CTAHR Research News

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Mark Wright uses a hand lens to look at a new green leaf, infested with galls, on a Wiliwili tree on the UHM campus.

Over in Africa: the search for biocontrol for the Wiliwili

CTAHR hosting African scholarship winners

Grant opportunities abound

In this issue

From the Associate Dean and Associate Director for Research

C.Y. Hu
Associate Dean and Associate Director for Research

Visitors are not the only ones who are attracted to the abundance of the Hawaiian Islands. Many other non-human "tourists" are pouring into our state through increased air and sea traffic with the rest of world. Insects, weeds and other pathogens that have arrived and established themselves in Hawaii have been a major challenge to agriculture and natural environment. CTAHR has invested heavily in combating the "invasive species" for a long time, with many successes along the way. However, with increased importation of farm products and other materials more invasive species have and will continue to arrive, keeping our talented scientists busy. In this issue, we showcase a team of entomologists – Drs. Mark Wright, Russ Messing, and Dan Rubinoff of our Plant and Environmental Protection Sciences Department – who have been working on various approaches to control the gall wasps that have killed many native Wiliwili trees. This is just one of many projects CTAHR faculty are working on to help Hawaii maintain its natural beauty and for the continued growth of profitable crops by our local farmers.

CTAHR has a long history in the international agriculture arena. Dr. Goro Uehera's CRSP program is a good example of such work (see the September issue of *CRN*). Dr. Russ Yost – another soil scientist – has also conducted numerous projects overseas and has trained many scientists from developing countries, and introduces two fellows who have been working in his program for the last two years. More international activities will be introduced in future issues.

The College continues to make good progress in the grant/contract area, as indicated by the piece provided by Doug Vincent. However, he also points out these numbers are deceiving, as our individual grants are falling behind last year's totals. It is also important to note that for the first time, the U.S. Senate Appropriation's Committee has adopted new language that (initially) limits Special Research Grant funding to three years: thus we must provide significant performance data to justify additional funding beyond 3-years (if it is even allowed). This new language will have a serious impact on our special grant programs (such as T-STAR) and we are closely monitoring this situation and will keep you posted on this issue. This is another sign that we can no longer rely on special grants to support our research portfolio. We must all work together to increase our success in competitive grants to support our research needs, so please let me know how our office can help you in this area.

As usual, we round out the November issue of *CRN* with more grant opportunities and publications. Please continue to send your publications, ideas, and comments, as we are always looking for projects, individuals and teams to profile. *C.Y. Hu*

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Exploring Africa (and the world!) for biological solutions to invasives

By Mark G. Wright, Russell Messing and Dan Rubinoff
Entomologists, Plant and Environmental Protection Sciences (PEPS)

Dr. Russell Messing explains to viewers how biocontrol works on the T-STAR impact video:
http://www.ctahr.hawaii.edu/t-star/TSTARHilitePage.htm

The gall wasps attacking *Erythrina* (Wiliwili trees) in Hawaii have become infamous due to their sudden and dramatic effect on trees planted as wind breaks and landscaping, as well as on the native Wiliwili trees of Hawaii's endangered dry forests. The wasps (*Quadrastichus erythrinae*) lay their eggs into green tissues of the Wiliwili trees, and the wasp larvae that hatch cause gall formation: malformation of buds, leaves and flowers. The galling results in trees losing their leaves, not flowering and therefore not setting seed, in many cases. The effect on the endemic *Erythrina sandwiciensis* or Wiliwili – which occurs only in Hawaii – is also severe, and there are concerns that the trees will be unable to set seed and reproduce, threatening their survival. The gall wasps have invaded most other Pacific islands (Guam, American Samoa, Philippines, Taiwan) and have also been recorded in Asia (China, Thailand) and on many Indian Ocean islands. They are having significant effects on *Erythrina* trees throughout.

A serious concern is that the wasps may reach the continental US and then move into South America, a region with a high species richness of native *Erythrina* tree species, but evidently devoid of gall insects.

Current evidence suggests that the invasive gall wasps originated in Africa. The genus *Quadratsichus* is know to occur and cause galls on *Erythrina* species in South Africa, and has also been recorded from east and west African countries. The first record of *Q. erythrinae* as an invasive pest in an island system was from Mauritius, which is close to Madagascar and not far from the east coast of Africa.

Hybridized Wiliwili trees, used as a windbreak on the Mid Pacific Institute campus on Oahu, are a good illustration of the impact of the gall wasps.

What we are doing

Efforts being made to mitigate the effects of these invasive wasps include insecticidal control – injecting insecticides directly into the trees – and biological control – using natural enemies of the gall wasps. Insecticides provide only temporary and expensive relief from the problem, and while they may be somewhat useful in ornamental settings, the results so far have been mixed. Moreover, insecticide injections

Checking out trees for wasps on the fringe of the East London Harbor, South Africa. Could the containers in the background be one way these pests found their way to Hawaii?

An example of giant galls on an *Erythrina* leaf from Africa.

Quadrastichus eyrthinae female on galled leaf; photo M. Tremblay.

are not practical for use in stands of the trees in the wild. A sustainable and effective means of controlling the gall wasps may be available in the form of classical biological control: using natural enemies of the wasps to suppress the populations here. This option is being explored by a collaborative team comprising University of Hawaii CTAHR researchers (**Mark Wright**, **Dan Rubinoff**, **Russ Messing**, **Aime Bokonon-Ganta**) and Hawai'i Department of Agriculture (DOA) exploration and quarantine entomologists.

Knowing that Africa was the probable source of our invasive wasps was a good start - but where in Africa? It a huge continent, with many countries, not all easy to work in or to obtain scientific records from. We developed a plan of action. UH entomologists headed for South and West Africa to collect potential natural enemies and gall wasps for DNA analysis; Hawaii DOA's entomologist Mohsen Ramadan went to Tanzania for collections there, and UH collaborators in Kenya began sending us material from East Africa.

Why collect the gall insects from so many locations? We need to identify the precise region of origin for the invasive gall wasps. One of the most effective ways of doing this is to extract DNA from wasps from Hawaii and locations from which we think they came. Wasp DNA from all over is 'sequenced' to give us an exact idea of variation between wasps from different places. The sequence data are then analyzed to provide a "phylogeography" – a reconstruction of the pattern of relatedness among the wasps from various places. These patterns can greatly assist in identifying the geographic

Drs. Wright and Rubinoff collecting specimens in South Africa.

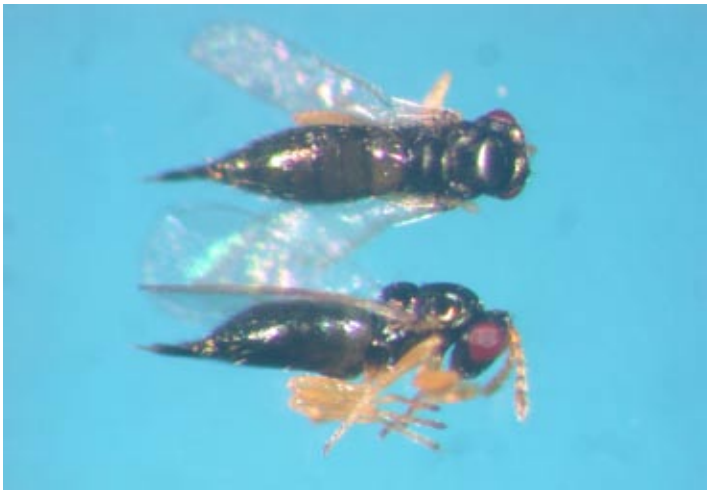
Dr. Russ Messing sucking insects into a collection bottle. Dr. Wright photographs the damaged plant.

origin of the wasps (or any insects) we are dealing with. Then we can make accurately targeted searches for the safest and most effective natural enemies (as potential biological control agents) in those places.

The Wiliwili situation is dire. Trees are dying all over the state and have not been able to produce leaves in over a year, so we started the process of seeking natural enemies while collecting gall wasps for DNA work on their region of origin. This has allowed us to get a number of species into quarantine at the DOA and to begin non-target screening on them, an important aspect of conducting biological control work.

There is concern that species introduced as biological control agents might attack indigenous species and cause their populations to decline. However, we can identify species of natural enemies that are host specific to the pest we want to control and that do not attack indigenous species in their natural habitat, thus reducing the risks of non-target impacts to negligible levels. We currently have a number of projects within CTAHR that address the issue of non-target risks, including the development and validation of probabilistic risk assessment procedures (funded by T-STAR), and an investigation into genetic and behavioral changes associated with a host shift by an introduced biological control agent (funded by USDA-NRI). The Wiliwili gall wasp project provides a contemporary problem that allows us to implement findings from other ongoing work, as well as previous work, on non-target effects.

CTAHR's Wiliwili gall wasp team addresses the spectrum of issues central to an effective biological control program. Russ Messing has extensive experience in classical biological control, and in measuring non-target impacts in the field. He conducted some of the groundbreaking studies on potential impacts of introduced fruit fly natural enemies in Hawaii on beneficial and indigenous species. Dan Rubinoff is a systematist with expertise in phylogeny reconstruction. He works on invasive and indigenous species, with the objective of better understanding our biodiversity, and ways to reduce impacts of invasive species and conserve indigenous species. Aime Bokonon-Ganta



Aprostocetus sp. in HDoA quarantine, a potential biocontrol agent. Photo W. Nagamine.

works on quarantine screening of biological control agents and biological control of fruit flies. Mark Wright develops non-target risk assessment procedures based on an understanding of the ecology of the species involved, and management of invasive insect species. Collaborators at the Hawai'i DOA – Moshsen Ramdan, Walter Nagamine and Julia Yalemar – conduct exploration work, quarantine insectary work and non-target screening, respectively. Another collaborator from the Bishop Museum, Azadeh Ghotaslou, contributes to non-target studies.

Where are we now?

Our exploration work so far has yielded a number of species of natural enemies from locations throughout south and east Africa that have potential to control the gall wasps. There are currently three species from Tanzania and Kenya in quarantine with the DOA. Because they are currently undescribed (new) species, we sent specimens of these parasites – and others collected from other regions – to taxonomic specialists in Australia and at the Smithsonian Institution. Once we have a better idea of the identity of these wasps, we will start to understand the diversity of species that were collected form the various regions. Practical considerations also play a major role in dictating our progress: the acute shortage of quarantine space in Hawaii is a serious limiting factor and the rules governing the practice of biological control in the state can be vexing.

The bigger picture

Biological control of invasive insect species has considerable value in Hawaii. The Hawaiian Islands are the world's 'invasive species' capital. We accrue many more invasive species than most other places on the planet, largely due to the volume of shipping traffic that moves through our ports and our benign climate. Invasive species pose risks to the natural environment and agriculture in Hawaii, and habitat loss and invasions are the most significant threat to indigenous species here. Hawaii has a long history of biological control, with more than 849 species introduced over the past 100 years. Some of these introductions have resulted in indigenous or beneficial (non-target) species being attacked by the purposefully introduced species. However, there is no record of any non-target shift having taken place on any species introduced since 1970, which shows that we have improved our ability to select benign biological control agents. Among the many useful introductions that have been made are biological control agents of whiteflies, fruit flies and a multitude of weeds. The biological control agents used in these programs are from all over the world, from locations as diverse as the sources of the pests. Effective biological control reduces the need for pesticide use and therefore has clear environmental and economic benefits. While we collect biological control agents form many foreign countries, we in turn provide many researchers in other countries with useful natural enemies of pests they are dealing with. The benefits of a good comprehensive biological control research program are thus far reaching.

Successful implementation of classical biological control for the Wiliwili gall wasp stands to make a similar contribution to the protection of our environment. This work has wider reaching implications as well, with a need for biological control agents of this wasp in Asia and numerous Pacific islands, and potentially in South America, if/when *Q. erythrinae* reaches there.

Our work on the Wiliwili gall wasp has also resulted in unprecedented collaboration among conservation organizations, the Hawaii DOA and University of Hawaii researchers. Historic institutional barriers are being broken down in the process and the long-term implications for future collaboration are significant.

Yost lab hosts two African scholars

Two College of Tropical Agriculture and Human Resources (CTAHR) Ph. D. candidates recently received Norman E. Borlaug fellowships to enhance their current research activities. The Borlaug fellowships, awarded on the basis of highest potential to become leaders in agriculture among current Ph.D. candidates in agriculture and related fields, derive from N.E. Borlaug, the first agriculturalist to be awarded the Nobel Prize for Peace.
– Russ Yost, Department of Tropical Plant and Soil Sciences.

Measuring the potential of soil carbon stock in West African soils

By Antonio Querido, graduate student

In 2000, all nations jointly set eight major goals called the "Millennium Development Goals" ("MDG") to be achieved by 2010-2015. In most West African nations, the MGD priorities focus on ending extreme poverty, hunger and environmental degradation. In this regard, soils are critical both in terms of food security and carbon dioxide removal from the atmosphere.

Carbon dioxide (CO_2) is mainly released from human activities, soil and plants and can contribute to global temperature increase. While plants can remove huge amounts CO_2 from the atmosphere, soils can store even larger quantities of carbon. By capturing and storing the CO_2, farmers can improve their soil and crop production. The MDG agreement also allows countries to trade carbon just like any other product. Carbon trading can encourage West African farmers to preserve crop residue and consequently preserve the environment. Notably, most nations have also agreed to take immediate measures to lower the amount of CO_2 annually released into atmosphere.

My research is part of a long-term regional effort under the Soil Management Collaborative Research Support Program (SM-CRSP) involving the National Research Institutions from Senegal, Mali, Gambia, the University of Hawaii, and Virginia Tech. The overall objectives are: (1) to develop a practical method to measure gains and losses of soil organic carbon over time and; (2) to apply these methods to determine the capacity of West African soils to store the carbon removed from the atmosphere. The fact that countries currently do not have an adequate procedure to measure the amount of carbon stored in the soil of a particular field or region is the main focus of our study.

Antonio Querido (right) explains his ideas of increasing and measuring carbon sequestration in soils as a way to reduce atmospheric C, reduce global warming, while improving crop productivity in West Africa. The other two persons are his colleague Isaurinda Baptista, soil scientist from Cabo Verde, and Kevin Brannan, hydrologist from Virginia Tech.

An algorithm to predict amounts of rock Phosphate needed to meet crop production requirements

By Aminata Sidibé-Diarra, graduate student

I am the recipient of the 2006-2007 Leadership Enhancement in Agriculture Program (LEAP) award, which is funded by USAID and honors the legacy of Dr. Norman E. Borlaug. Its purpose is to enhance the quality of thesis research of graduate students from developing countries who show strong promise as leaders in the field of agriculture and related disciplines. The LEAP award will support my travel to Mali for field work and to pursue collaborative work with other scientists which will complement and improve the quality of the overall efforts already made by SM-CRSP.

The inherent low soil fertility, particularly phosphorus (P) deficiency, has long been known as one of the limiting factors for plant growth in many regions of West Africa. Furthermore, the increased pressure on the land coupled with the unsustainable farming practices have resulted in severe land degradation and have reduced food production. Thus, the importance of increasing agricultural productivity to ensure food security for the fast growing population in West Africa becomes a priority as about two-thirds (2/3) of the population lives in rural areas and derives their main income from agriculture. This challenge can be attained only through agricultural intensification by restoring and improving soil fertility.

Aminata Sidibé-Diarra (right) prepares one of her field experiments in Senegal. This and a similar experiment in Mali will field-test her published algorithm that will predict the quantity of rock phosphate needed for sustainable growth of the subsistence crop millet. Richard Kablan (left) provides technical assistance.

The use of rock phosphate (RP) in agriculture is an interesting alternative for West African countries because:

- West African soils are generally deficient in phosphorus;
- Rock phosphate deposits are scattered throughout West Africa;
- Rock phosphate deposit are predominantly of sedimentary origin (more soluble than igneous rock phosphate); and
- The cost and the accessibility of soluble fertilizers constitute a great limitation to their extensive use.

In spite of the excellent potential of rock phosphate for agriculture, direct use of it in West Africa is very limited. Rock phosphate suitability as a phosphorus fertilizer is influenced by many factors such as soil properties; rock phosphate composition; solubility, plant, climate and management factors; and the ability to control available phosphorus from dissolved rock phosphate.

The overall goal of the Nutrient Management Decision Support System (NuMaSS) program funded by the United States Agency for International Development (USAID) is to increase agricultural productivity and to achieve food security through the development of decision aids for the management of soil fertility. My dissertation research – which is part of the NuMaSS project – is on the development of a natural rock phosphate algorithm to diagnose the suitability for the use of rock phosphate for a particular cropping system and soil and to predict the amounts needed to meet crop phosphorus requirements.

Both the NuMaSS program and the LEAP fellowship represent an enormous contribution to improve phosphorus fertility status and to increase crop yields in West African soils.

In the research calabash

By Doug Vincent
Special Program Director for Grants and Contracts

CTAHR Sustainable Bioenergy Strategic Initiative released, Letters of Intent due: December 8, 2006

CTAHR is seeking letters of intent for its Sustainable Bioenergy Strategic Initiative from multidisciplinary teams. While bioenergy and energy efficiency are important topics for Hawaii, there is a lack of understanding about how the development, growth and the social impacts of expanding Hawaii's bioenergy crop production will affect Hawaii's agriculture, its environment and the social structure of our rural communities. CTAHR is investing funds from state and federal sources to fund a single multidisciplinary project to address these important questions. Letters of intent are due by December 8, 2006. More information can be found here (http://www.ctahr.hawaii.edu/vincent/CTAHR_Sustainable_Bioenergy_Initiative.pdf). Contact Doug Vincent at 956-8157 or mailto:vincent@hawaii.edu if you have questions.

CRIS AD-421 Annual Progress Reports

Thanks to all of you who have submitted your annual progress or termination reports via the CRIS AD-421. They were due November 15, 2006. There are still a few reports that are outstanding, so if you've not done so, please complete the reports right away. Updated instructions can be found on-line. (http://www.ctahr.hawaii.edu/vincent/AD-421_Progress_Report_Instructions_FY2006.pdf)

T-STAR, Floriculture and ARS Cooperative Agreement Annual Progress Reports due soon

Written annual progress and impact reports are due for projects funded by USDA CSREES Tropical and Subtropical Agricultural Research (T-STAR) grants, the USDA CSREES Federal Floriculture Research Grant, and projects funded through USDA ARS Specific Cooperative Agreements (BBTV/CTV, Fruit Fly, Minor Crops, Papaya, Pineapple and Value Added, Post Harvest). Deadlines are as follows:

ARS Specific Cooperative Agreements
December 11, 2006
Federal Floriculture Research Grant
December 11, 2006
T-STAR
December 15, 2006

These progress reports are important. They are shared with stakeholders, form the basis of reports to our Congressional delegation (whose efforts are critical to the continuation of this funding), and help us decide whether these federal funds are being expended appropriately. CTAHR receives generous federal support through Congressionally-mandated programs. Besides doing great science, we have an important responsibility to those that invest in CTAHR – we must show impact and the return on this significant investment. Please make every effort to complete these reports. If you have questions, contact Doug Vincent or Lynnet Higuchi at 956-8157.

Requesting a No-Cost Extension for USDA CSREES funded projects

The legislation that authorizes USDA CSREES Special Research Grants (T-STAR, Floriculture, and Agricultural Diversification) puts a three (3)-year statutory limit on funds received under these grants. In the past, USDA CSREES would automatically grant three-year agreements. Current practice by USDA CSREES is to make awards for a single year, if the budget funds only a single year's worth of work. Delays in starting projects due to growing season, obtaining plots or the recruitment of personnel can make expending these funds in a single year difficult. This change in practice has caused great stress among recipients of this funding, those expecting a three year agreement and receiving a single year. The solution to this single year "humbug" is to request a No Cost Extension (NCE) for an additional year. The University of Hawaii at Manoa is a participant in the Federal Demonstration Project, which grants the University authority to grant NCE's without going back to the funding agency. The UH Office of Research Services is designated to make approvals of NCE's. To request a NCE, one must fill out the Prior Approval Form and submit it to ORS (http://www.hawaii.edu/ors/forms/priorapprove.pdf). The one page form requires the Principal Investor's and Fiscal Officer Signature before submission to ORS. If you have questions, contact the fiscal office.

CTAHR submits USDA Iraq Agricultural Extension Grant Proposal

Samir El-Swaify, NREM, reports that CTAHR, as the team leader, successfully submitted a grant proposal to the USDA CSREES IRAQ Agricultural Extension Revitalization Project. If funded, CTAHR will lead a consortium of U.S. land-grant universities (CTAHR, University of Florida, Iowa State University, Langston University, and Michigan State University). We propose to strengthen the agricultural extension capacity at five Iraqi universities (Universities of Baghdad, Basrah, Dohuk, Mosul and Tikrit). CTAHR already has experience, through its earlier USAID project, working with the Universities of Dohuk and Mosul. Thanks are in order for Samir's leadership and to Barry Brennan, Ali Fares, Halina Zaleski, Ekhlass Jarjees and Brian Turano for their efforts in pulling together this consortion.

Hu and Vincent meet with T-STAR colleagues in Florida

Associate Director for Research C.Y. Hu and Special Director Doug Vincent met with colleagues from the T-STAR Pacific and T-STAR Caribbean programs in Tampa, FL on October 31 and November 1, 2006. In addition to joint program and policy meetings, we visited the oldest (Range Cattle Research and Education Center, Ona, FL http://rcrec-ona.ifas.ufl.edu/) and the newest (Gulf Coast Research and Education Center, Balm, FL http://gcrec.ifas.ufl.edu/) centers in the University of Florida IFAS system.

The Caribbean Basin Administration Group

University of Florida	Dr. Bill Brown, Dr. John Neilson, Mr. Mark Trujillo
University of Puerto Rico	Dr. Vivien Carro, Dr. Hector Santiago
University of Virgin Islands	Dr. Jim Rakocy, Dr. Bob Godfrey
ARS Representative	Dr. Ricardo Goenaga, USDA ARS – Mayaguez, PR
SAAESD Executive Director	Dr. Eric Young

The Pacific Basin Administrative Group

University of Hawaii	Dr. C.Y. Hu, Dr. Doug Vincent
University of Guam	Dr. Greg Wiecko
ARS Representative	Dr. Dennis Gonsalves – USDA-ARS – PBARC
WAAESD Executive Director	Dr. Mike Harrington

From USDA CSREES Dr. Jim Green, National Program Leader, T-STAR.

Ona Range Cattle Center, Ona, FL.

Gulf Coast Research and Education Center, Balm, FL.

CTAHR's successful grant winners!

By Doug Vincent
Special Program Director for Grants and Contracts

The awards keep coming in! Since the last CRN and October 20, 2006, CTAHR has brought in another 8 awards for $2,376,474. Excellent! At first glance, for this fiscal year, CTAHR appears to be doing very well – 116 awards for $18,392,193. Into the fifth month of the fiscal year, we are well ahead of last year's pace. We have 10 more grants and contracts than at the same time last fiscal year and nearly $4 million more funds. But, I caution you, the $4 million dollar increase can be accounted for by three very large new grants -- $2,779,920 for the Flood Relief Grant; a $1,445,053 from the Office of National Drug Control Policy; and the CTAHR-Kurdistan grant for $1,246,647. If we subtract out these big grants, we are actually **behind last year's pace in funding**. We urge you to continue to seek additional support for your research, outreach or instructional endeavors.

If you are hesitant in seeking funding for your activities – please reconsider. The grants listed below exemplifies that CTAHR's strength is its diversity of expertise that we "bring to the table". We all bring different strengths and offer up a wide variety of skills, know-how and capabilities that are attractive to an array of funding agencies. To illustrate my point, below you see 8 grants, received in the past month – physical sciences, biological sciences, environmental sciences and social sciences – **all applied to better serve our stakeholders**. Grants have been received to fund water quality extension programs; to support the sensing and remediating pollutants in our soils; to provide capacity building training and techical assistance to grassroot community organizations. Different disciplines yet all supporting CTAHR's vision of diversifying our economy, sustaining our environment and strengthening our communities. These grant recipients show that. Please congratulate the latest recipients of our newest grants and contracts.

HC Skip Bittenbender (TPSS)
Determining Coffee Origins.
University of Hawaii Foundation. $1,500.

Gregory Burland (NREM)
Assessment and Monitoring of the Water Quality and Habitat Functions of Restored, Created, and Natural Wetlands of the Hawaiian Islands.
Environmental Protection Agency. $143,713.

Carl Evensen (NREM)
Water Quality Research and Extension Coordination in Hawaii.
University of Arizona. $123,959.

CY Hu (Admin)
Hawaii High Density Drug Trafficking Area (HIDTA) Core Program.
Office of National Drug Control Policy. $ 1,445,053.

Nguyen Hu (NREM)
Remediation of Arsenic in Hawaii Soils: Laboratory and Field Pilot Studies of Phytoremediation.
Hawaii Department of Health. $24,000.

Daniel Jenkins (MBBE)
Innovation of Detection Mechanisms for Dissolved Nitrogen and Biocarbonate in Agriculture and the Environment.
USDA CSREES. $73,081.

Mark Wright (PEPS)
Economic and Ecological Impacts and Management of Glassy-winged Sharpshooter in Hawaii.
USDA CSREES. $65,168.

Sylvia Yuen (CoF)
Compassion Capital - Hawaii Moving Forward.
Department of Health and Human Services. $500,000.

Lots of grant opportunities

By Doug Vincent
Special Program Director for Grants and Contracts

There are still lots of open grants and more open up every single day. For example, in the last three days on Grants.gov, four pages of new funding opportunities were released. Browsing Grants.gov can be an intimidating experience – there are so many agencies and so many funding opportunities. But Grants.gov (http://www.grants.gov/applicants/search_opportunities.jsp) provides several ways to search through federal funding opportunities – simple keyword searches (http://www.grants.gov/search/basic.doc); browsing according to category (http://www.grants.gov/search/category.doc) (e.g. Environment, Health, Agriculture) or by agency (http://www.grants.gov/search/agency.doc) (e.g. USDA, EPA, NIH); or doing an advanced search (http://www.grants.gov/search/advanced.doc). Grants.gov will also notify you by e-mail of new grant postings (http://www.grants.gov/applicants/email_subscription.jsp). Once you find an opportunity read through the RFA thoroughly, give yourself enough time to complete the application, and if you have questions, contact the program manager. There are many opportunities out there. Here are some new opportunities that fit into what we do in CTAHR. Good luck.

U.S. Department of Agriculture - CSREES
Assistive Technology Programs for Farmers with Disabilities – National and Regional AgrAbility Project, Smith-Lever 3B,3C, and 3D Program.
Deadline: December 1, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1061

U.S. Environmental Protection Agency
Activities that Advance Methane Recovery and Use as a Clean Energy Source
Deadline: December 4, 2006
http://www.epa.gov/oar/grants/06-08.pdf

U.S. Department of Health and Human Services
Administration for Children and Families
Matching Grant Program
Deadline: December 4, 2006
http://www.acf.hhs.gov/grants/open/HHS-2007-ACF-ORR-RV-0119.html

U.S. Environmental Protection Agency
Research to Develop, Adapt or Compare Technologies to Detect Live Viruses and other Enteric Pathogens in Large Volumes of Water.
Deadline: December 5, 2006
http://www.epa.gov/nerl/opportunities/RFA-EPA-ORD-06-26210.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. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Biology (C): Biochemistry
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1115

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Biology (D): Growth and Development
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1116

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Genome (D): Applied Plant Genomics (CAP)
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1604

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Biology of Weedy and Invaisve Species in Agroecosystems
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1123

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Soil Processes
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1605

U.S. Department of Agriculture
CSREES – Children, Youth and Families at Risk (CYFAR)
Sustainable Community Projects
Deadline: December 8, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1501

U.S. Department of Agriculture
CSREES – National Integrated Food Safety Initiative
Minimizing Microbial Food Safety Hazards of Fresh and Fresh-Cut Fruits and Vegetables
Letter of Intent Due: December 8, 2006
Proposal Deadline: January 12, 2007
http://www.csrees.usda.gov/funding/rfas/pdfs/07_food_safety.pdf

U.S. Department of Agriculture
CSREES – Regional Integrated Pest Management Western Region
Deadline: December 11, 2006
http://www.csrees.usda.gov/funding/rfas/pdfs/07_ipm_western.pdf

National Science Foundation
East Asia and Pacific Summer Institutes for U.S. Graduate Students
Deadline: December 12, 2006
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf06602

U.S. Environmental Protection Agency
Uncertainty Analyses of Models in Integrated Environmental Assessments
Deadline: December 13, 2006
http://es.epa.gov/ncer/rfa/2006/2006_star_uncertainty.html

U.S. Department of Energy – Golden Field Office
Solar America Initiative Market Transformation: State and Utility Solar Technical Outreach
Deadline: December 13, 2006
https://e-center.doe.gov/iips/faopor.nsf/UNID/9E16B7D0CA68443D85257204004CB2AE?OpenDocument

U.S. Department of Justice
Bureau of Justice Assistance
Gang Resistance Education and Training (G.R.E.A.T.) Program
Deadline: December 14, 2006
http://www.ojp.usdoj.gov/BJA/grant/07GREATsol.pdf

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Food Safety – Epidemiological Approaches
Deadline: December 14, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1088

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Food Safety
Deadline: December 14, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1087

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Managed Ecosystems
Letter of Intent Due: October 5, 2006
Proposal Deadline: December 14, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1104

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Microbial Biology (B): Biology of Plant-Microbe Associations
Deadline: December 14, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1500

U.S. Environmental Protection Agency
Development of Environmental Health Outcome Indicators
Deadline: December 14, 2006
http://es.epa.gov/ncer/rfa/2006/2006_star_ephi.html

U.S. Department of Agriculture
CSREES – Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers Competitive Grants Program
Deadline: December 15, 2006
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1113

Environmental Law Institute
National Wetlands Awards
Deadline: December 15, 2006
http://www2.eli.org/pdf/nwa/2007_nwa_nomination_form.pdf

Organic Farming Research Foundation
Requests for Proposals
Deadline: December 15, 2006
http://www.ofrf.org/research/application.html

Centers for Disease Control and Prevention
Research for Preventing Violence and Violence-Related Injury
Deadline: December 15, 2006
http://www.cdc.gov/od/pgo/funding/CE07-010.htm

U.S. Department of Agriculture
CSREES – Special Research Grants Program – Potato Research
Deadline: December 20, 2006
http://www.csrees.usda.gov/funding/rfas/pdfs/07_potato.pdf

U.S. Environmental Protection Agency
4th Annual P3 Awards: A National Student Design Competition for Sustainabilty Focusing on People, Prosperity and Planet.
Deadline: December 21, 2006
http://es.epa.gov/ncer/rfa/2007/2007_p3_4thannual.html

U.S. Environmental Protection Agency
Integrated Assessment of Multiple Greenhouse Gases, Climate Impacts and Pollution
Deadline: December 22, 2006
http://www.epa.gov/oar/grants/06-10.pdf

U.S. Department of Agriculture
Rural Development Program – Solid Waste Management Grant Program
Deadline: December 31, 2006
http://www.usda.gov/rus/water/SWMG.htm

U.S. Department of Agriculture
Rural Development Program – Technical Assistant and Training Grant
Water and Waste Disposal
Deadline: December 31, 2006
http://www.usda.gov/rus/water/tatg.htm

Hawaii Community Foundation
Victoria S. and Bradley L. Geist Foundation
Supporting Foster Children and Parents
Deadlines: January 2, 2007, May 1, 2007, September 3, 2007
http://hawaiicommunityfoundation.org/doc_bin/grant_rfps/RFP-geistfcp07final.doc

U.S. Department of Energy – Golden Field Office
Development of Robust, Highly Efficient Fermentative Organisms for the Conversion of Lignocellulosic Biomass to Ethanol
(Note: RFP requests a Letter of Intent but LOI is not required)
Deadline: January 4, 2007
https://e-center.doe.gov/iips/faopor.nsf/UNID/13949F628D2B2DB68525720C00706F4E?OpenDocument

U.S. Department of Agriculture
CSREES – Secondary and Two-Year Postsecondary Agriculture Education Challenge Grants
Deadline: January 11, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1083

U.S. Department of Agriculture
CSREES – National Integrated Food Safety Initiative
Proposal Deadline: January 12, 2007
http://www.csrees.usda.gov/funding/rfas/pdfs/07_food_safety.pdf

U.S. Environmental Protection Agency
Pesticide Environmental Stewardship Program (PESP) Regional Grants
Deadline: January 12, 2007
http://www.epa.gov/PESP/regional_grants/2007announcement.htm

U.S. Department of Health and Human Services
National Institute of Environmental Health Sciences
Innovative Approaches to Remediation of Recalcitrant Hazardous Substances in Sediments (R01)
Deadline: January 12, 2007
http://grants.nih.gov/grants/guide/rfa-files/RFA-ES-06-006.html

U.S. Environmental Protection Agency
Targeted Grants to Reduce Childhood Lead Poisoning: Request for Proposals 2006
Deadline: January 12, 2007
http://www.epa.gov/lead/pubs/nofa2006.pdf

Binational Agricultural Research and Development (BARD) Fund
Vaadia-BARD Postdoctoral Fellowships
Deadline: January 15, 2007
http://www.bard-isus.com/postguide_07.pdf

Binational Agricultural Resesearch and Development (BARD) Fund
Senior Research Fellowship
Deadline: January 15, 2007
http://www.bard-isus.com/ResFellguide_07.pdf

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Water and Watersheds
Deadline: January 17, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1135

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Arthropod and Nematode Bilogy and Management (A): Organismal and Population Biology.
Deadline: January 17, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1103

U.S. Department of Health and Human Services
National Institute of Environmental Health and Safety
Letter of Intent Due: January 21, 2007
Proposal Deadline: March 22, 2007
http://grants.nih.gov/grants/guide/rfa-files/RFA-ES-06-003.html

U.S. Department of Justice – National Institute of Justice
NIJ FY07 Intimate Partner Violence and Stalking: Research for Policy and Practice
Deadline: January 23, 2007
http://www.ncjrs.gov/pdffiles1/nij/sl000774.pdf

National Science Foundation
Major Research Instrumentation Program (needs to come from the institution)
Deadline: January 25, 2007
http://www.grants.gov/search/search.do?oppId=11296&mode=VIEW

U.S. Department of Energy – Chicago Service Center
Office of Biological and Environmental Research
Scientific Discovery through Advanced Computing: Climate Change Prediction Program
Deadline: January 25, 2007
https://e-center.doe.gov/iips/faopor.nsf/UNID/D0793A0892724C0B8525720D0042D18A?OpenDocument

National Fish and Wildlife Foundation
Coral Reef Conservation Fund
Preproposals Due: January 31, 2007
http://www.nfwf.org/programs/coral.cfm

U.S. Department of Health and Human Services
Substance Abuse and Mental Health Services Administration (SAMHSA)
Statewide Family Network Grants
Deadline: January 31, 2007
http://www.samhsa.gov/Grants/2007/sm_07_001.aspx

U.S. Department of Health and Human Services
Substance Abuse and Mental Health Services Administration (SAMHSA)
Statewide Consumer Network Grants
Deadline: February 1, 2007
http://www.samhsa.gov/Grants/2007/sm_07_002.aspx

U.S. Department of Agriculture
CSREES – Higher Education Challenge Grants
Deadline: February 1, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1082

National Aeronautics and Space Administration
ROSES2006: Ocean Biology and Biogeochemistry
Deadline: February 1, 2007
http://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={307FF8D5-59A9-E2E0-0637-6ED8AB166C4F}&path=open

U.S. Department of Agriculture
Agricultural Marketing Services
Federal-State Marketing Improvement Program
Deadline: February 12, 2007
http://www.ams.usda.gov/tmd/fsmip.htm

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Genome
Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1604

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Agricultural Prosperity for Small and Medium-Sized Farm
Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1200

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Biology (C): Biochemistry
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1115

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Biology (D): Growth and Development
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1116

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Genome (D): Applied Plant Genomics (CAP)
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1604

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Biology of Weedy and Invaisve Species in Agroecosystems
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1123

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Soil Processes
Letter of Intent Due: December 6, 2006
Proposal Deadline: February 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1605

National Science Foundation
Environmental Engineering
Deadlines: March 1, 2007, September 15, 2007
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501029

National Science Foundation
Environmental Sustainability
Deadlines: March 1, 2007, September 15, 2007
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501027

National Science Foundation
Environmental Technology
Deadlines: March 1, 2007, September 15, 2007
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501030

National Science Foundation
Energy for Sustainability
Deadlines: March 1, 2007, September 15, 2007
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501026

National Science Foundation
Biotechnology (BTEC)
Deadlines: March 1, 2007, September 15, 2007
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501029

U.S. Department of Energy – Chicago Service Center
Office of Biological and Environmental Research
New Analytical and Imaging Technologies for Lignocellulosic Material Degradation, for Multiplexed Screening of Plant Phenotypes.
Deadline: March 6, 2007
https://e-center.doe.gov/iips/faopor.nsf/UNID/E569DBDE47BE80FF85257229006E3FC9?OpenDocument

U.S. Department of Energy – Chicago Service Center
Office of Biological and Environmental Research
Quantitative Microbial Biochemistry and Metabolic Engineering for Biological Hydrogen Production
Deadline: March 8, 2007
https://e-center.doe.gov/iips/faopor.nsf/UNID/D390B42A791A6F4585257229006EE9EF?OpenDocument

U.S. Department of Health and Human Services
National Institute of Environmental Health and Safety
Superfund Basic Research and Training Program (P42)
Letter of Intent Due: January 21, 2007
Proposal Deadline: March 22, 2007
http://grants.nih.gov/grants/guide/rfa-files/RFA-ES-06-003.html

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Microbial Genomics (B): Functional Genomics of Microorganisms
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1091

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Arthropod and Nematode Biology and Management (B) and (C): Suborganismic Biology and Tools, Resources and Genomics
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1602

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Agricultural Markets and Trade
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1106

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Animal Growth and Nutrient Utilization
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1067

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Animal Genome
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1066

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Air Quality
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1062

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Human Nutrition and Obesity
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1095

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Plant Biosecurity
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1521

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Agricultural Markets and Trade
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1106

U.S. Department of Defense
United States Army Medical Research & Materiel Command
Broad Agency Announcement
Deadline: September 30, 2007
http://www.usamraa.army.mil/pages/index.cfm

U.S. Department of Defense
National Biodefense Analysis and Countermeasures Center
Broad Agency Announcement
Deadline: September 30, 2007
http://www.usamraa.army.mil/pages/index.cfm

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Arthropod and Nematode Bilogy and Management (B) and (C): Suborganismal Biology and Tools, Resources and Genomics.
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1602

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Animal Genome
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1066

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Animal Growth and Nutrient Utilization
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1067

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Air Quality
Deadline: June 5, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1062

U.S. Department of Agriculture
CSREES – National Research Initiative-Competitive Grants Program
Animal Protection and Biosecurity (C): Animal Biosecurity Coordinated Agricultural Products (CAP)
Deadline: August 14, 2007
http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1522

U.S. Department of Agriculture
Agricultural Marketing Service
Specialty Crop Block Grant Program
Deadline: October 11, 2007
http://www.ams.usda.gov/fv/scbgp.html

Getting the word out on CTAHR science

Winston Su (MBBE)

Peckham, G. D., Bugos, R.C., Su, W.W. 2006. Purification of GFP fusion proteins from transgenic plant cell cultures. *Protein Expr. Purif.* 49, 183-189.

Su, W.W. 2006. Bioreactor engineering for recombinant protein production using plant cell suspension culture. In: Dutta Gupta, S. and Ibaraki, Y. (eds.) *Plant Tissue Culture Engineering*. Springer, Berlin; pp. 135-159.

Su, W.W. and Lee, K.T. 2006. Plant cell and hairy-root cultures - process characteristics, products, and applications. In: Yang, S.T. (ed.) *Bioprocessing for Value-Added Products from Renewable Resources: New Technologies and Applications*, Elsevier, New York; pp. 263-292.

Mark Thorne (HNFAS)

Cox, L.J., Q.A. Edwards, M.S.Thorne, G.K. Fukumoto, and L.Y.T. Ching. 2006. Commercial cow-calf management decisions: Calculating your cost of production with Calf-XL 2006. University of Hawaii at Manoa, *CTAHR – LM-12*. pp.21.

Gardner, D.R., M.S. Thorne, R.J. Molyneux, J.A. Pfister, and A.A. Seawright. 2006. Pyrrolizidine alkaloids in *Senecio madagascariensis* from Australia and Hawaii and assessment of possible livestock poisoning. *Biochemical Systematics and Ecology* 34:736-744.

Mattos, J., and M.S. Thorne. 2006. Slaughter and Market Issues at the Andrade Slaughterhouse. pp 11-12. In: Thorne, M.S. and L.J. Cox (eds.), Proceedings: 2006 Mealani Forage Field Day: Hawaii Grown Beef: From Pasture to Market. *University of Hawaii at Manoa, CTAHR Publication*, pp.53.

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Jinzeng Yang (HNFAS)

Cesar J., Zhao B, Malecha S., Ako H., Yang J. 2006. Morphological and biochemical changes in the muscle of the marine shrimp *litopenaeus vannamei* during the molt cycle. *Aquaculture* 261: 688-964.

Cesar J. and Yang J. 2006. Expression patterns of ubiquitin, heat shock protein 70, alpha-actin and -actin over the molt cycle in the abdominal muscle of marine shrimp *Litopenaeus vannamei*. *Mol Reprod Dev*. 73, Epub ahead of print.

Yang J., DuPonte M., Fukumoto G., Ferreira R. 2006. Growth Performances of Angus Plus Calves Grazing on Pasture in Hawaii Subtropical Climates. *Journal of Animal Science* 84 (suppl. 1): 421.