

CTAHR IN FOCUS



A Review of 2016 Highlights



COLLEGE OF TROPICAL AGRICULTURE
AND HUMAN RESOURCES
UNIVERSITY OF HAWAII AT MĀNOA



CTAHR by the Numbers

CTAHR had contact with **736,625** community members last year. That's like reaching nearly every registered voter in the state.

Photo by Dennis Oda, *Honolulu Star-Advertiser*; used with permission

2.5

percent of state residents 85 and older, according to a Center on the Family report. More at <http://uhfamily.hawaii.edu>.

204

number of growers who participated in CTAHR on-farm trials in 2015.

500

number of Hawai'i Island 4th-graders who explored sustainability and science careers at 4-H AGventure days in Waimea and Hilo.

356

pounds of food wasted per person in Hawai'i in a year. A student group has delivered more than a ton to homeless shelters.

50

minimum hours of volunteer service required of new Master Gardeners on Kaua'i, where these greenthumbs promote environmental stewardship and sustainable garden practices in the community.

4,966

total ounces of low-cost, local-variety seeds distributed by CTAHR's Agricultural Diagnostic Service Center in 2015.

Take a Chance on Agriculture in Hawai'i



Dr. Rachel Novotny
Interim Dean and Director for
Research and Cooperative Extension
www.ctahr.hawaii.edu
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CTAHR Associate Deans

Dr. Charles Kinoshita, Academic and
Student Affairs
Dr. Kenneth Grace, Research
Mr. Kelvin Sewake, Cooperative Extension

CTAHR Departments and Units

Family and Consumer Sciences (FCS)
Human Nutrition, Food and Animal
Sciences (HNFAS)
Molecular Biosciences and Bioengineering
(MBBE)
Natural Resources and Environmental
Management (NREM)
Plant and Environmental Protection
Sciences (PEPS)
Tropical Plant and Soil Sciences (TPSS)
Center on the Family (COF)

A Neighbor Island sugar plantation closes. Diversified agriculture is discussed as a potential way to use the lands productively and create employment for some 600 displaced workers. 2016 on Maui sounds a lot like Hawai'i Island four decades ago. In 1973, Tamo Kitagawa started plant production at Kohala Nursery, one of five ventures identified by a state task force to receive low-interest loans. Today Kohala Nursery is the largest producer of *Rhapis excelsa* and Hawaiian *Kentia* palms in North America. Operated by Tamo's daughter Dawn Kitagawa, Kohala nursery sells potted palms wholesale to distributors in the continental U.S. and Canada for use in malls, resorts, and offices. The secret is Hawaiian sunshine and a clean, pest-free artificial growing medium composed of volcanic cinder and peat moss.

Kohala Nursery is certainly a success story, but the task force is a cautionary tale. Of five state-assisted post-sugar ventures on Hawai'i Island, Kohala is the only one still in business. "Farmers are the biggest gamblers," say nursery manager Ted Matsuda. "The youngest plant we sell takes five years to grow," and a lot can happen in five years. In 2006, an earthquake took out the nursery's overhead watering system and damaged its main water supply, the Kohala Ditch irrigation system no longer maintained by the sugar companies. In 2009, nematodes found in Hawai'i Island's cinder supply threatened mainland shipments. In 2014, winds from Hurricane Iselle wiped out 30 percent of the shade house and plant inventory.

**Farmers have to
be gamblers, but
CTAHR and the
State can improve
their odds.**

CTAHR's role is to improve the odds for producers. We can't do a lot about the weather (although our scientists develop crops and growing protocols for local and changing growing conditions), but we did help with the nematodes, advising a steaming process that sterilized the cinder and providing ongoing lab work to monitor for any sign of their return. Earlier, we helped identify a high potassium fertilizer to enhance plant growth. A USDA grant helped the nursery transition to drip irrigation to conserve water.

In considering what's next for Maui, we must remember that if local agriculture is important, and I believe it is, we must be prepared to ensure that it is a gamble worth taking through continued government investment and CTAHR support. Ventures won't always succeed, but they can flourish when they do.



CTAHR's Kelvin Sewake, left, with Kohala Nursery's Ted Matsuda

MISSION TEACHING



This graduate student is CTAHR's go-to trainer for ag operations via unmanned aircraft.

Seeding: Weed Weapon Is a Teaching Op

It's tempting to picture **Roberto Rodriguez** as a pioneering crop duster. He's earned his wings and employs new technologies in aerial delivery of pesticides. But this is no daredevil stunt pilot. The quiet, disciplined, and deliberate PhD candidate has become CTAHR's resident expert on UAs, or unmanned aircraft because, he says, "I was the one willing to do the paperwork."

The grandson of Puerto Rican fruit growers, he accepted a CTAHR biological engineering scholarship to learn how technology could help on the farm. Then he met **James Leary**, an invasive weed management researcher who was developing Herbicide Ballistic Technology. HBT (think paintball) delivers weed killer to invasive plants in hard-to-reach terrain, such as the highly destructive miconia trees threatening critical Hawai'i watersheds. As a master's student, Rodriguez helped refine dose calculations and employ GPS technology for HBT operations.

Helicopter-based HBT has its limitations, however—such as weather and access considerations, noise abatement and safety concerns, and operational costs of around 25 cents per second. So Rodriguez is focusing his doctoral work on the use of unmanned aircraft. He hopes to adapt, design, and validate software that recognizes target plants plus equipment able to accurately deliver the herbicide. The Maui Invasive Species Council, a federal Hatch grant, and USDA are providing funding; Tippmann Sports is collaborating on firepower.

Still, "all the beautiful technology in the world doesn't mean anything unless you're authorized to use it," Rodriguez notes. With various agencies governing UAs, regulations are in a state of flux and application paperwork is voluminous. Rodriguez earned pilot and remote pilot licenses as well as pesticide applicator certificates to prepare for the project. He will train remote pilots, payload operators, visual observers, and support crew. He also offers online seminars for others at UH interested in using UAs on research projects. "I want to raise awareness," he says—in no small part to avoid potential conflicts that could stall aviation-related agricultural activities before they get off the ground.

Molecular biosciences and bioengineering are CTAHR's most popular **graduate programs** (72 students enrolled), followed by natural resources and environmental management (50). Another 80 graduate students pursue tropical plant pathology and soil sciences, entomology, nutrition, and food and animal sciences.

Site Posts Jobs, Internships

The new Student Internship and Professional Opportunity Website links CTAHR undergraduates and graduate students with internship, career, and professional development opportunities. Employers, as well as faculty and staff members, are encouraged to list openings—visit www.ctahr.hawaii.edu/sipo. Alumni interested in accessing the site should contact Lisa Kitagawa-Akagi at kitagawal@ctahr.hawaii.edu.

Undergraduate Published



Senior **McMillan Ching** was one of 20 authors featured in the inaugural issue of *Mānoa Horizons, A Journal of Undergraduate Research, Creative Work, and Innovation*. He submitted his poster about research on a fungal pathogen that is a major cause of illness among immunocompromised HIV-positive individuals in developing countries of Asia. View the issue at <http://manoa.hawaii.edu/undergrad/horizons/volume1>.

CTAHR ACADEMIC ADVISING



It's Good Advice!

All 51 students surveyed about the CTAHR undergraduate advising they received during early fall 2016 said the experience helped clarify their degree plans and academic progress. All but one said all their questions had been answered. Many remarked on how well prepared and personable their advisor was. As one typical respondent wrote: "My advisor was very knowledgeable about what I needed to do in order to reach my goal. It was very helpful when trying to figure out my future plan."

MISSION TEACHING

Indigenous Education: Incorporating Agri/Cultural Values

You can't look at any system without considering the cultural and societal values and the political environment surrounding that system, says **Noa Lincoln**, a CTAHR faculty member committed to indigenous education. His tropical plant science core course is titled Agriculture, Environment, and Society. "We cover essential aspects of soil and plant science and so on, but we take time to zoom out to consider context," he says. Native Hawaiian values associated with agriculture include strong reverence, sense of kinship, and belief that the plants and animals we domesticate deserve respect.

A holistic Hawaiian cultural perspective also affects how you teach. Lincoln uses outdoor, field-based experiences to spur students to use their own senses and get their hands dirty. "Students respond well when you have more faith and trust in them," he says. With countless Internet sources supplying information, colleges must impart more wisdom about how to apply knowledge, he adds.



Lincoln also launched a weekly Indigenous Cropping Systems seminar that draws—and draws on—UH faculty, community members, and public officials to discuss issues from biogeochemical cycling to agricultural economics, with an eye to fostering discussions and creating collaborations that can ultimately influence public policy and on-the-ground application. His own research incorporates ethnography and science, taking accounts from the historical record, such as the Hawaiian-language newspapers, to direct site studies.

Sophisticated navigators, the Hawaiians also operated an unprecedented dryland agricultural system, Lincoln says. They farmed 25 square miles at Kohala, a development on a continental scale that was sustainable without use of legumes or external inputs such as fertilizers. "We have no idea how they did it, or why it collapsed so rapidly," he says. But finding out might help modern producers grow plants in a more sustainable way.



CTAHR Provides a Meaningful Experience for Students



As part of CTAHR's 2016 Meaningful Experience trip, undergraduate students visited the Haraguchi Farm on Kaua'i Island, where they mastered the team technique for removing apple snail eggs from the taro lo'i. They learned how the invasive pest reduces taro yield and can transmit rat lungworm disease.



New Faculty Join Extension



Clockwise from left: Kiersten Akahoshi, Nancy Ooki, Jenee Odani, Fred Reppun, Kylie Wong, Jeff Goodwin, Kathryn Fiedler, Josh Silva, Kalani Matsumura. Not pictured: Kyle Caires

Kiersten Akahoshi: junior Extension agent, Hawaiian Home Lands, Hawai'i County; grew up in Waimea and Hilo; educated at UH Hilo; enjoys photography. Early interests in teaching, science, and entrepreneurship augment her desire to provide "the full toolbox of skills" her clients need to be successful.

Nancy Ooki: 4-H assistant Extension agent, Maui; educated at Purdue and Pepperdine; has experience as a technology teacher. The New Jersey native enjoys travel.

Jenee Odani: assistant specialist (veterinarian), O'ahu. See profile at right.

Fred Reppun: junior Extension agent (food safety and edible crops), O'ahu; grew up on a small, diversified farm in Waiāhole; educated at Harvard, Ohio State; enjoys sailing and fishing; wanted to be a paleontologist. He wants to provide growers with useful information on the changing market and public landscape around food safety.

Kylie Wong: junior Extension agent (sustainable farming, edible crops), Maui; CTAHR alumna; enjoys pasture time with the cattle, owns an Australian Blue Heeler cattle dog named Boss. She enjoys educating others and takes pride in infographics she developed for use in helping growers understand the Food Safety Modernization Act.

Jeff Goodwin: associate specialist (state 4-H coordinator), O'ahu; from Sunray, Texas; educated at West Texas State and Texas A&M; aspired to be a comedy writer and has done extensive public speaking across the U.S. and Canada. Goodwin says he "lucked into" an Extension job 33 years ago and "never looked back."

Kalani Matsumura: junior Extension agent (gardening and home food production) and O'ahu Master Gardener coordinator; from 'Aiea; educated at University of Southern California and UH Mānoa; body surfs, makes lei, and enjoys his 2-year-old son. He dreamed of baseball and studied engineering, then discovered passion in soil science.

Joshua Silva: junior Extension agent (Master Gardener), Kaua'i; a CTAHR alumnus; has enjoyed being outdoors since hanabata days in Mililani, plays slack key and sings oldies. He helped develop the online Hawai'i Soils Atlas and will evaluate ways to reduce nēnē feeding damage on farms and develop locally produced soil amendments.

Kathryn Fiedler: junior Extension agent (invasive species), Kaua'i; roots in Puerto Rico and Massachusetts; attended Dickinson, University of Massachusetts, Amherst, and Virginia Tech; enjoys hiking. A plant pathologist who once wanted to be a pilot like her father, she is fascinated with how interdisciplinary natural sciences can help growers.

Kyle Caires: assistant Extension agent (livestock), Maui; educated at Oregon State and Washington State Universities. The Hawai'i born animal scientist does molecular and genetic research with agricultural and biomedical applications and conducts Extension programs for livestock producers and 4H youth. He likes to work hard and play hard.

Outstanding Outreach

International Master Gardener's Search for Excellence awarded **Kaua'i Master Gardeners** First Place for community service for their Village Harvest gleanings program. The pilot project donated more than 14,000 pounds of fresh produce to food banks, schools, and after-school programs, and it has raised \$40,000 for an ongoing community network.

The Hawai'i Invasive Species Council Week gave **JB Friday**, right, its Greatest Hit Award for work on Rapid 'Ōhi'a Death. It named **James Leary** Maui County MVP for innovative control of invasive weeds.



Education Specialist **Cathy Tarutani**, pictured with trophy, was named the National Pesticide Information Retrieval System Member of the



Year for her 30 years of contributions. She has served on the advisory council for the Purdue-based project for the past 10 years.

Count on Extension

2015 CTAHR Activities in Priority Categories	Workshops	Publications
Food: Food safety, global food security, hunger	138	29
Agriculture: Diversified crops for sustainability and competitiveness	195	66
Community: Youth, family, health, wellness, community development	262	76
Environment: Natural resources and environment, invasive species	185	46
TOTAL	780	217

Source: 2015 UH Combined Research and Extension Annual Report

MISSION EXTENSION

The New Vet: A Pathologist Joins CTAHR



Odani checks over a student's dog after her popular animal science class.

From kindergarten on, every explore-a-profession project **Jenee Odani** did was on becoming a veterinarian. That doesn't mean her career has lacked variety. She has worked in small animal practice and university-based and regulatory-focused diagnostic pathology laboratories. As CTAHR's vet, the diminutive, Maui-born, karate black-belt mother enjoys teaching on campus, helping producers on the farm, and conducting research. "Diseases are my passion," she says—identifying, tracking, and recommending how to treat animal ailments. She even likes the wonky task of writing standard operating protocols. There's a whimsical side too. Her ringtone? It's literally the cat's meow.

The O'ahu Urban Garden Center's monthly Second Saturday

offers garden tours, plant sales, demonstrations, and workshops.
Information and schedule at www.ctahr.hawaii.edu/ougc.

Diamondback Moth: An Ongoing Battle

Crucifers, particularly head and Chinese cabbage, are a major vegetable crop for Hawai'i. And the most serious pest of crucifers is the diamondback moth. The tiny larvae's oversized ability to develop resistance to pesticides has made control a roller coaster ride for growers. To date, the diamondback moth has developed resistance to nine different classes of pesticides.

Working with industry and government partners, a CTAHR team developed a successful insecticide resistance management program to control the pest. It relies on population monitoring and monthly rotation of insecticides that have different modes of action. For each newly introduced insecticide group, dose-mortality assays are performed, and the lowest concentration needed to achieve complete mortality is calculated.

Diamondback moth larva feeding

"The regional program has sustained crop production for 15 years."

—Robin Shimabuku

Diamondback moth populations are monitored during the spring and fall in major production areas on O'ahu, Maui, and Hawai'i. The seasonal results are used to determine a spray rotation that effectively counters insecticide resistance. Cooperative Extension crop advisors present the information at grower meetings, where the coming years' regional spray schedule is set. "The program has helped maintain the viability of the crucifer industry in Hawai'i and prolong the efficacy of the insecticides used," says Maui-based CTAHR Extension Agent **Robin Shimabuku**.

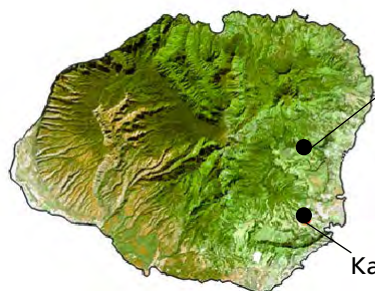
photo by Washington State University



The new Landscape MD app helps both home gardeners and landscape professionals diagnose common tropical diseases and pests on a variety of vegetables, ornamentals, and fruit and nut trees. Users can search by symptom or plant or browse pests and diseases. Developed by **Scot Nelson, Arnold Hara, and Ruth Niino-DuPont**, the app covers symptoms and integrated pest management recommendations, complete with pictures and links to more information. Download it for free from iTunes at <http://go.hawaii.edu/jFg>.



Take Charge of Your Money₄! is a special series of financial literacy videos available free online to help consumers effectively manage household resources. It provides 16 hours of information on topics from basic banking to estate planning. See them at www.ctahr.hawaii.edu/tcym.



Kaua'i Research Station

The entire Kaua'i County Extension staff learned to respond to medical emergencies through a half-day Hearts4Kaua'i course in **CPR and first aid**.

Kaua'i Extension Office

After Community Behavioral Health Early Warning System surveys identified stress, adult depression, and use of alcohol, tobacco/nicotine, and illegal drugs as **leading health issues**, Extension Educator **Laura Jean Kawamura** arranged for faculty member **Thao Le** to train community members in mindfulness and skillful living techniques. The activities helped clients reduce stress, gain focus, and regulate self-emotion in their daily lives.

KAUA'I COUNTY
8,794 people contacted
286 practices adopted

Poamoho Research Station

Waiale'e Livestock Research Station

Whitmore Pineapple Research Station

Wahiawā Extension Office

Waimānalo Research Station

Pearl City Urban Garden Center

Mānoa campus Honolulu Extension Office Magoon Research Station

The Giving Orchard, just one of the many demonstration gardens for **home gardeners** at the Urban Garden Center, donated more than 7000 pounds of fruit to Hawai'i Foodbank last year.

HONOLULU COUNTY
348,945 people contacted
6,682 practices adopted

380 elementary and middle school students are participating in the GENE-ius Day **Saturday science programs**, which provide hands-on experiments and activities. More than 8,000 have attended GENE-ius Day field trips, which teach science standards and implications for genetics, agriculture, and forensic sciences. More information at www.ctahr.hawaii.edu/geneius-day

Moloka'i Applied Research Farm

40 families from four homestead areas participated in the Moloka'i **Homestead Gardening Program** a twice-weekly workshop to establish home vegetable gardens on their Hawaiian Home Lands using drip irrigation and composting.

The Hawai'i Foods **Nutrition with Aloha** website is rich in resources for users everywhere. Get—

- nutritional assessment of local ingredients and Hawai'i-kine snacks,
- healthy recipes for favorite ethnic foods,
- educational materials, fact sheets, and how-to videos,
- an interactive My Diet portal for personalized analysis of daily eating habits, and
- links to a wide range of additional resources.

The website is the work of collaborating faculty, students, and staff at CTAHR in partnership with the University of Hawai'i Cancer Center and Kapi'olani Community College. Check it out at www.hawaiifoods.hawaii.edu

CTAHR Is at Work Statewide

MAUI COUNTY

23,104 people contacted
1,686 practices adopted

Moloka'i Extension Office

Maui County Cooperative Extension will develop 2 acres for use in **community farmer training and practice plots** with funding from the USDA Specialty Crop Block Grant Program.

Maui Master Gardeners monitor bee hives for the UH Honeybee Project as a community teaching aid and a source of research data. They also partner with UH Maui College and HDOA to provide **beekeeping** classes, using their hives for experiential learning, while fellow volunteers maintain a Bee Garden to promote flowering plants that support bees and other pollinators.

Kahului Extension Office

Haleakalā Agriculture Research Station

Kula Agricultural Park

Maui Agriculture Research Center

Cooperative Extension collaborated with the mayor's Office of Economic Development and Maui Chamber of Commerce, to create **Made in Maui County Marketplace**. See the online shopping resource for local businesses at www.MadeInMauiCounty.com

Kohala Coast farmers improved irrigation practices and used cover cropping to build soil quality and increase beneficial chemical content of **medicinal herb crops** in a 6-year project led by Specialist **Hector Valenzuela**.

Junior researcher **Curtis Ewing** has found that fungus-infected dust created when tiny ambrosia beetles bore into trees may contribute to the spread of **Rapid 'Ōhi'a Death**—suggesting a possible avenue for mitigation efforts.

HAWAII COUNTY

165,710 people contacted
1,721 practices adopted

In CTAHR field trials, a **new variety of tea** dubbed 'Mealani' produced comparable yields to the 'Yutaka Midori' already grown on the island, but is easier to process and exhibits better resistance to spider mites, **Randall Hamasaki** and **Stuart Nakamoto** report.

Kamuela Extension Office

Mealani Research Station

Hāmākua Research Station

Komohana Research and Extension Center

Waiākea Research Station

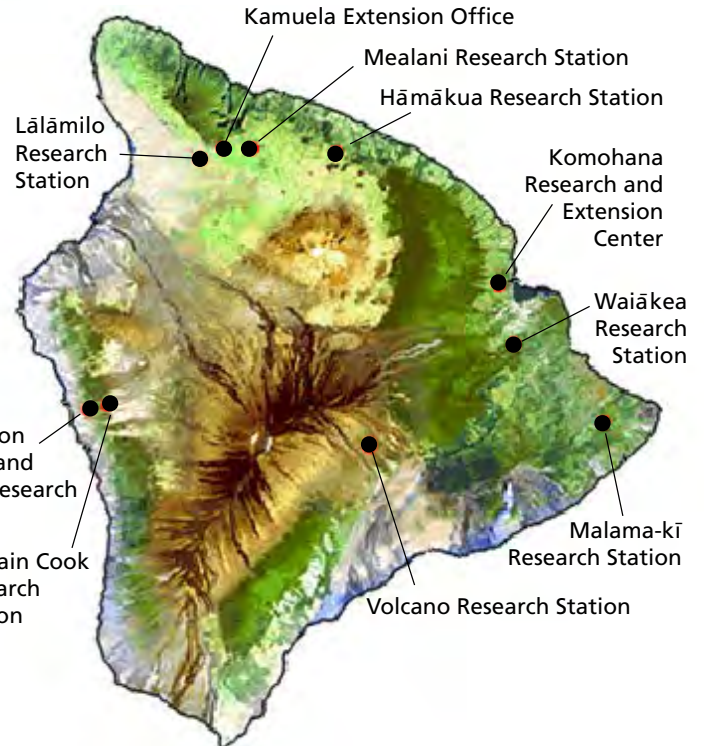
Malama-kī Research Station

Volcano Research Station

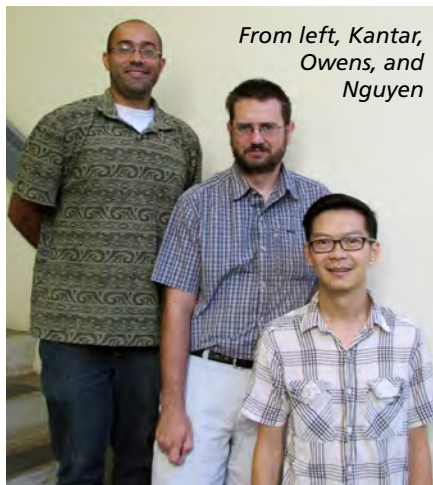
Lālamilo Research Station

Kona Extension Office and Kona Research Station

Captain Cook Research Station



MISSION RESEARCH



From left, Kantar, Owens, and Nguyen

New Research Faculty

Michael Kantar, TPSS

Kantar focuses on breeding vegetable crops with wild relatives to examine complex interactions and create food systems that are more productive, healthy, and sustainable. He studied at the University of Minnesota and was a post-doc in British Columbia. He likes travel, history, biogeography and *The Phantom Tollbooth*.

Daniel Owens, MBBE

The son of a machinist, Owens is interested in the metabolic and molecular mechanics of plants and use of natural products in agriculture. He worked in USDA's Natural Products Utilization Research Unit after earning his PhD from Virginia Tech. Owens enjoys outdoor activities, including geocaching, and his 120-pound Great Dane named Pearl.

Nhu Nguyen, TPSS

Nguyen was always interested in science, but his field—soil microbiology—is just entering a new era, with “incredible tiny things” yet to be discovered. He did his PhD at UC Berkeley and postdocs there and the University of Minnesota. A hiker and photographer, he bakes and can julienne vegetables blindfolded.

Andre Seale HNFAS (not pictured)

A Brazilian American who always wanted to be a scientist, Seale will apply his interest in fish endocrinology and environmental physiology to advancing sustainable aquaculture practices. He received a PhD from the University of Hawai'i at Mānoa and has won awards for underwater photography.

Climate Change: The Impact of Ag

Because agricultural crops and livestock release up to a third of human-generated greenhouse gas emissions worldwide, they must be considered in efforts to mitigate climate change. But the level of ag-related emissions varies by crop and agricultural practice, particularly when considered in proportion to the amount of food produced, according to analysis by CTAHR Assistant Professor **Kimberly Carlson** and colleagues. For example, Vietnam ranks sixth for total greenhouse gas emissions, but has the most emissions per kilocalorie of rice produced. Climate change policy should prioritize eliminating the draining of peatlands, which generates a whopping 32 percent of cropland emissions for slightly over 1 percent of total crop kilocalories, the researchers write in *Nature Climate Change*. On the other hand, the use of nitrogen fertilizers to increase food production generates relatively low increases in greenhouse gas emissions.

A Yale-trained land systems scientist, Carlson is among a new breed of investigators who combine social and natural science methods with tools like remote sensing to explore the intersection of issues related to agricultural land use, ecosystem processes, environmental governance initiatives, and human livelihoods. Read more about her work at <https://carlson-lab.org>.



In 2015, Kimberly Carlson received 1 of only 9 **Google Earth Engine Research Awards** to map and evaluate forests in Sumatra and Borneo as zero-deforestation zones (areas where deforestation would have particularly dangerous ecological consequences).

News Briefs: Recently Published Findings

Seven key papers and their impact on important issues are collected in **Chennat Gopalakrishnan's** book *Classic Papers in **Natural Resource Economics** Revisited*.

Nancy Chen and **Robert Paull** were part of an international team that sequenced the **pineapple genome**, illuminating the evolution of a high water use—efficiency form of photosynthesis. (*Nature Genetics*, www.nature.com/ng)



Biochar—fine-grained, highly porous charcoal—improved the fertility of acid soils in greenhouse and field tests in Hawai'i and Indonesia. **Hue Nguyen** describes important properties of the six wood-derived biochars tested. (*Soil Science*, <http://journals.lww.com/soilsci>)

Populations of iconic native Haleakalā **silversword** have declined about 60 percent since 1990, a period coinciding with lower rainfall that could be the result of shifting atmospheric circulation caused by climate change. **Paul Krushelnicky** and co-authors analyzed 80 years of records for their article. (*Climate Change Responses*, <http://go.hawaii.edu/jat>)

Dan Rubinoff and **Will Haines** report that a **new butterfly**, the Sleepy Orange, is only the third of the pierid family to become established in Hawai'i. First seen in late 2013 in Waialua, the American native is now abundant on several islands, where it feeds on shower trees. (*News of the Lepidopterists' Society*, www.lepsoc.org)



MISSION RESEARCH

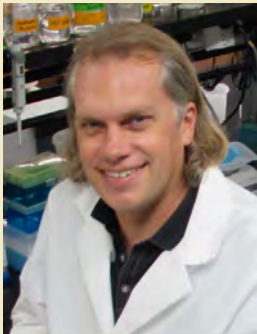
Agrosecurity: Lab Serves Sentry Duty

Like people, plants suffer from bacterial, viral, and fungal diseases as well as insect pests that slip into the Islands uninvited. **Michael Melzer** fights to keep such threats at bay. The assistant researcher is head of CTAHR's Agrosecurity Lab, a position created in 2014 as part of a CTAHR–Hawai'i Department of Agriculture project to improve and expand detection and diagnostic capabilities and increase communication with home and commercial growers. With a crew of about 10, including a junior researcher, graduate students, technicians, and student employees, Melzer pursues a three-pronged defense:

1) Vigilance—The lab stands sentinel, surveying for pests, pathogens, and diseases that have recently arrived, like the coconut rhinoceros beetle, and those we want to keep out, such as huanglongbing, or citrus greening, which has devastated citrus groves in Florida. It tests plant materials and also teaches inspectors on the front lines what to watch for in imports and exports.

2) Arsenal—A member of the National Clean Plant Network, Melzer's lab generates disease-free germplasm to equip growers with healthy plants. Ger-

Michael Melzer
ranked 29th
among all UH
faculty for most
extramural fund-
ing secured during
FY2016, with \$2.6
million for the
agrosecurity lab.



mplasm is living tissue, from a few cells to pieces of stem, used to generate a new plant. It is "clean" when produced through methods, such as tissue culture, that eliminate systemic pathogens. "Most plants get rid of viruses when they reproduce through seeds, but taro isn't grown from seed, so the viruses accumu-

late," explains Melzer. "They don't kill the plant, but they slow it down, like a cold you can't get rid of." The benefits of clean germplasm were dramatically illustrated when the lab produced disease-free ti plants so vigorous that they burst their pots and sprouted yard-long leaves. Melzer's team is now working on pathogen-free taro accessions from Lyon Arboretum and will tackle sweet potato and banana. "Who knows if we'll get the same increased vigor?" he wonders. "But I think we'll see something exciting."

3) Intelligence—In discovering and profiling new pathogens, the lab aids the development of diagnostic tools and control methods. New technologies for genetic sequencing and the like are important allies. "When I was a student, you could spend a whole career doing what a machine can do in one day," he marvels. "We try to isolate a virus by looking at DNA that doesn't belong to the plant and matching that to known pathogens or identifying something new,"—like two new genre which cause green ringspot symptoms in hibiscus, a disease that could impact citrus here. Research is increasingly transdisciplinary, he adds. The melding of biology and engineering allows researchers to monitor insect populations based on the unique acoustic signatures of their beating wings or sanitize soil with ultrasound or ionic radiation, for example.

A CTAHR graduate (MS and PhD), Melzer got his first science job as a high school student working in a college lab that was studying chestnut blight, a fungal disease. He developed a knack for molecular work as an undergraduate at Canada's Trent University. A professor there encouraged him to apply to UH, for graduate studies. CTAHR plant pathologist **John Hu** convinced him to stay.

Decision scientist **Megan Barnes** is part of a team addressing West Maui land management issues in **Kirsten Oleson's** environmental management lab. Learn more at <http://olesonlab.org>



Protected Areas Work

Protected areas worldwide successfully safeguard wildlife populations within their boundaries, NREM Postdoctoral Researcher **Megan Barnes** reported in *Nature Communications*. While at the University of Queensland's Centre for Biodiversity and Conservation Science she and colleagues examined data on 1,902 populations of birds and mammals in 447 refuges across 72 countries between 1970 and 2010. They found that—

- intermediate-sized species are doing less well, perhaps because they don't reproduce as rapidly as smaller species or receive as much attention as larger species.
- active management can overcome disadvantages of lower reproductive rates and more severe threats experienced by larger species of birds and mammals.
- social and economic conditions that support protected areas are critical for maintaining wildlife populations—as important even as ecological concerns.
- extra effort is needed to retain species in developing regions, and human dependence on the resources within protected areas must be addressed.

More at www.nature.com/articles/ncomms12747 or Barnes's website <https://mdbarnes.wordpress.com>.

PhD student Surendra K.C. received a prestigious German Academic Exchange Research fellowship to Germany's University of Hohenheim.

FOCUS ON Food and Family

CTAHR is the Pacific subregion lead on a \$1.2 million grant to establish the Western Regional Center for

Food Safety

Training, Education, Extension, Outreach and Technical Assistance.

Defining Healthy Diets

Culture Matters...

Assistant Professor in Human Nutrition **Jinan Banna** and colleagues in Hawai'i and Hunan surveyed college students in the U.S. and China to see how they define a healthy diet. While both groups mentioned moderation and nutritious foods, there were marked differences. Chinese students described physical outcomes, such as maintaining immunity and digestive health, and focused on timing and regularity of meals. American students were more concerned with balancing intake and exercise and limiting sugar, salt, and fat. Understanding views about healthy eating helps educators to tailor advice and intervention according to cultural values and predominant beliefs.

...and So Do Parents

Increasing independence and deteriorating diets mark early adolescence in the U.S. In another study, **Banna** and co-authors review research which suggests that parental influence can sway children's food choices even when parents are not present. They say more research is needed on the impact of parenting practices during independent eating to identify ways to counter adolescent obesity. Read the *Nature* article at www.mdpi.com/2072-6643/7/10/5431/htm.

Waste Not: Better Use for Discarded Food

While people in Hawai'i waste less food than their Mainland counterparts—likely because of higher grocery costs—we still waste about a quarter of the available food supply and it costs us more. CTAHR economists **Matthew Loke** and **PingSun Leung** have calculated that we waste close to a pound of food per person per day at a per-capita cost of \$698.36 a year. Fresh fruits and vegetables, seafood, and rice are most often tossed, and consumers waste the most—about twice the amount lost in the distribution and retail stages of the food supply chain, they found. “The findings suggest that any meaningful intervention to reduce food waste in Hawai'i should target the consumer, and distribution and retail stages of the food supply chain,” they write in the journal *Waste Management and Research*.

They don't have to convince CTAHR dietetics students. **Joy Nagahiro-Twu** and **Heather Fucini**, pictured, joined **Victoria Duplechain** and **Mariah Martin** to launch a Food Recovery Network chapter at UH Mānoa to deliver usable food to the hungry. Working with Sodexo campus general manager and CTAHR alumna **Donna Ojiri**, they provided more than half a ton of prepared but unserved campus food to O'ahu homeless shelters in the first six months of the program alone.



Subsequently, CTAHR's Halina Zaleski participated in a legislative symposium addressing opportunities and barriers related to recovering food waste, and Sen. Brian Schatz co-sponsored federal legislation to clarify expiration labels, encourage use of less-than-perfect-looking produce, and fund composting initiatives.

Family Leave: Good Business Practice

The United States is the only industrialized nation without a paid family leave program for workers. Laws that afford job protection and unpaid leave to care for a new child or sick family member (federal) or ailing parent-in-law or grandparent (state), apply only to larger businesses. More than a third of the workforce isn't covered by the state law. Yet there are good business reasons for Hawai'i to join states that have adopted paid leave requirements, say **Ivette Stern** and **Hua Zan**. Their Center on the Family fact sheet, used by community partners advocating for paid family leave in Hawai'i, cites studies that show:

- Reduced turnover and increased engagement of employees with access to paid leave enhance employee performance, productivity, and company profits.
- New parents with access to paid leave are more likely to return to work and less likely to depend on public assistance.
- Newborns are healthier and seriously ill children recover faster when parents can be present without worrying about reduced income.

On average, employees in California and New Jersey, which mandate paid family leave, take less than the maximum allowed, the fact sheet notes. And plans can be employee funded through a small monthly payroll deduction roughly equivalent to the cost of a cup of coffee. More information on this and other family policy topics is available at <http://uhfamily.hawaii.edu>.



FOCUS ON Farming



Stacy Sugai, left, and Patsy Oshiro

www.2ladypigfarmers.com

Producer Partner: SK Natural Farms

School counselor Stacy Sugai was interested in producing home-grown food home when she bought a Wai'anae pig farm. Neighboring third-generation farmer and USDA airport inspector Patsy Oshiro joined her in SK Natural Farms, a farrow (birth) to finish swine operation. They provide all-natural local pork to restaurants as 2 Lady Farmers and select Foodland and Sack N Save stores as PS Pork through Higa Foodservice. They're like minded on how to handle animals, members of Hawai'i Pork Industry Association, and Pork Quality Assurance Plus certified. SK's 300 pigs are grain fed, despite the added expense, because the pork tastes better and cooking slop is too time and labor intensive. "Higa's and their restaurant patrons believe in farm-to-table and are willing to pay the price. They want to be able to tell customers the story of their food," Oshiro says.



CTAHR Veterinarian Jenée Odani, left, Zaleski and student Naomi Ogasawara inspect pig lungs for signs of disease during a workshop for swine producers.

Oshiro's family had long turned to CTAHR swine specialist **Halina Zaleski**, and so does SK. "Dr. Z" does certifications and offers workshops and publications on health issues, artificial insemination to improve breeding stock, waste management, laws, industry standards, and more. The farm has hosted studies by her students and animal nutrition expert **Rajesh Jha's**. He confirmed the nutritional value of using macadamia nut cake, an oil production by-product, to augment expensive imported feed and is evaluating okara soy byproduct, sweet potato, taro, and cassava. Sugai considered using the "Korean Natural Farming" microbe-based Inoculated Deep Litter System promoted by **Michael DuPonte** but converting existing facilities proved too costly. "It would be good for a start-up farm," she says.

But start-ups are few. Land is expensive. Direct sales to Island families have dwindled and local farmers can't compete with mainland producers who pay a third the price for feed when consumers flock to big box stores to save 2 cents a pound, says Zaleski. So while fast-growing swine are the world's leading source of meat, Hawai'i producers number under 200 and dropping. A 10–20 percent increase in locally grown pork might be doable, she says, noting that investment in proven technologies—to turn food waste into pig feed and pig waste into fertilizer—could help economically and environmentally. "Composted pig waste statewide could replace 4 percent of imported fertilizer."

Needs Assessment



Half of Hawai'i's farms lost money during 2012 according to the National Agricultural Statistics Service. But what are the broad challenges to expansion and sustainability of agriculture in the state and how do they vary among groups of farmers? To get the full story, **Frederick Reppun** has teamed up with fellow junior extension agents **Josh Silva** and **Marisol Quintanilla** and UH West O'ahu colleagues to conduct a state-wide needs assessment for edible crop farmers. Watch for their survey in early 2017, followed by a series of networking events where farmers can share their challenges and meet with agricultural service providers.

New sites in Hawai'i and Maui counties make GoFarm one of the country's largest **new farmer training** programs. Information at www.gofarmhawaii.org.

The Chickpea Challenge

The United Nations declared 2016 International Year of Pulses. Ancient, loaded legumes provide important protein, carbohydrates, fiber, and nutrient in the diet and require low water and fertilizer applications, but will they will grow in Hawai'i? "The answer to that is yes," says CTAHR researcher **Amjad Ahmad**. He grew 11 varieties and 15 genotypes of chickpeas (or garbanzos, one of 11 types of pulses), in six locations on five islands and shared his results with growers at field days on O'ahu and Maui. He is now exploring mechanical harvesting, working with a Maui company on snack items, and suggesting chickpea "hay" for livestock to enhance profitability for the crop.



US Marine Corps photo by Cpl. Wesley Timm

Groundbreaking Medalist

Alumnus **Ernest James Harris** received a 2016 Congressional Gold Medal for helping break racial barriers as one of the first African Americans to join the Marines and serve in World War II. The NAACP Lifetime Achievement Award recipient served 40 years with USDA's Agricultural Research Service in Hawai'i, earning his PhD from CTAHR in 1975. His innovative methods for eradicating fruit flies were adopted by more than 20 countries, earning him recognition from the Chilean government and the Royal Entomological Society of London.

Faculty: Kudos to...

Kent Kobayashi, named a fellow of the American Society for Horticultural Science.

Andrew Reilly, elected vice president of scholarship for the International Textile and Apparel Association.

Steven Chiang, appointed to USDA Advisory Committee on Beginning Farmers and Ranchers.

Helen Spafford, Entomological Society of America science policy fellow and chair of the committee writing its "Not-So-Hidden Dangers of Invasive Species" position statement, and

Mark Wright, elected vice president of its Plant-Insect Ecosystems section.

Charles Kinoshita, recipient of the North American Colleges and Teachers of Agriculture's Distinguished Educator Award for 2016.

Rich Criley, for award-winning shots in Pi Alpha Xi National Honor Society for Horticulture's 2016 Photo Contest.

Students: Teaching, Working, Organizing

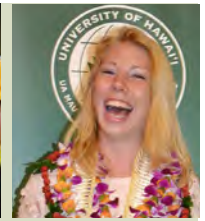
UH Mānoa enlisted two CTAHR students to help prepare new graduate assistants for their teaching duties. Undergraduate **Lavender Oyadomari** discussed local identity and the higher ed learning



Oyadomari



Chen



Jamieson

environment while graduate student **Amit Singh**, not pictured, shared insights on being a teaching assistant. Undergraduate **Mandy Chen** was Hawai'i's 2016 Student Employee of the Year for coordinating agriculture awareness events for local elementary students and highschoolers from across the country. UH System student sustainability coordinator **Kristen Jamieson** was honored by Governor David Ige for running a no-waste higher ed sustainability summit.

Alumna: A Horticulturalist Does Good Abroad



"Being a volunteer lets me feel that I am contributing to the livelihood of other farmers in a constructive way."

—Larish

Alumna **Linda Burnham Larish**, who received her MS in horticulture in 1990 and has conducted research with CTAHR faculty, returned to southeastern Africa in June as a volunteer with Cultivating New Frontiers in Agriculture, a USAID-supported Farmer-to-Farmer program. She spent three weeks teaching 41 members of Malawi's Ngolowindo Cooperative

about cultivation and pest and disease management to improve their technical knowledge of growing tomatoes. On a previous visit, she taught integrated pest management to the Lobi Horticultural Association. The latest trip was her sixth assignment with the program. She has also volunteered in Bangladesh. "As a former Peace Corps volunteer, it is natural for me to think of myself as a citizen of the world," says Larish.

—from *Pūlama, Conservation News from the University of Hawai'i*

Volunteers: It's All in the Family and Community

Established 65 years ago with support from CTAHR, the **Hawai'i Association for Family and Community Education** reached nearly 33,000 people last year with projects ranging from sewing dresses for girls in developing countries and assisting homeless people in the Islands to organizing candidate forums, instructing the elderly, conducting character-building activities for youth, and promoting recycling. Members also provide support for CTAHR Cooperative Extension events and activities.



Close Ups

Licensing: A Market for Micropropagation

Responding to a 35% decline in ornamental sales as she joined CTAHR in 2009, Associate Specialist in nursery management **Kheng Cheah** thought outside the planter box. She drew on 30 years of academic and commercial experience in plant tissue culture work and project management to propose a new business

**3 growers licensed
5 varieties for sale
of 6 million plants**



model: create novel products, identify new markets, use new technologies. She—

- screened 45 new varieties submitted by growers and faculty members, including orchids and “fortune-catching” *Nepenthes* pitcher plants; developed micropropagation protocols; and made annual trips to Asia to gauge their potential in the burgeoning Chinese market;
- established the International Tissue Culture Network to link growers with large-scale commercial micropropagation firms that use tissue culture to produce high-quality plants in a nutrient culture medium; and
- facilitated negotiation of licensing agreements.

While traditional cuttings might yield 100 plants a year that sell for \$10–\$100 each, tissue culture can create a million clones generating \$1 each, Cheah says. With retirement on the horizon, she documented the plant licensing process in an article for the CTAHR Entrepreneur’s Toolbox in July and recruited the UH Office of Technology Transfer and Economic Development to facilitate future licensing arrangements, which could include coffee and food crops. Learn more at www.khengcheah.com.



An Effective Take-Home

The Junior Master Gardener program’s Learn, Grow, Eat, and Go! curriculum expanded five-fold here last year. Children in 20 participating schools and after-school programs learn science, get active, prepare and eat healthy foods, and even influence the choices their parents make. “In one year, I’m seeing good results in changing behavior. We’re excited by that,” says Hilo-based Associate Extension Agent **Becky Settlage**.

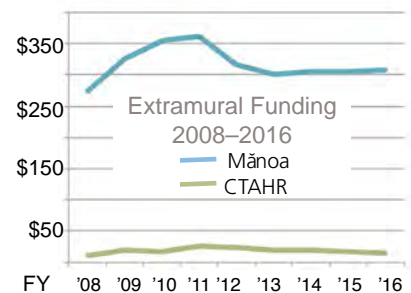
Pre-Vet: CTAHR-Supported Program in Top 10

UH Mānoa made Vet Tech Colleges website’s list of 10 Top U.S. Pre-Vet Colleges based on strong advising, scholarship opportunities, Western Interstate Commission on Higher Education tuition exchanges, and the active Pre-Veterinary Club. Read more at www.vettechcolleges.com/blog/pre-vet-colleges or visit <http://manoa.hawaii.edu/rio/prevet>.



Attracting Outside Dollars

CTAHR brought in more than \$16 million in extramural funding during FY2016. The college ranked 4th among Mānoa units for the number of awards, which represented 5% of total campus extramural dollars.



More than half of CTAHR’s extramural funds came from the federal and Hawai’i Departments of Agriculture. About 71% came from outside of Hawai’i—from federal agencies including National Science Foundation and Departments of Interior and Defense, Mainland businesses, and nonprofit entities, or through other universities.

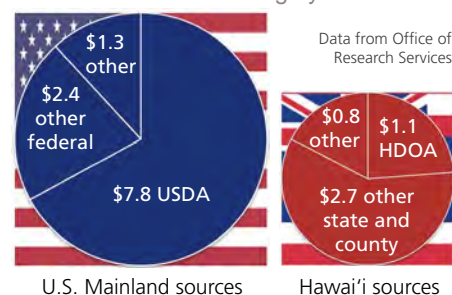
International: CTAHR Partnerships Span Globe



CTAHR had Memoranda of Understanding with 37 international institutions for joint activities and faculty and student exchanges in 2015–2016.

In June, CTAHR hosted ag professionals from Albania (left), who came to Hawai’i to learn about niche farming under the USDA’s Cochran Fellowship Program.

Extramural Funding by Source



Fashioning the Future for 50 Years

Moses Gouveia and **Kari Begay**,



left, are the latest Fashion Design and Merchandising seniors to display their collections at the college's annual Senior

Fashion Show. To honor the event's 50th anniversary, the student producers chose the theme "Roots" and incorporated work by alumni designers, including **Joelle Perry**. Student work from earlier shows, drawn from the department's extensive Costume Collection, were on display. Meet the senior designers and show director **Von Kaanaana** on Associate Professor **Andrew Reilly's** monthly Ōlelo program, *Hawai'i Fashion Now*, at <http://go.hawaii.edu/j2R> or visit www.facebook.com/fdm430.



2016 resort collection from Moses Gouveia



Moto culture-inspired design by Kari Begay, 2016



Casual plaid from the 1987 show



Swimwear from the 1976 show