




Focus: UH Extension

A Review of Recent UH Extension Highlights



COOPERATIVE EXTENSION

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



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

In a given year...

38 class leaders on 5 islands are trained to lead a 6-week **course for family caregivers** needed to help tend many of the 2.5 percent of state residents who are 85 or older.

204 growers participate in CTAHR-sponsored **on-farm trials**.

19,399 hours of CTAHR-certified **Master Gardeners'** volunteer service are logged, the equivalent of having 10 full-time employees.

2,000 pounds of prepared but unserved food on campus is delivered to homeless shelters by a student-driven **Food Recovery** Network initiative.

1 in 50 Hawai'i farms are involved in **community-supported agriculture** (CSA)—more than 3 times the national average.

2.5 million pounds of 'ulu, or **breadfruit**, is the anticipated harvest from the 5,000 trees planted in the Islands during the last decade.

70 percent of GoFarm students who complete AgPro comprehensive training **start farming** in Hawai'i—7 times the Mainland success rate.

24 new **invasive insect species** arrive in the Islands, posing threats to agriculture and the natural environment.

\$200 million worth of crops statewide depend on pollination by **local honeybees**, whose health is the focus of CTAHR's UH Honeybee Project.

4,966 ounces of local variety low-cost **seeds** are distributed by CTAHR's Agricultural Diagnostic Service Center.

80,000 potted plants (worth \$3.9 million) receive CTAHR-developed hot water shower treatment to **eliminate pests** that could prevent their export.

1,281 Hawai'i-focused **publications**—most of them free—covering a wide range of topics are available at www.ctahr.hawaii.edu/site/Info.aspx

The Extension Mission

TELLING OUR STORY: The Importance of Cooperative Extension

Compared to the rest of the United States, Hawai'i has an unusually high percentage of small farms. Nearly two out of three farms are less than 50 acres, and 90 percent have annual sales under \$50,000, yet they are crucial players if Hawai'i is to become more self-sufficient in the production of food. So **CTAHR takes on the risk** of trying new crops or methods that are too much of a gamble for a small farmer working on a limited profit margin.

Our agents and specialists are involved in nearly every aspect of **Island agriculture**, from protecting the bees that pollinate crops to developing new varieties and integrated pest controls to creating protocols for safe export of Hawai'i products. We are also involved in **environmental protection**, with particular focus on our fragile

watersheds and invasive species, and address issues related to **urban agriculture and landscape**.

More than half of the people we reach are in the non-agriculture human resources sphere. We help **children get a strong start** toward productive adulthood by promoting healthy lifestyle choices, good financial practices, and scientific understanding. We assist our **aging citizens** and those who care for them.

We share **science-based** knowledge and **educational expertise** with an average of 500 people a day through 27 offices and stations in communities statewide. Thousands tell us they have adopted a practice or changed a behavior due to

contact with CTAHR Extension faculty or programs.



Garnering Support: O'ahu rancher John Morgan represented CTAHR on the 2016 Council for Agricultural Research, Extension, and Teaching—a national grassroots organization of stakeholders who build support for land-grant university programs.

CTAHR Administration

Dean and Director for Research and Cooperative Extension

Dr. Nicholas Comerford

CTAHR Associate Deans

Dr. Ania Wiczorek, Academic and Student Affairs

Dr. Jinzeng Yang, Research

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)

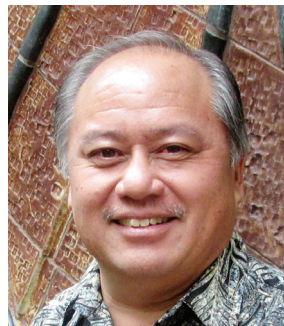
Tropical Plant and Soil Sciences (TPSS)

Center on the Family (COF)

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COOPERATIVE EXTENSION: A Q&A



Kelvin Sewake brings deep commitment and 30 years of Cooperative Extension experience—including two as Hawai'i County administrator—to his interim assignment as associate dean. The Wahiawā-born, CTAHR-educated floriculture expert shares some thoughts on Extension.

Q: Why is Cooperative Extension important?

A: Because they are constantly interacting directly with community stakeholders, Extension personnel understand their social, economic, or environmental needs. Therefore, they can work with researchers and partners

to develop meaningful programs that have direct positive impacts. Extension adds significantly to our state's economy and improves people's lives.

Q: What are the challenges?

A: To adapt quickly to rapidly changing needs and succeed with limited resources, we must reassess our capacity in terms of personnel, funding, and expertise, and then modernize and re-structure to address needs and trends. We need to develop strong partnerships with community leaders and stakeholders by being visible in those communities.

Q: Why work in Cooperative Extension?

A: Constantly addressing new situations and issues means Extension work is always fresh and exciting. The cooperative nature of the work creates many long-lasting professional and personal relationships. These human bonds are what make the job so rewarding and improve chances of programmatic successes for all.

FOCUS ON Crops

SWEET POTATOES: Getting to the Problem of the Root

Using her own farm as a research station and donating her crop to Hawai'i Community College's culinary program, agronomist **Susan Miyasaka** evaluates sweet potato varieties for resistance to two major pests (sweet potato weevils and reniform nematodes) that can reduce commercial yields.



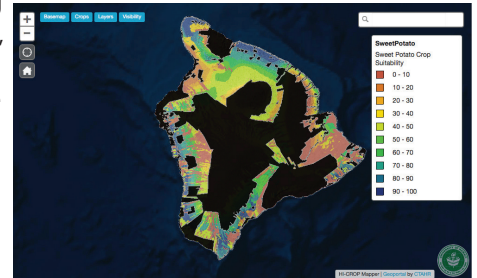
Agronomist Susan Miyasaka

She started with 7 varieties forwarded from Moloka'i by Assistant Extension Agent **Alton Arakaki**. Okinawan (white skin, purple flesh) and Simon (white skin, white flesh) did well. Arakaki then sent another 60-plus varieties acquired from a Mainland USDA germplasm facility to be evaluated along the Hāmākua coast. After a couple years of field trials, Miyasaka selected 10 varieties showing the most promise for yield and pest resistance. She also launched a small greenhouse study to determine whether increased yield justifies investment in virus-free tissue-cultured vines (it appears to). She began contemplating breeding experiments to improve crop quality when she dug up a new problem—damage indicating that the rough sweet potato

weevil had arrived on the Big Island. The Honolulu native, who studied agriculture out of a desire to feed people in the face of famine, was philosophical: "I may have to go back to the original 60 to look for varieties resistant to the new pest."

Related Projects—**Sharon Motomura**, a Hawai'i County junior Extension agent is creating a program to teach farmers how to maintain on-farm sweet potato nurseries to produce desirable characteristics, such as yield, root shape, and color. **Michael Melzer**, a Plant and Environmental Protection Sciences assistant researcher, is cataloging the sweet potato viruses present in the Islands.

Suitable for Cropping—The Hawai'i Cropland Rating and Optimization Planning (HI-CROP) Web Mapper rates areas for sweet potato using temperature range, rainfall, slope, and soil conditions. See it at the Remote Sensing and GIS Laboratory CTAHR Geoportal — gis.ctahr.hawaii.edu



Chickpea Challenge

The United Nations declared 2016 the International Year of Pulses. The ancient, loaded legumes provide important protein, carbohydrates, fiber, and nutrients 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.

PEACHES: Low-Chill Varieties Look Promising

Moloka'i Assistant Extension Agent **Alton Arakaki** is field-testing four low-chill peach varieties and some experimental cultivars at 50 sites on six islands—from hot, dry Wai'anae and Ho'olehua to high, cool Kula and Kamuela.

Ironically, the varieties claim as a genetic parent a "Hawaiian" variety that was described as "poor quality, unattractive, low yielding" and susceptible to fruit flies in 1960s trials. CTAHR's later work on fruit fly management improved the odds for commercial viability.

Given the substantial investment of time, capital, and acreage

required to establish a new tree crop, commercial orchardists are hesitant to take an economic gamble on an experimental crop.



"You never know until you're growing," Arakaki says. "The college can take some risk trying new things, such as discovering the behavior of a plant with deciduous characteristics in tropical conditions, so it will be more predictable for farmers."

Island chefs are eager to see if the promising early results are an anomaly or a predictable genetic and scientific achievement that growers can bank on.

FOCUS ON Farming



IT'S ORGANIC: Sustainable Agriculture Is Goal

CTAHR's Sustainable and Organic Agriculture Program (SOAP) stays connected with its community. SOAP hosts conferences and field days that provide research-based knowledge and hands-on experiences addressing many concerns of local growers. A quarterly newsletter, *Hanai'Ai* (The Food Provider), provides science-based information and inspiration to Hawai'i's farming community. Each issue features a local farmer or producer, with relevant statistics about their business, practical tips, and encouragement, as well as articles by CTAHR faculty and partners on topics from pest management to variety trials to new crops and growing techniques.

SOAP recently updated and expanded its website, which reports on CTAHR projects and activities that promote the understanding and practice of sustainable agriculture in Hawai'i. The website offers links to past issues of *Hanai'Ai* as well as Extension bulletins, presentations, reports, and numerous other resources. Check it out at www.ctahr.hawaii.edu/soap.



Locally grown organics represented just 10% of Hawai'i food distributors' business in 2013. Inconsistent supply was the major challenge cited in an Organic Industry Advisory Group survey. CTAHR researchers and Extension agents are sharing new varieties and methods with growers who want to go organic and the 1,497 other farmers who use earth-friendly no-till and conservation tillage practices.

Field Days are held to share new hybrids, describe the benefits of reflective plastic mulch, explain Korean Natural Farming methods, etc. The Center for Rural Agriculture Training and Entrepreneurship provides posters explaining how to use oyster mushroom compost to combat destructive nematodes, calculate nitrogen contributed by leguminous cover crops to reduce fertilizer accordingly, employ hot-water treatments to manage pests, and grow plants that attract beneficial insects.



Expanding on the Past

Renewed interest in use of cover crops as green manure or mulch begs the question: how much fertilizer can they replace? **Koon-Hui Wang** is principal investigator on a 3-year \$474,043 USDA Conservation Innovation Grant to create a Cover Crop Calculator for the Tropics. She works with Extension colleagues, USDA agents, and local farmers to evaluate 10 annual and perennial leguminous cover crops under varied conditions. Results will be shared with Hawai'i growers and Northern Mariana Islands Extension agents.



Hawaiians sustainably operated an unprecedented 25-square-mile dryland farm system at Kohala without using legumes or external inputs such as fertilizers, says CTAHR's **Noa Lincoln**. Figuring out how could help modern producers grow food more sustainably. His weekly Indigenous Cropping Systems seminar draws academics and community members to discuss issues from biogeochemical cycling to agricultural economics, to encourage good public policy and on-the-ground application.



Ways Eating Local Pays

More than \$3 billion leaves Hawai'i each year to pay for importing food, say CTAHR economists **PingSun Leung** and **Matthew Loke**. Replacing just 10% of food imports with local production would create 2,300 jobs and add \$188 million in sales, generating \$94 million for farmers, \$47 million in wages, and \$6 million in new tax revenue.

FOCUS ON Family

DON'T FIGHT, FETCH: Supporting Families



For more than 10 years, Family Education Training Center of Hawai'i (FETCH) has nourished families—literally and figuratively. At an on-campus Community Supported Agriculture mini-farm, teens learn science and business skills, youngsters discover gardens of the world, and families gain skills in sustainable living, effective communication, self-reflection, and goal setting—key ingredients to preventing teen risk behaviors. 250 families and 300 teens have practiced group participation and family leadership while creating communal gardens and cooking the harvest.

About a dozen set up home gardens in collective all-day “permablitzes.” The result? “Youth demonstrate significant increases in life skills mastery, initiative, interest in science, group skills, science grades, and plans to attend college,” says Family and Consumer Sciences Professor **Mary Martini**. “Families significantly improve in harmony, effective communication, and family problem solving.”

Take Away: Influencing Kids' Food Choices

The Junior Master Gardener program's Learn, Grow, Eat, and Go! curriculum expanded five-fold on Hawai'i Island last year. Children in 20 participating schools and after-school programs learned science, got active, prepared and ate healthy foods, and even influenced their parents' choices. “In one year, I'm seeing changing behavior. We're excited by that,” says Associate Extension Agent **Becky Settlege**.



Although increasing independence and deteriorating diets mark early adolescence in the U.S., research suggests parental influence can sway children's food choices even when the parents are not present, says Assistant Professor **Jinan Banna**. She says more research is needed on the impact of parenting practices during independent eating to help identify ways to counter adolescent obesity. Read the *Nature* article she co-authored at www.mdpi.com/2072-6643/7/10/5431/htm.

Family Leave: Promoting 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 workers aren't covered by the state law. Yet there are good business reasons to adopt paid leave requirements, say Center on the Family's **Ivette Stern** and **Hua Zan**. Studies 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. 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 family policy topics at <http://uhfamily.hawaii.edu>.



Take Charge of Your Money!

is a series of financial literacy videos available free online to help consumers better manage their household resources. It provides 16 hours of information on topics from basic banking to estate planning. View them at www.ctahr.hawaii.edu/tcym.



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. Projects ranged 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.

Sleep Tight...

Cimex lectularius is a wingless blood-sucking bug, but it isn't limited to the boudoir. Infestations have been found in hospitals, movie theaters, restaurants, 5-star hotels, buses, submarines, and locker rooms. Entomologist **Helen Spafford** works with colleagues to study the growing public health problem nationwide and presents educational workshops. Email hspaffor@hawaii.edu for more information.

FOCUS ON Community



Winner of the 2017 International First Place Master Gardener Search for Excellence Community Service award, the Village Harvest program created by two Kaua'i Master Gardeners has gleaned more than 14,000 pounds of fresh produce from CTAHR orchards, training plots, and local farms for food banks, schools, and after-school programs.

Village Harvest

Market Measures

CTAHR faculty members **Ju-Young Kang** and **Youngjin Bahng** were recognized recently for papers on consumer behavior and Hawai'i retailing strategies, respectively. The findings can help local businesses strategize.



Community Behavior

Kaua'i is one of eight index communities piloting an early warning system for mental health and substance abuse issues. The project, led by the Center on the Family's **Sarah Yuan** with **Eilleen Sabino-Laughlin** and Kaua'i County's **Laura Kawamura**, regularly surveys 30 knowledgeable residents to generate local benchmarks, which community leaders can then use to initiate appropriate interventions.

The Community Assessment and Education to Promote Behavioral Health Planning and Evaluation (CAPE) project is funded by the U.S. Department of Health and facilitated by the U.S. Department of Agriculture. More at www.healthbench.info

HOMELESSNESS: Getting an Accurate Picture

The Center on the Family's 2015 *Homeless Service Utilization Report* provides good baseline data to gauge approaches such as the current "housing first" philosophy. The report puts a face on the 14,282 individuals who used publicly funded homeless services and presents an overall analysis of the homeless service system—statewide and by county. "Homelessness is a complex issue," says sociologist and lead author **Sarah Yuan**. "The homeless population is diverse, and we need evidence-based approaches to effectively target services and guide policies." The report—the 10th on homeless services—is available along with many others at uhfamily.hawaii.edu:



Hawai'i's Older Adults



Alcohol and Drug Treatment



Early Childhood Indicator



Choosing Child Care



Managing Job Loss

MINDFULNESS: Being in the Moment



"We all have self-chatter going on in our heads," says **Thao Le**, a psychologist and Family and Consumer Sciences faculty member. "We worry about the future or relive past regrets and mistakes. Mindfulness gives us the ability to push the mute button." Le has documented positive effects of mindfulness exercises in adolescents, including Native American youth, Vietnamese children with disabilities, and residents at the Hawai'i Youth Correctional Facility. They latter had lower levels of the stress hormone cortisol in their

saliva and felt better equipped to live with aloha after training. Most at-risk youth lack good coping skills and the ability to self-regulate when distressed by strong emotions. Simple, fun activities help them become more attentive to the moment, recognizing rather than replaying old habits and thought patterns. Le describes mindfulness as "mental weight lifting to build healthy brain muscle." Neuroscientists call it brain plasticity. The important thing is that it works.

Not-So-Small Fishery

Ecological economist **Kirsten Oleson** and colleagues report that the Kiholo Bay reef "food shed" annually produces 30,000 meals worth \$78,000. The fishery generates social benefits along with food security through shared catch and in social and cultural events. Read the *PLoS One* journal article at <http://go.hawaii.edu/Ckj>



FOCUS ON Landscape



Forest Stewards

Extension forester **J.B. Friday** and colleagues offer an intensive training program for forest landowners, public and private, covering topics from forest ecology, wildlife habitat, and agroforestry to Hawaiian culture and tax and estate planning. "The goal is not to advocate for one specific type of forest management, but to help landowners make informed decisions," he says. Trained stewards commit to teaching neighbors about good forest stewardship and provide service as volunteers. For more, see www.ctahr.hawaii.edu/forestry



Photo by Dolan Eversole
UH Sea Grant College Program

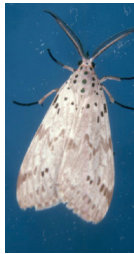
Surge Protectors

Associate Professor and landscape specialist **Andrew Kaufman** tests the ability of coastal bio-shields to prevent severe property damage and human injury from tsunami and storm surges. He is using native species in five experimental coastal reforestation plots at Bellows Air Force Base and quantifying ecological services performed by existing coastal forests in Hawai'i. Poster at www.ctahr.hawaii.edu/bio-shields

LANDSCAPE: Cooperative Effort Bears Fruit



It had been a dozen years since Maui had a Landscape Industry Certification Test (LICT), with only a handful of people becoming certified in turf maintenance at that time. Island landscape managers turned to the Maui Association of Landscape Professionals and its advisor, CTAHR commercial landscape, nursery, and turfgrass agent **Norman Nagata** (front row, third from the right) for LICT training. Nagata organized a committee that developed a 12-class training program on ornamental plant maintenance, one of four areas with national certification offered in Hawai'i. Classes covered a broad spectrum of knowledge, from workplace safety to soil and plant nutrition to equipment operation. A three-hour written exam and all-day field test produced 16 newly certified landscapers.



To combat toxic fireweed, Maui Master Gardeners raise and evaluate host-specific *Secusio extensa* moths for release in Island pastures.



CTAHR alumnus Sean Aukanaii Fong is a 2015 U.S. Small Business Administration Young Entrepreneur of the Year for his success with Hawaiian Turfgrass.

WILDFIRE: Harnessing Technology

A website and interactive map created by CTAHR's **Clay Trauernicht** and **Tomoaki Miura** shows ignitions by location, area burned, and date. State and county agencies can use the statistics when petitioning for support. Communities can use them to develop the Community Wildfire Protection Plans needed to justify federal funding for risk-mitigation measures and infrastructure. Trauernicht and colleagues also authored a new publication, *Protecting Tree Plantations from Fire in Hawai'i*, and are active partners in the Pacific Fire Exchange consortium. More at gis.ctahr.hawaii.edu/WildfireHistory



Wildfires burn more than 20,000 acres annually in Hawai'i.

FOCUS ON Environment



Rapid 'Ōhi'a Death

The name is no exaggeration for a new fungal epidemic threatening the iconic Hawaiian tree that makes up 80 percent of the native canopy and plays an essential role in the forest ecosystem. Healthy trees appear to succumb within days to a few weeks. Millions have already died across tens of thousands of acres on Hawai'i Island.

The fungus causing the disease, *Ceratocystis fimbriata*, is a well-known pathogen worldwide. Other strains have infected sweet potato and taro in Hawai'i for decades, but the strain causing Rapid 'Ōhi'a Death, or ROD, is unique. CTHAR entomologists **Gordon Bennett** and **Curtis Ewing** are investigating the possible role of an insect in spreading the disease, either directly as a vector or by producing sawdust that is blown onto downwind trees. The University of Hawai'i's Lyon Arboretum is banking seeds from different varieties to test for disease resistance and use in reforestation efforts.

CTAHR forester **J.B. Friday** has been on the case since the beginning. He and two USDA colleagues (aka the "ROD Squad") were honored by the Hawai'i Invasive Species Council for their efforts to understand, raise awareness of, and work to contain the disease. Public education is critical since humans could be the worst vectors by spreading infected wood or soil.

Learn more at <https://cms.ctahr.hawaii.edu/rod/HOME.aspx> or www.rapidohiadeath.org.

INVASIVE PEST: Battling the Coffee Berry Borer

When the coffee berry borer (CBB) arrived in the Islands in 2013, Extension agents and specialists leaped into action. Producers have had to change the way they farm and process coffee. CTAHR research and outreach—in collaboration with USDA, Hawai'i Department of Agriculture, and the



Assistant Agent Andrea Kawabata examines coffee cherries

Synergistic Hawaii Agriculture Council program—have been important sources of new information about CBB control to mitigate crop damage and save the industry.

Surveys indicate there has been increased adoption of field sanitation and the use of strip-picking after harvest to remove residual breeding sites, one of the most critical components of CBB integrated pest management. Flat bark beetles have been distributed and *B. bassiana* fungus applications adjusted as countermeasures. This has helped stabilize the coffee industry and reduce unmarketable beans. Outreach and grower education are ongoing. Workshops, field days, and educational displays are focused on new CBB IPM updates, coffee quality for farmers, and increased interaction with participants. Knowledge of CBB control and farm and mill efficiency for mechanized farms was the focus during last year's statewide coffee conference. Updates are frequently provided to growers via emails, mail-outs, Extension publications, posters, presentations, educational booths, and websites.



BIOENERGY: Releasing Natural Potential



97% of Hawai'i residents favor increased development of renewable energy. Solar and wind have overwhelming support; oil and coal, less than 14%.

Center on the Family's Public Attitudes About Renewable Energy in Hawai'i

Hawai'i must use biomass, solar, wind, and geothermal to go completely renewable, says **Samir Khanal**. The Molecular Biosciences and Bioengineering associate professor harvests the energy contained in biological sources ranging from grass to larva while creating byproducts that make the technologies more profitable. He focuses on anaerobic digestion, using microbes to convert food waste and ag byproducts into biogases like methane. Quick-growing, minimal-input banagrass can be harvested with sugarcane equipment for fuel production without diverting a food crop like corn.

Fungus grown in vinasse, the nutrient-rich waste water from ethanol production, can become marketable protein-rich animal or aquatic feed. And the dried larvae of black soldier flies fed on food waste can be converted into both liquefied fat for biodiesel and meal for animal feed.



FOCUS ON Biosecurity

Ag and Climate Change



Agricultural crops and livestock release up to a third of human-generated greenhouse gases, but the level varies by crop and agricultural practice.

Writing in *Nature*

Climate Change, Assistant Professor **Kimberly Carlson** and colleagues suggest that policies consider emissions in proportion to the amount of food produced. For example, use of nitrogen fertilizers to increase food production generates relatively low increases in emissions, while the draining of peatlands generates a whopping 32 percent of cropland emissions for just slightly over 1 percent of total crop kilocalories. Read more about Carlson's use of tools like remote sensing to examine land use, ecosystem processes, environmental governance initiatives, and human livelihoods at <https://carlson-lab.org>.



Little Ant, Big Problem

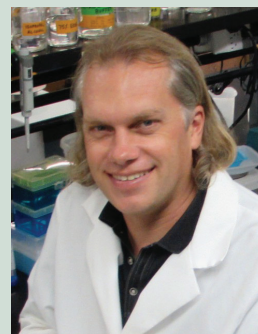
Without increased management, the tiny, flame-colored *Wasmannia auropunctata* will cost the Hawai'i Island \$140 million in economic damages, reduce agriculture yields and nursery exports by 50%, and inflict 390 million human and 107 million pet sting incidents over the next decade, according to CTAHR economists. Extension experts advise homeowners and industry on best practices for monitoring and combating the ants, including hot water drenching, soapy water dips, and granular baits. The ants have been eradicated on Kaua'i and contained on Maui and O'ahu.

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, 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. The lab 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.

Melzer ranked **29th** among all UH faculty for most extramural funding secured during FY2016, including **\$2.6 million** for the agrosecurity lab.



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

FOCUS ON Resources

VETTED: CTAHR Has a Pathologist in the House



Jenee Odani, CTAHR's new veterinarian, has worked in small animal practice and in university-based and regulatory-focused diagnostic pathology laboratories. Besides teaching on campus, the diminutive, Maui-born, karate black-belt mother enjoys 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. She has a whimsical side too: her ringtone is literally the cat's meow.

Go online to shop Made in Maui County, a searchable agricultural product marketing hub developed by Maui Cooperative Extension in collaboration with the mayor's



Office of Economic Development and the Maui Chamber of Commerce.

Browse the wares at www.MadeIn-MauiCounty.com

Hawai'i Farmers Market and Agritourism Venues



Best Food Business and Food Handling Practices for Farmers and Vendors

Download Hawai'i Farmers Market and Agritourism Venues for a comprehensive guide to best practices for vendors and farmers. Free at www.ctahr.hawaii.edu/site/Info



Growth-Wise

At Risk Management Hawai'i workshops, participants learn about a wide range of issues, from pest control and crop diversification to nutrition, food safety, marketing, farm business practices, federal crop insurance, and disaster assistance programs. Attendees at 75 Risk Management programs rated the events as excellent (3.7 on a 4-point scale). 92% said they were better able to manage agricultural risks after the training. Not a bad bet for return on investment!

Nutrition Nuggets

Nutrition experts **Joannie Dobbs** and **Alan Titchenal** have dished up more than



2,000 daily nutrition tips since 2009 along with links to sound information via email, newspaper columns, and the Got Nutrients? website. Visit www.gotnutrients.net

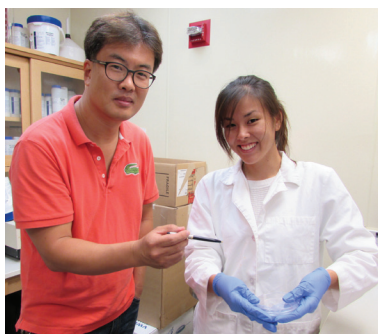
Biochar Benefits



Use of biochar—fine-grained, highly porous charcoal—enhanced the fertility of acid soils, improving productivity and plant growth in green-

house and field tests conducted in Hawai'i and Indonesia. **Hue Nguyen** describes important properties of the six wood-derived biochars he tested in the September/October 2016 issue of *Soil Science*. Read the abstract or order the article at <http://journals.lww.com/soilsci>

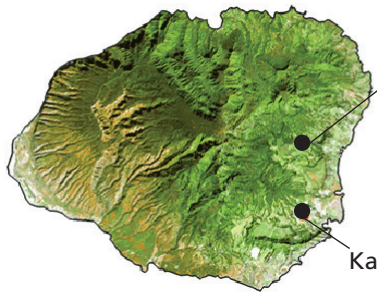
FOOD PROCESSING: Better, Safer Products



Japanese visitors were eager to take home Big Island Abalone products as gifts, so the Kona company turned to Associate Professor **Soojin Jun**. He had worked with NASA on flexible food packaging in retort pouches—vacuum-packed, steam-processed "canning" minus the heavy, landfill-clogging metal containers. It's just one of the technologies his Food Processing Laboratory explores to address food quality, portability, and safety. With USDA, industry, and national funding, his lab group explores several projects:

- A promising supercooling method that combines pulsed electric and magnetic fields to reach subzero temperatures, extending shelf-life without sacrificing fresh-food character of meat and fruit.
- A patented technology that combines ohmic heating by electric current (efficient for liquids) with microwave heating (good for solids) to efficiently and safely process canned foods without degrading quality and nutrition.
- Carbon-nanotube based biosensors to rapidly detect and neutralize food-borne pathogens and nano-material coatings to reduce bacteria-promoting biofilm buildup on the surfaces that come in contact with food during processing.
- Laser decontamination of fresh produce and biodegradable or edible films as waste-reducing packaging for safe export.

"I'm not a foodie guy," says Jun, an electrical engineer. Inspired by automation in a Korean tofu factory, he sees potential for processing local foods like poi and kava.



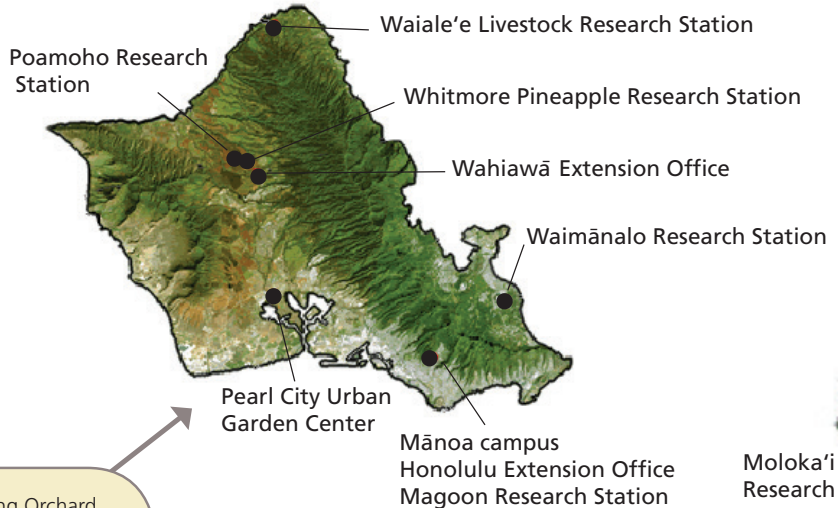
Kauai Research Station

Kauai Extension Office

The entire Kauai County Extension staff learned to respond to medical emergencies through a half-day Hearts4Kauai course in **CPR and first aid**.

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.

KAUAI COUNTY
8,794 people contacted
286 practices adopted



Waiale'e Livestock Research Station

Poamoho Research Station

Whitmore Pineapple Research Station

Wahiawa Extension Office

Waimanalo Research Station

Pearl City Urban Garden Center

Manoa 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 Hawaii'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



Molokai Applied Research Farm

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

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

- nutritional assessment of local ingredients and Hawaii'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 Hawaii'i Cancer Center and Kapi'olani Community College. Check it out at www.hawaiiifoods.hawaii.edu

CTAHR Is at Work Statewide

MAUI COUNTY

23,104 people contacted
1,686 practices adopted

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.

Moloka'i Extension Office

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 'Ohi'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

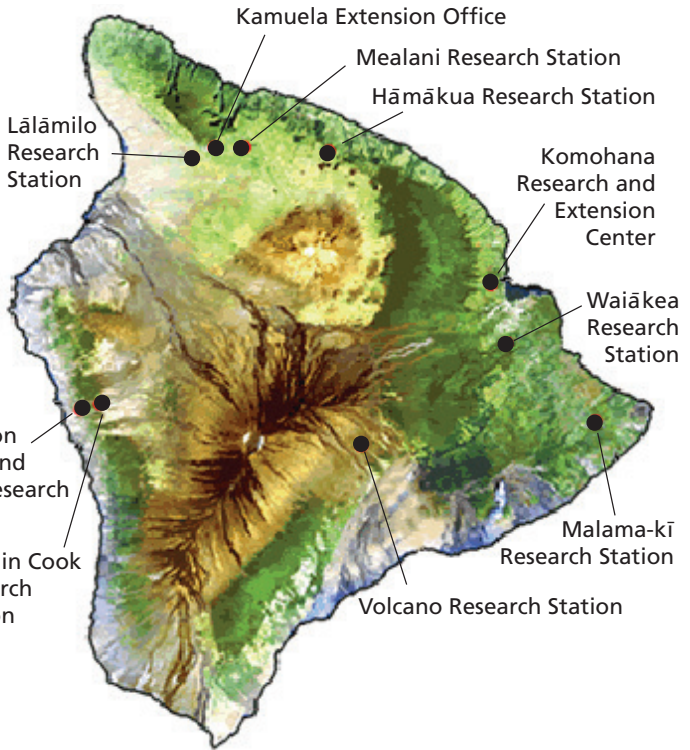
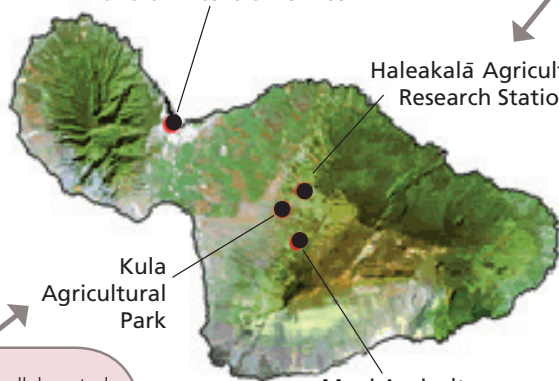
Malama-kī Research Station

Volcano Research Station

Lālamilo Research Station

Kona Extension Office and Kona Research Station

Captain Cook Research Station



Kaua'i County

Population	70,475
Under age 18	29%
Over age 64	17%
Farmers	1 in 53 adults
Acres of farm per resident.....	2.1
Number of farm operators	947
Who are women.....	38%
Share of principal operators who:	
Live on the farm operated.....	74%
Are majority owners.....	96%
Farm as primary occupation....	48%
Have farm Internet access.....	73%
Market value of ag products sold:	
Crop sales	\$156 million
Livestock, aquaculture ..	\$91 million
Farm payroll.....	\$68 million
Unpaid workers.....	5,343

Drought and disease hurt the 7th-ranked state commodity in the 2012 census—203 fewer farms and 41% less acreage were in banana.

KAUA'I PRODUCER PROFILE: Kapa'a Banana Co.

Product: Williams and apple bananas.

Customers: Hawai'i grocery stores.

Location: 20+ acres near Wailua Falls leased from the State.

Proprietor: Third-generation farmer and CTAHR alumnus Godwin Esaki.

Workforce: Family members and friends who volunteer are a strong part of the company.

Challenge: Establishing a local workforce of associates rather than laborers—what Esaki calls the Special Forces of agriculture. "I'm looking for the elite—people who are smart, mechanically inclined, strong, hard working, and more interested in a special career than in the paycheck."

CTAHR connection: "I have only good things to say about Janel (Yamamoto)," says Esaki, a self-described late-bloomer who benefited from the leadership coaching provided by the Agribusiness Incubator Program specialist. "They're the key to success. They listened and made recommendations that were helpful. I feel like the farm is a puzzle I've been putting together. Now I've found most of the pieces."

Philosophy: "I'd like to see the farm provide a livelihood, not just be a place to go to work, but a viable, happy place to work. I think we're getting there."



O'ahu County

Population	991,788
Under age 18	28%
Over age 64	16%
Farmers	1 in 440 adults
Acres of farm per resident.....	< 0.1
Number of farm operators	1,622
Who are women.....	35%
Share of principal operators who:	
Live on the farm operated.....	55%
Are majority owners.....	93%
Farm as primary occupation....	52%
Have farm Internet access.....	60%
Market value of ag products sold:	
Crop sales	\$56 million
Livestock, aquaculture	\$9 million
Farm payroll.....	\$28 million
Unpaid workers.....	863

Composted waste from the state's nearly 200 pig farms could replace 4 percent of imported fertilizer, a CTAHR faculty member estimates.

O'AHU PRODUCER PROFILE: SK Natural Farms

Products: A farrow-to-finish operation offering all-natural pork to restaurants and grocers and pigs for direct sale.

Proprietors: USDA airport inspector/third-generation farmer Patsy Oshiro and School counselor Stacy Sugai.

Location: Wai'anae

Workforce: The owners and occasional interns and volunteers.

Methods: 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. They partner with Higa Foodservice for slaughter and marketing. "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 connection: Faculty provide certifications and offer workshops and publications on health issues, artificial insemination to improve breeding stock, waste management, laws, industry standards, etc., as well as studies of alternate feed sources, such as macadamia nut cake, okara soy byproduct, sweet potato, taro, and cassava to augment expensive imported grain.

Philosophy: The "two lady pig farmers" say they're like-minded on how to handle animals, members of Hawai'i Pork Industry Association, and Pork Quality Assurance Plus certified.

Website: www.2ladypigfarmers.com



Maui County

Population	163,019
Under age 18	29%
Over age 64	15%
Farmers	1 in 66 adults
Acres of farm per resident.....	1.4
Number of farm operators	1,751
Who are women.....	36%
Share of principal operators who:	
Live on the farm operated.....	63%
Are majority owners.....	94%
Farm as primary occupation....	54%
Have farm Internet access.....	66%
Market value of ag products sold:	
Crop sales	\$181 million
Livestock, aquaculture	\$7 million
Farm payroll.....	\$99 million
Unpaid workers.....	1,421

42 Hawai'i farms harvested pineapple in 2012, the same number as in the previous agriculture census five years earlier.

MAUI PRODUCER PROFILE: Hāli'imaile Pineapple

Product: Exclusive growers of field-ripened supersweet Maui Gold pineapple. 80% of the weekly harvest is delivered to local markets within 3 days.

Location: 1200 upcountry acres leased from Maui Land & Pine.

Proprietors: Founded in 2010 by President and CEO Darren Strand (left), and Executive Vice President Rodrigo "Rudy" Balala with three fellow former Maui Land & Pine managers and 'Ulupalakua Ranch owner Pardee Erdman.

Workforce: 86, including employees displaced by closure of the state's last cannery and affiliated field operations.

Distinction: Using water-conserving, sustainable farming practices to produce high-quality fresh fruit and minimizing cull by using imperfectly formed fruit in fresh-cut and quick-frozen products.

Partners: Maui's Winery at 'Ulupalakua Ranch (pineapple wine), Hāli'imaile Distilling Company (Pau Maui Vodka), and the Maui Culinary Academy at UH Maui College (roasted pineapple jam).

CTAHR connection: Help with the initial business plan and advice during startup. "We learned a lot through our relationship with the Agribusiness Incubator."

Philosophy: "Pineapple agriculture is an integral part of Maui's identity," says Rudy.

Website: www.pineapplemaui.com



Hawai'i County

Population	194,190
Under age 18	29%
Over age 64	17%
Farmers	1 in 21 adults
Acres of farm per resident.....	3.5
Number of farm operators	6,554
Who are women.....	36%
Share of principal operators who:	
Live on the farm operated.....	67%
Are majority owners.....	95%
Farm as primary occupation....	66%
Have farm Internet access.....	70%
Market value of ag products sold:	
Crop sales	\$145 million
Livestock, aquaculture ...	\$16 million
Farm payroll.....	\$75 million
Unpaid workers.....	986

Tea was brought to Hawai'i in 1887. Successful CTAHR and USDA field trials in the 1990s identified its potential as a specialty crop.

HAWAI'I PRODUCER PROFILE: Mauna Kea Tea

Products: Organic seasonal green and oolong teas sold online, on farm, and through wholesale accounts.

Proprietors: Taka and Kimberly Ino began farming in 2005 and selling tea in 2008. They have been Health Department Kitchen and USDA National Organic Program Certified since 2011.

Workforce: The owners, 2 part-time employees, a seasonal picking crew, occasional volunteers, and family.

Location: 2 acres planted on a 5-acre lot in Honoka'a (Āhualoa) among the 'ōhi'a forests on the north flank of Mauna Kea, Hāmākua District.

Methods: Masanobu Fukuoka's Natural Farming principals—no pesticides, chemical fertilizers, or tilling; use of weeds and cover crops to enhance soil fertility.

Influences: Education in philosophy and environmental science; traditional cultivation techniques and mentors.

CTAHR connection: Nursery stock, publications, workshops, and business plan assistance from CTAHR Cooperative Extension and Agribusiness Incubator programs.

Philosophy: "Using various techniques that have minimal impact on the environment, we not only keep the native 'ōhi'a forest for the wildlife but also utilize the materials from the forest to help build healthy soil."

Website: www.maunakeatea.com



There's a CTAHR App for That...

Find agriculture-related apps cataloged by CTAHR's Kent Kobayashi for iPhones at sites.google.com/a/hawaii.edu/hort-apps or Android phones at sites.google.com/a/hawaii.edu/android-hort-apps.

Online tools developed by people at CTAHR include diagnostic tools such as the **Leaf Doctor**, **Plant Doctor**, and **Landscape MD** apps. The **UH Mānoa Plant Map** assists campus visitors and landscape workers. Citizen researchers enjoy the **Pulelehua Project** while professional scientists make use of **GPS Field Tags** and the **CTAHR Geoport** mapping site.



In one year alone, about 1,000 people in 42 states and 36 countries used the CTAHR Plant Doctor app to help diagnose sick plants.