

CTAHR RESEARCH NEWS

April 2006
Volume 2, Issue 4



**Termites love
your Hawaii
home**
(unfortunately)

**USDA's SARE
program**

**CTAHR faculty
continue to
bring in grants**

**Dr. Ken Grace holds a
termite trap**

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From the Associate Dean and Associate Director for Research

One of the many great things about living in a tropical paradise is that it doesn't take much to convince people to visit. One recent visitor was Dr. Phil Rasmussen, director of Western SARE. Phil arrived on April 10, and presented a workshop on how to obtain grants from Western SARE to an audience of 28 people. In this issue of *CRN*, Dr. Doug Vincent provides an excellent summary of Phil's talk and the W-SARE grant program with links to additional information. This is an excellent funding source for you if you are interested applied research or integrated research and extension projects.

Other recent visitors to CTAHR were Dr. Bob Matteri, assistant director of USDA/ARS Pacific West Area, and Dr. Lew Smith, ARS Aquaculture National Program Leader. They met with Drs. Malecha, Yang, Ako, Tamaru and other researchers to discuss CTAHR's and UH's aquaculture program, as well as opportunities for collaboration. So, if you know of people coming to town, please invite them to give a presentation and share their knowledge and experiences.

We continue to showcase the wonderful work and impacts of our faculty, staff and students. This month's feature is the collaborative research and outreach projects on termites headed by Dr. Ken Grace and Dr. Julian Yates. While termites in Hawaii are a powerful force, the PEPS program is up to meet the challenge. Be sure to check out their new T-STAR impact video!

Attending the second session on budget formulation of Dr. Brain Turano's Grant Writing Workshop were 23 faculty members, compared to just seven attending the first session. We have included the schedule for the remaining eight topics in this series. Note that the last five sessions are restricted to only 12 people, so please make your reservation early for a spot in this valuable workshop.

On May 4-5, CTAHR will convene its all-college conference. This is an important time for everyone as we will be making some critical decisions on the future direction for

the college. During this conference, we scheduled a breakout session on the *Logic Model*. Extension colleagues are familiar with this concept because it originated from an extension program at the University of Wisconsin <<http://www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html>>. The Logic Model has been adopted by many federal agencies – including CSREES – for the development, planning and evaluation of projects and programs. CSREES now requires that all state Plans of Work follow the same approach. Understanding the concepts of the Logic Model should help you with project development, management, evaluation and reporting, and I encourage you to attend this session.

Also scheduled for May 4th is our annual award banquet, which is a wonderful time for us to celebrate the achievements of our faculty, staff and students. Although the ticket price of \$50 sounds expensive, it's really a steal considering the actual cost for each person is more than \$65! Please make a reservation to join us. Contact: Merrisa Uchimura events@ctahr.hawaii.edu / 808.956.6016. More information is found here: <<http://www.ctahr.hawaii.edu/banquet/>>

Last but not least, we introduce more of our Hawaii Island research station staff. Please join me in thanking them, and all station employees, for the hard work and efforts they put out each and every day.



Ching Yuan (CY) Hu
Associate Dean and
Associate Director for
Research



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USDA's Sustainable Agriculture and Education program

By Doug Vincent
Special Program Director for Grants and Contracts

The Western Regional Sustainable Agriculture and Education (SARE) Coordinator, Dr. Phil Rasmussen, was in Honolulu on Monday, April 10, 2006, to present a seminar entitled “[Simply Sustainable](#)” on the SARE program. SARE is a program of the U.S. Department of Agriculture that functions through competitive grants conducted cooperatively by farmers, ranchers, researchers and agricultural professionals to advance farm and ranch systems that are profitable, environmentally sound and good for communities. Dr. Rasmussen’s seminar was very timely, as the latest requests for applications were released on April 3, 2006. The success rate for Hawaii proposals over the 18 years of the program has averaged 30 percent.

There are several kinds of funding opportunities in the SARE program, including the largest program in terms of funding availability: the [Research and Education](#) (R&E) Program. Grants ranging from \$20,000 to \$200,000 are available through the R&E program and pre-applications are due to the Western SARE office on **June 14, 2006**.

Two grant applications directly involve working with farmers and ranchers: the [Farmer Rancher Grants](#) (FRG) and the [Professional + Producer Grants](#). FRGs are awarded directly to farmers and ranchers but include support and guidance from a technical advisor (which in most cases an extension agent). An individual farmer may apply for up to \$10,000, and a group of three or more farmers may apply for up to \$20,000. Farmer Rancher Grants are due to SARE on **December 6, 2006**. Similar to the FRGs are the [Professional + Producer Grants](#). In this case, an agricultural profession – such as an extension educator or NRCS professional – coordinates the project with a farmer or rancher serving as a technical advisor. These grants are also due on **December 6, 2006**.

The [Professional Development Program](#) (PDP) SARE grants are aimed at helping the Cooperative Extension Service and the Natural Resource Conservation Service (and others in the Western Region) increase their understanding and proficiency

in sustainable agriculture. Critical to the success of any PDP SARE grant is the involvement – from start to finish – of agricultural producers in the planning, implementation and outreach of any SARE-funded project. PDP projects should increase agricultural professionals’ knowledge of sustainable agriculture, skills and actions AND have clear outreach plans that demonstrate how the project will effectively deliver this knowledge to the producers. Dr. Richard Bowen of NREM is designated as Hawaii’s state contact for the PDP program and questions about this program can be directed to him. The deadline for WSARE PDP applications is **November 1, 2006**.

The newest program in the Western SARE is the [WSARE Graduate Student Fellow Grants](#). Up to \$20,000 is available to support graduate students working in sustainable agriculture. The deadline for submission of Graduate Student Fellow applications is **May 31, 2006**. For more information about the Western SARE program, see their web site here: <http://wsare.usu.edu/>.



Dr. Phil Rasmussen is SARE's Western Region coordinator.

Termites vs CTAHR Faculty and Students

By Ken Grace

Chair and Researcher, Plant and Environmental Protection Sciences (PEPS)

Termites are both amazingly interesting and amazingly destructive creatures. Unfortunately, Hawaii has one of the most destructive species: the Formosan subterranean termite. This termite probably arrived in Hawaii from southern China at the end of the sandalwood trade in the 1800's, and is responsible today for over \$100 million in control and repair costs each year. Fifty years ago, former entomology chair Henry Bess initiated CTAHR's research on termite control. This research area was developed in the 1960s and 1970s into one of the premier termite research programs in the world by Professor Emeritus Minoru Tamashiro, who has the distinction of inventing the Basaltic Termite Barrier: a physical barrier to termites used in construction throughout Hawaii and one of the University's most successful patents.

Our current work spans the range from basic research to an active community outreach program. Two fundamental beliefs guide our efforts: (1) the purpose of science is to change the world for the better,

and (2) teamwork works. Extension specialist Julian Yates and I share the exciting world of termites with CTAHR graduate students and research staff, and also with collaborators across the globe. In this brief article, I would like to share some of that excitement with you.

Basic Research

The investigative tools we have developed at CTAHR and with our collaborators are rapidly changing the way that we understand and "see" termites. Termites are cryptic insects, hidden in the soil or in the wall of your house, so direct observation of their behavior is virtually impossible. We have modeled their behavior in the laboratory using tunneling arenas developed by former graduate student Dr. Cory Campora (now employed at Pearl Harbor). Using molecular genetic methods such as DNA fingerprinting and microsatellites, developed by former CTAHR researcher Dr. Claudia Husseneder (now assistant professor at Louisiana State University)



(L-R) Dawn Adams, Cecil Bernhard, Ranit Kirschenbaum, Kari Nishiyama, Ken Grace, Maria Aihara-Sasaki, Carrie Tome, Margaret Gentz, Joe Woodrow, Georgina Frost, Julian Yates, and Rob Oshiro.

and our other collaborators, we are able to actually “see” how termite colonies are organized in the field and how the colony members interact with each other. With this information, we hope to develop new and improved ways to reduce the destructive impact of termites. Check out some of our T-STAR-funded work on this video <http://www.ctahr.hawaii.edu/ctahr2001/Research/ResearchNews.html>.

Along with Dr. Husseneder, CTAHR graduate student Darcy Oishi and PEPS graduate Dennis Higashiguchi, we have also been able to isolate and identify unique *termite-specific* stomach bacteria. We have been granted a patent on the use of genetically modified forms of these bacteria as biological control agents for termites.

<http://www.ctahr.hawaii.edu/ctahr2001/Research/Patents.html>.

Ants are the major insect enemies of termites. Graduate student Ranit Kirschenbaum is examining how invasive ant species and termites interact with each other in Hawaii, to better understand the current distribution of these invasive pests and to better predict where they will occur in the future.

Applied Research

Continuing the theme of “least-toxic termite control” – begun by Dr. Tamashiro with the development of non-chemical physical barriers – we are working on a variety of projects to develop and evaluate the efficacy of such physical barriers, novel soil insecticides, baits, and preservative treatments to protect the lumber used to build our homes. The most commonly used wood



Formosan subterranean termite soldier.

preservative treatment in Hawaii, derived from boric acid, was largely the result of CTAHR research. Currently, graduate student Margaret Gentz is taking this work a step further to better understand the effects of borates on insect physiology.

Our research on these shorter-term answers to termite problems is supported by both industry and the federal government, and pushed

forward by CTAHR researcher Dr. Joe Woodrow and research technicians Robert Oshiro and Carrie Tome. Dr. Woodrow is also a CTAHR graduate, and has conducted innovative work on the use of heat as a non-chemical method of termite control. The pest control industry follows our progress closely, and Dr. Yates has been very successful in promoting better pest management practices to our clientele. *(con't next page)*

Julian Yates, III

Hometown: Kamuela, Hawaii

Joined CTAHR: 1985 (as a faculty member; been here since undergrad days)

Educational History: BS, Entomology, UH Manoa; MS, Entomology (insecticide toxicology), UH Manoa; PhD, Entomology (insecticide toxicology), UH Manoa

Specialization: Biology, ecology and management of urban pests with emphasis on termites

Current work: Extension Specialist in Urban Entomology

Languages spoken: English, bits of Spanish and Hawaiian



Outreach

One of the best parts of working with termites is the opportunity to also work with people – especially children. Over the past three years, we have developed a major educational and outreach program in Hawaii’s public schools, implementing a curriculum that uses termites to teach the scientific method while meeting both state and national standards for science education. This curriculum has been adopted in the classrooms of 30 public schools on Oahu, Maui, and the Big Island. A little bit about our school work, and our research work can be found on our T-STAR video here: < <http://www2.ctahr.hawaii.edu/t-star/TSTARHilitePage.htm>>

Children are naturally curious about insects, and when they engage their parents in their learning, we can have a great multiplier effect in outreach. Project coordinator Maria Aihara-Sasaki and technicians Georgina Frost and Dawn Adams spend a tremendous amount of time improving our curriculum and working with teachers. Dr. Yates also conducts adult education seminars in each district for parents and community members. Basically, we are using the public schools as “windows” into Hawaii’s communities, and we are teaching both the next generation of homeowners and their parents about termite prevention and control at the same time.

In a way, our approach is analogous to using baits for termite control – a termite takes the bait home and shares it with its colony mates, and likewise, students are taking knowledge home and sharing it with their family and the community. In both cases, the end result is to reduce termite damage to Hawaii’s homes and property.



Ken Grace

Hometown: Manhattan Beach, California

Joined CTAHR: 1990

Educational History: BA, Biology, UC Berkeley; PhD, Entomology, UC Berkeley.

Specialization: Behavior and control of termites and social insects; wood protection

Current work: Chair and Researcher in entomology, Dept. of PEPS

Languages spoken: English, bits of Spanish and French

Securing and Managing Extramural Funding: A Workshop Series for Faculty

Tuesdays, 2-4 pm; Ag. Sci. 219

- May 9 Pre-Award Paperwork and Procedures**
Form 5, 5a, 5b, agency forms/certifications, electronic filing *via* Grants.gov
Paul Kakugawa, Georgette Sakumoto, and Linda Lau
- Jun 13 Compliance Issues**
Human and animal subjects, recombinant organisms, hazardous materials, importation of organisms
Bill Dendle, Norman Magno, Denise Yee, Roy Takekawa, Hubert Olipares, Irene Sakimoto, Mark Burch
- Jul 11 Post-Award Paperwork and Procedures**
Hiring personnel, purchasing supplies and equipment, travel, project recording, FTE certification, and CRIS reports
Janice Muraoka, Pua Fisher, Jan Tatsuguchi, and Terri Hee
- Aug 08 Defining and Writing Objectives and Hypotheses**
Hands-on writing and critiquing objectives and hypotheses (limit 12)
Brian Turano
- Sep 12 Generating Measurable Outputs and Impacts**
Introduction to the Logic Model and follow-up exercise to draft outputs and impacts for your project (limit 12)
Doug Vincent and Brian Turano
- Oct 10 Building a Compelling Case**
Stresses the importance of finding supporting statistics, a concise primary literature review, and a strong significance statement (limit 12)
Brian Turano
- Nov 14 Experimental Design/Methods**
Rationale, approach, methodology, expected results, potential problems, alternative approaches, and summary of impacts (limit 12)
Brian Turano
- Dec 12 Abstracts**
Presentation of the key elements of an abstract, followed by a hands-on exercise (limit 12)
Brian Turano

Brian's Basic Grant Definitions*

Goal: a broad statement of the intent, accomplishment, or purpose of the project.

Objective: what you will accomplish (a measurable step toward the goal).

Activity: how you are going to achieve the objective (method, service, event).

Output: product of the activity.

Outcome: impact of project; i.e. change in behavior, knowledge, attitude (in the target population, if appropriate).

*These definitions will not fit every funding source. As always, read the ENTIRE RFP guidelines.

CTAHR faculty continue to be successful in grants and publishing

By Doug Vincent
Special Program Director for Grants and Contracts

In just the last few weeks, CTAHR got word that new grants were being awarded to our faculty. Congratulations to the individuals and teams who put together these winning proposals! The total value of these grants is \$1,069,886.

Joe DeFrank (TPSS)

Establishing Native Hawaiian Plants for Ground Cover Protection on Hawaii's Roadways - (Hydromulching, Weed Control and Subsurface Irrigation). Hawaii Dept of Transportation. \$93,750.

Cerruti Hooks (PEPS)

Management of Banana Bunchy Top in Hawaii. Western Regional Sustainable Agriculture Research and Education (WSARE) Professional Development Program. Utah State University. \$30,200.

Mike Kawate (PEPS)

Hawaii Pest Management and Regulatory Information and Notification Network. University of California-Davis. \$45,658.

Claire Nakastuka (FCS)

2006 Military 4-H Grant Renewal. Kansas State University. \$30,000.

Aurora Saulo (TPSS)

Enhancing Hawaii's Global Competitiveness and Business Performance in International Agribusiness with Focus on Food Processing. U.S. Dept of Agriculture. \$100,000.

Sylvia Yuen (CoF)

Memorandum of Agreement Relating to Quality Care Program for Home-Based Child Care Providers and Center-Based Child Care Providers. Hawaii Dept of Human Services. \$646,798.

HMIS Analysis and Dissemination Project. Hawaii Housing and Community Development Corporation. \$123,480

Recent faculty publications

Jim Brewbaker (TPSS)

Shi, Xuebo and J. L. Brewbaker. 2006. Vegetative propagation of *Leucaena* hybrids by cuttings. *Agroforestry Systems* 66:77-83.

David Christopher (MBBE)

Matsumoto, K. Neuteboom, L. and Christopher, D.A. (2006). *Expression and Biochemical Characterization of a Novel Pineapple Cystatin.* BIO Pacific Rim Summit on Industrial Biotechnology and Bioenergy. Honolulu, HI. January 12-13, 2006.

Christopher, D.A., Borsics, T., Penner, R., Ondzighi-Assoume, C., Staehelin, L.A. (2006). *AtCNGC10, a calmodulin-binding, cGMP-regulated potassium channel of Arabidopsis localizes to the plasma membrane in plant and HEK cells and confers tolerance to Na⁺ and Cs⁺ in a yeast K⁺ uptake mutant.* Keystone Symposium on "Plant Responses to Abiotic Stress." Copper Mountain, CO. April 8-13, 2006.

CY Hu (HNFAS)

Brandebourg, T.D. and C.Y. Hu. 2005. Isomer-specific regulation of differentiating pig preadipocytes by conjugated linoleic acids. *J. Anim. Sci.* 83:2096-2105.

Sahar Zaghoul (HNFAS)

Goolsby, S., P. Casey, J. Stuff, S. Zaghoul, J. Weber, J. Gossett, P. Simpson, M. Bogle. 2006. Consumption of calcium among African American adolescent girls. *Ethnicity & Disease*, Volume 16, Spring 2006: 476-482.

Open grants!

U.S. Department of Agriculture
Economic Research Service
Food Assistance and Nutrition Research Program
Deadline: May 22, 2006
<http://www.ers.usda.gov/Briefing/FoodNutritionAssistance/Funding/>

U.S. Department of Agriculture
New Technologies for Ag Extension (NTAE)
Deadline: May 23, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1560>

Department of Health and Human Services
Administration for Children and Families
Special Improvement Project
Deadline: May 24, 2006
<http://www.acf.hhs.gov/grants/open/HHS-2006-ACF-OCSEFI-0005.html>

U.S. Department of Agriculture
Rural Business-Cooperative Service
Rural Business Opportunity Grant
Deadline: May 26, 2006
<http://www.rurdev.usda.gov/rd/nofas/2006/031506rbog.pdf>

U.S. Department of Agriculture
WSARE Graduate Student Fellow Grants in Sustainable Agriculture
Deadline: May 31, 2006
http://wsare.usu.edu/grants/docs/req_gs_07.pdf

U.S. Department of Agriculture
Rural Development Water and Environmental Programs
Household Water Well System Program
Deadline: May 31, 2006
<http://www.usda.gov/rus/water/well.htm>

National Science Foundation
Hydrologic Sciences
Deadline: June 1, 2006
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf06545

U.S. Department of Agriculture
Rural Youth Development Grants
Deadline: June 1, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1420>

U.S. Department of Agriculture
Higher Education Multicultural Scholars Program
Deadline: June 1, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1110>

U.S. Department of Agriculture
Food and Nutrition Service
WIC Special Project Grant Program
Deadline: June 5, 2006
<http://www.fns.usda.gov/oane/MENU/DemoProjects/WICSPG/WICSPG.htm>

U.S. Department of Agriculture
Western Regional Sustainable Agricultural Research and Education (SARE)
Research and Education Program
Deadline for Pre-applications: June 14, 2006.
http://wsare.usu.edu/grants/docs/req_re_07.pdf

U.S. Department of Agriculture
Human Nutrition and Obesity, NRI
Deadline: June 15, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1095>

U.S. Department of Agriculture
Animal Genomics, NRI
Deadline: June 15, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1066>

U.S. Department of Agriculture
Plant Biosecurity, NRI
Deadline: June 15, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1521>

U.S. Department of Agriculture
Air Quality, NRI
Deadline: June 15, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonom=1062>

National Science Foundation
Plant Genome Comparative Sequencing Program
Deadline: June 16, 2006
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf06555

U.S. Environmental Protection Agency
Consequences of Global Change for Air Quality
Deadline: June 20, 2006
http://es.epa.gov/ncer/rfa/2006/2006_star_gcaq.html

U.S. Department of Agriculture
Foreign Agriculture Service
Technical Assistance for Specialty Crops Program
Deadline: July 1, 2006
<http://www.grants.gov/search/search.do?mode=VIEW&oppld=7869>

National Science Foundation
Science and Society
Deadline: August 1, 2006
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05588

U.S. Fish and Wildlife Service
Partners for Fish and Wildlife Program
Deadline: September 30, 2006
<http://www.fws.gov/partners/pdfs/grantsgov06partners.pdf>

U.S. Department of Commerce
National Institute of Standards and Technology (NIST)
Small Grants Program
Deadline: September 20, 2006
<http://www.grants.gov/search/search.do?oppld=7452&mode=VIEW>

U.S. Department of Agriculture
Animal Biosecurity Coordinated Agricultural Projects (CAP)
Deadline: October 31, 2006
<http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1522>

U.S. Department of Agriculture
Western Regional Sustainable Agricultural Research and Education (SARE)
Professional Development Program
Deadline: November 1, 2006
http://wsare.usu.edu/grants/docs/req_pd_07.pdf

U.S. Department of Agriculture
Western Regional Sustainable Agricultural Research and Education (SARE)
Farmer Rancher Grants
Deadline: December 6, 2006
http://wsare.usu.edu/grants/docs/req_fr_07.pdf

U.S. Department of Agriculture
Western Regional Sustainable Agricultural Research and Education (SARE)
Professional + Producer Grants
Deadline: December 6, 2006
http://wsare.usu.edu/grants/docs/req_pp_07.pdf

U.S. Environmental Protection Agency
Office of Research and Development Broad Agency Announcement
Conferences, Workshops and/or Meetings
Deadline: January 18, 2007
http://www.epa.gov/ord/grants_funding/pdfs/BAA_conferences_011806.pdf

U.S. Department of Defense
Defense Advanced Research Projects Agency (DARPA)
Defense Sciences Research and Technology
Deadline: Open (through February 9, 2007)
<http://www.grants.gov/search/search.do?mode=VIEW&oppld=8019>

Trolling for dollars? Try www.Grants.gov, the central site for grants with the U.S. government.

WHAT'S NEW

- [Read the Washington, DC Success Story](#)
- [Read our Spring 2006 "Succeed" Newsletter.](#)
- [Check out our Get Started with Grants.gov Webcast!](#)
- [Find out about the Grants.gov Updates!](#)
- [Citrix Server Now Available for Non-Windows Users!](#)
- [Review the latest Stakeholder Meeting Minutes!](#)
- [Download the Registration Brochure](#) to get started today!
- Learn more about [P.L. 106-107](#).
- [Grant Opportunities](#) posted in the last 7 days.

QUICK LINKS
Access the most requested

Find Grant Opportunities

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- [Register for Email Notification of Grant Opportunities](#)
- [Resources for Grants](#)
- [Find Information on Government Benefits for Individuals](#)

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- [Complete a Grant Application Package](#)
- [Submit a Completed Grant Application Package](#)
- [Check the Status of an Application Submitted via Grants.gov](#)

Our hats are off to our CTAHR research station farm crews in Kona and Mealani. Thanks so much for providing our faculty and clients with the quality service! Marc and Harold are from the Kona station and the other 8 crew members staff Mealani.



Marc Meisner
Hometown: Hilo, Hawaii
Joined CTAHR: 1981
Educational history: Kailua High School.
Current work: Farm foreman. Horticultural crops and nursery.



Harold Stene
Hometown: Stanwood, Washington
Joined CTAHR: 1984
Educational history: BS, Entomology, Washington State University.
Current work: Nurseryman.



Earl Arakaki
Hometown: Hilo, Hawaii
Joined CTAHR: 1991
Educational history: BS, General Ag, UH-Manoa.
Current work: Crops.



Damien (Sonny) Arruda III
Hometown: Hilo, Hawaii
Joined CTAHR: 2004
Educational history: High School.
Current work: All around livestock, crops, mechanic.



Kelly Asai
Hometown: Ainakea, Hawaii
Joined CTAHR: 1985
Educational history: BS, General Ag, UH-Manoa.
Current work: Equipment operator.



Marla Fergerstrom
Hometown: Kamuela, Hawaii
Joined CTAHR: 1988
Educational history: BS, Animal Science.
Current work: Livestock and crops.



Lori Hasegawa
Hometown: Ahualoa, Hawaii
Joined CTAHR: 2005
Educational history: BS, Tropical Ag., UH-Manoa.
Current work: Crops.



Roy Ishizu
Hometown: Kalopa Homestead, Hawaii
Joined CTAHR: 1994
Educational history: BS, General Agriculture.
Current work: Crops and livestock.



Aric Matsubara
Hometown: Hilo, Hawaii
Joined CTAHR: 2005
Educational history: BS, General Agriculture.
Current work: Crops.



Milton Yamasaki
Hometown: Kamuela, Hawaii
Joined CTAHR: 1970
Educational history: Education from HKU.
Current work: Farm Manager: Mealani, Hamakua, Lalamilo and Kona and general ag.