2012

IMPACT REPORT Q4

FOURTH QUARTER

Of Innovation, Collaboration, and Compassion

College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

The founding college of the University of Hawai'i, established 1907

www.ctahr.hawaii.edu
www.facebook.com/uhctahr

FOURTH QUARTER

Q4

College of Tropical Agriculture and Human Resources
Of Innovation, Collaboration, and Compassion

"Research informs our academic programs through our courses and our extension programs as we disseminate this new knowledge to consumers, producers, and the general public."

Research. The term "Research I" is no longer used by the Carnegie Foundation to designate the small and elite group of institutions that engage in extensive research, qualify for over $40 million in federal funding, and demonstrate a strong commitment to doctoral education. But the University of Hawai'i-Manoa was ranked as a Research I institution when the term was in use, and it retains these proud attributes today.

Our research excellence is one of the reasons I am proud to be Dean of CTAHR. Research informs our academic programs through our courses and our extension programs as we disseminate this new knowledge to consumers, producers, and the general public. However, much of the research done at universities, even in our college, may at first seem to be invisible. A researcher may make a groundbreaking discovery, which paves the way for another discovery, which in turn paves the way for an insight or a product that will improve the lives of the local or even the global community. But all the research conducted that made that final discovery possible may go unnoticed outside of the scholars' own fields.

That is why it is so important to highlight the research that the faculty of our college engage in, and why I am so pleased that this quarter's Impact Report showcases three research projects. Maria Stewart's work on fiber and resistant starch in rice, that local staple, may one day lead to a healthier two scoops on the plate-lunch plate. Paul Krushelnycky's silversword project illustrates the reality of global climate change using an iconic native species. And Arnold Hara's longtime research into invasive pests combined with Charles Nelson's machine-shop wizardry have come together to create a piece of equipment that is helping to keep out ecosystem intruders.

I value the opportunity to share these research projects with you so that we gain a better appreciation for the value research brings to the community. I have been a researcher for the majority of my career. I love the work for its own sake, and for the promise it gives for a better future. I know CTAHR's researchers feel the same way.

Aloha,

Maria Gallo

Maria Gallo
Dean and Director of CTAHR

www.ctahr.hawaii.edu
www.facebook.com/uhctahr

Armed With a Silver Sword

Paul Krushelnycky is doing his part to battle climate change, using perhaps the most important weapon available—knowledge. The researcher in the Department of Plant and Environmental Protection Sciences is studying the declining population of silverswords (*Argyroxyphium sandwicense macrocephalum*) on Haleakalā to discover whether, as his previous data suggest, their disappearance is related to climate change. His is one of five projects associated with and funded by the newly established Pacific Islands Climate Science Center, one of eight such centers throughout the country.

Dr. Krushelnycky collecting data from his alpine desert "lab."

Not much survives on the upper slopes of Haleakalā, but much of what does live there is dependent on the silversword, including several species of endemic insects. It thus plays a critical ecological role in its alpine desert environment. This native plant is also one of the most striking and rare species in the Islands (it only lives on these slopes) and as such is a great attraction to the million-plus visitors to Haleakalā National Park.

Beyond that, it's an indicator of what's happening throughout the world as plants and animals are impacted by higher temperatures and changing rainfall patterns. As Dr. Krushelnycky points out, when temperatures rise, populations of high-elevation species that thrive in the cold move ever upwards in search of lower temperatures, and "species that already occupy summits may literally have nowhere to go." He further warns that "unless climate trends on the mountain reverse course, the future outlook for the Haleakalā silversword looks bleak."

But Dr. Krushelnycky is partnering with Lloyd Loope of the USGS Pacific Island Ecosystems Research Center, UH's Thomas Giambelluca and Donald Drake, and Haleakalā National Park's Stephen Anderson and Matt Brown to try to change that. As part of their three-year project they'll not only track and monitor the remaining populations; they'll conduct drought-tolerance tests of silversword seedlings to figure out which can survive on less water, and why. This information will help with developing restoration strategies.

And they'll educate all those visitors about climate change and the many effects it has, even on places as remote as the top of a dormant volcano. Because only by understanding the advancing problem can we start to take action to reverse it.

The silversword is one of the most striking and rare species in the Islands.

A New Scoop on the Plate

Rice provides up to 80 percent of people's daily caloric intake in parts of Southeast Asia. Hawai'i, while not that extreme, is a bastion of rice-mania in its own right: The versatile grain finds its way into musubi, sushi, mochi, arare, and much more. It's as comfortable fried with kimchi as it is providing a pillowy base for a loco moco. And no plate lunch would be complete without those two all-important scoops.

Dr. Stewart setting up her exhibit at Honolulu's Rice Festival.

Human Nutrition, Food and Animal Sciences researcher Maria Stewart is hoping to use locals' love of rice to improve their diets—and their health. Hawai'i has rates of diabetes higher than the national average: 20 percent of the population between the ages of 65 and 74, and 7 percent of the total population. It's well understood that diet can affect diabetes, as well as a host of other diseases and conditions, both positively and negatively, and a food so commonly eaten has the potential to reach a large segment of the populace.

In her research project *The Rice Paradox: Identifying the Ideal Rice for Glycemic Control and Weight Loss*, Dr. Stewart looks at a type of fiber in rice called *resistant starch* (RS). In particular, she's interested in high-amylose rice, which contains up to 4 times as much RS as more common types like short-grain rice. Foods with greater amounts of resistant starch decrease blood glucose and insulin concentrations, so eating them can actually help some diabetics.

Dr. Stewart has charted the RS content of different types of rice and is now researching the physiological effects. In connection with Queens Medical Center, she feeds volunteers varieties of rice with differing percentages of resistant starch; then she measures their blood glucose and insulin—and their satiety, or how full they feel. She predicts that high-amylose rice, if substituted for the classic types and eaten with the same frequency, could be an effective diet therapy for those with type 2 diabetes.

And this finding could be good news on so many levels. Imagine rolling up to Rainbow Drive-In and saying, "I gotta watch my health—give me one hamburger steak plate...with extra rice."

Researcher Maria Stewart is riding the wave of locals' love of rice to improve their diets—and their health.

CTAHR Helps Save Christmas (Trees)

Strange but true: Christmas trees love the heat. Hot water, that is. Retailers suggest filling the tree stand with hot tap water, which the stem can absorb more readily than cold. But fresh, green, rehydrated trees are just a fortunate side effect of the plant disinfestation spray chambers invented by Arnold Hara of the Department of Plant and Environmental Protection Sciences and Charles Nelson of Molecular Biosciences and Bioengineering, along with UH-Hilo's Marcel Tsang. Their main goal at present is to keep the Islands safe for Christmas.

It all started with *cold* water—drenching floods in the Pacific Northeast, where the majority of Christmas trees imported to Hawai'i are grown. The ground became so soaked that banana slugs slithered into the trees to escape from drowning, and when the trees were cut down and shipped over, they came along for the ride.

Charles Nelson and Dr. Hara doing an equipment check before flipping the switch to another chamber full of Christmas trees.

Glistening and bright yellow, the slugs may look like a new type of Christmas ornament, but there's no holiday welcome for these invasive pests, which may carry rat lungworm disease. Banana slugs aren't yet found here, and the Hawai'i Department of Agriculture's Plant Quarantine division and CTAHR intend to keep it that way.

This isn't the first year they've been discovered in tree shipments, but they're far more numerous than ever before, infesting at least half the containers. So Dr. Hara came over from the Big Island, bringing with him the disinfestation chamber usually employed to keep coqui frogs from leaving that island to supplement the one already used on O'ahu. Constructed from ordinary shipping containers lined with pipes and spray nozzles, the chambers are deceptively simple—and extremely effective. Fifty to seventy trees are piled inside and bathed in 118°F water for a mere eight minutes. The water's even recirculated and reused.

Slugs aren't the only pests sheltering in the branches of the Christmas trees: A Western fence lizard, a salamander, wasps, and frogs have also been found in this year's shipments. The state has no other feasible method of disinfesting the trees besides manually shaking each one, making the invention not only ingenious but critical to the biosecurity of the Islands. And knowing we're being protected from invasive species is enough to give us all a merry Christmas.

Rows of spray nozzles drench the trees in 118°F water for eight minutes.

COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

University of Hawai'i at Mānoa
3050 Maile Way, Gilmore Hall 202
Honolulu, HI 96822
www.ctahr.hawaii.edu
www.facebook.com/uhctahr

ADMINISTRATION

Maria Gallo, dean and director

Charles Kinoshita, associate dean for academic and student affairs

J. Kenneth Grace, interim associate dean and associate director for research

Carl Evensen, interim associate dean and associate director for Cooperative Extension

Russell Nagata, county administrator, Hawai'i

Roy Yamakawa, county administrator, Kaua'i

Harold Keyser, county administrator, Maui

Ray Uchida, county administrator, O'ahu

DEPARTMENTS

Family and Consumer Sciences
Barbara Yee, chair

Human Nutrition, Food and Animal Sciences
Douglas Vincent, chair

Molecular Biosciences and Bioengineering
David Christopher, chair

Natural Resources and Environmental Management
Cathy Chan-Halbrendt, chair

Plant and Environmental Protection Sciences
Brent Sipes, chair

Tropical Plant and Soil Sciences
Robert E. Paull, chair

Impact Report Staff

Office of Communication Services
Frederika Bain, writer/editor
Miles Hakoda, director