raised in Nursery Management taught initially by Dr. William Sakai and continued by Dr. Jesse Eiben . She is also working on fire ant Integrated Pest Management (IPM) project in CAFNRM greenhouses. She is currently employed at Komohana Research and Extension Center.
- ◆ Eddie Bufil works for BIISC through a Forest Service grant controlling *Albizia* trees. He is renovating Insect Biological Control displays for the control of invasive weeds. These educational displays are resources for teaching and outreach. He is also working on fire ant management in the non-greenhouse areas at the farm this semester. Eddie's adviser is Dr. Jessie Eiben.
- ◆ Connor Rhyno and Shaun Gutierrez, both with specialization in Tropical Horticulture, are creating digital maps of the orchards at CAFNRM farm. The maps will provide digitized information of all the fruit trees at the farm which will be linked to a QR code embedded on the tree labels. The labels can be scanned using any mobile device to link to information about the trees in the orchard. High resolution images were taken by Timothy Sullivan, a geospatial research specialist at UH Hilo. Connor and Shaun are also propagating fruit trees by air layering and grafting to supply the needs of a land in Hilo soon to be developed into an orchard. Additionally, Shaun is cleaning up and redesigning the Sustainable AG area of the farm. Connor and Shaun's adviser is Dr. Norman Arancon.
- ◆ Keith Metuli, Faatali Fai'ai, Lemau Ale, Faamanu Puaina, and Iosefa Lefi are revitalizing the CAFNRM greenhouse. Their activities include propagating fruits trees, production of lowering potted plants, hydroponics, renovation of compost piles and shed and general maintenance of the greenhouse.
- ◆ Aquaculture Student Workforce Training Program employs about 25 students annually to conduct research and production in the aquaponics, oyster, and marine ornamental programs. Students typically gain 2-3 years of work experience prior to graduation and even though we have non-students managers and technicians, students are responsible for the bulk of the work and manage, supervise and even train other students. Dr. Maria Haws advises students in the program.

The faculty, staff and students of CAFNRM wishes to thank NW Farm Credit Services for the funding support to make our AG Seniors Recognition Night Fall 2017 a resounding success.



Sustainability Summit continued...

Every year, one student is granted a \$10,000 Green Student Initiative Award to execute their winning project proposal at his/her campus, in addition to multiple \$1000.00 Green Student Leader Awards also given to students who are recognized as leading Green Movements on their campus. Last year, UH Hilo CAFNRM student, Alexis Stubbs, took home the \$10,000.00 Green Student Initiative Award for her Waste Sustainability through Composting and Vermicomposting Project (WSCVP), along with UH Hilo ENSC student, Zoe Whitney, who took home two \$1000.00 Green Leader Awards.

Delegates from the neighboring islands arrived in Kona on Thursday, February 8th, and enjoy events and workshops at Palamanui Campus. Delegates traveled to Hilo campus Friday morning. The day started off with a virtual symposium on the Grand Challenges of Panel Session: "The indigenous ancestral western empirical faculty then separated was given at this time for of the \$10K WSCVP as Sustainable Agriculture

In preparation for the sustainable implements, Sustainable Agriculture together to beautify the revitalize the nearby food Project Advisor Dr. Ryan

Students of Sustainability also provided much effort to prepare the area for Friday's presentation. Please visit soshilo.weebly.com to learn more and get involved with UH Hilo Sustainability.



WSCVP in progress and on its way

Water and followed by a meeting of wisdoms between knowledge systems and sciences'. The students and into working sessions. A tour delegates to view the progress well as the adjacent Ag230 Plots.

showcase of UH Hilo's Professor Norman Arancon's class (AG230) worked surrounding areas and production plots. WSCVP Perroy and members of the

Dr. Singer professional beekeeper visits UH Hilo



Dr. Harald Singer from the University of Vienna, Department of Integrative Zoology gave a presentation on "Interactions between honeybees and Varroa mites influenced by cell sizes and hygienic behavior" on Monday, February 12, 2018 at 9:00 am in UCB 127. In attendance were UHH students/staff/ faculty and community beekeepers and the Department of Agriculture, Apiary program. Dr. Singer is a professional beekeeper, bee inspector for the Styrian state government, President of the European Beekeeper Association and a member of the Professional Beekeeping Association of Austria. He comes from a family of beekeepers and has taught beekeeping professionally.

Ag Students Give Back

By Kyle Jackson

Each semester students of Hort 262 (Introduction to Tropical Horticulture) engage in community service. On February 15, 2018, our class of 14 students set out to help Malia Puka O Kalani Church revive their ornamental garden. The church is located in Keaukaha, Hilo, where almost half of the resident population is Native Hawaiian and 292 acres are devoted to Hawaiian Home Lands. The garden was initially started by a few parishioners of Malia Puka O Kalani in 2016 when Fr. Oliver Ortega was the parish priest. Different tropical ornamental plants such as bougainvillea, anthuriums, hibiscus and many others adorned the church on weekend services and they are returned to the garden for care and maintenance. However, since Fr. Ortega left and the composition of the parishioners changed, most of the plants were left attended with half of the potted plants dead and half badly needed repotting, pruning, watering and fertilizing. We were given instructions on our mission for the day: beautifying the church area by moving plants and shelves to a new area. Another part of our goal for the day was to improve the general appeal and health of the plants. Initially we worked as a class removing all the plants, then all the shelving materials to a central area. We were then given a brief workshop on how to rehabilitate a plant that is not doing so well. Some of the plants were past the point of saving and we were instructed to get rid of these fallen soldiers. The class then split up into different groups to accomplish these goals. Some of the students worked on aligning and “installing” the shelving material that the plants would sit on in the new area. Another group began methodically selecting plants that needed some TLC and removing dead areas, weeds, and topping them off with fresh soil so that new root development could occur. After removing some of the dead plants from their pots we rinsed the pots out so that they wouldn’t be moldy or dirty for the next use. The class came together for the end of the period and finished cleaning out the plants together, setting the revitalized plants close together in 2 rows. Once we started winding down we got the pleasant surprise of an auntie from the church community bringing us freshly homemade malasadas! For a group of dirty, hungry students this was one of the best surprises we could have hoped for. After eating our snacks, socializing a bit, and cleaning up we headed out for the day. Through this lab our class learned the value and importance of working together to contribute to your community. The fact that we had such a large group made it so that we were able to make a big change in a short amount of time without overworking anyone. I think it is important to do events like these for many reasons. It connects you with different areas of the community in a positive way and gives a true feeling of compassion/happiness to see others benefit from your donated time. It also can help different groups (whether students or other organizations) a good place to bond and build relationships with each other because you are all doing something to make a positive change .



Hort 262 students reviving ornamentals at Malia Puka O Kalani Church

**Kyle is BS.A4 student at UH Hilo*