CTAHR Research News

May-June 2009
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Dulal Borthakur shows the *Arabidopsis thaliana* plants expressing a *Rhizobium* ACC deaminase gene.

Symbiotic nitrogen fixation

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In this issue

From the Associate Dean and Associate Director for Research

In prior years, the *CRN* May-June issue usually came out at the beginning of summer. We delayed the release of the May-June issue this year, however, hoping that we could include more information on the budget and possible furloughs. Unfortunately, we still have no additional news for you at this time. What is certain now is that UHM will take a $30 million cut, and that amounts to an 8% budget reduction. The Dean is making every effort to save every single position in CTAHR. We will need to wait for the President's directive on furloughs and the Chancellor's plan on how much to pass down to individual colleges before making any final decisions. The *CRN* will return in early August to provide the latest developments on these issues.

With the appointment of Dr. M.R.C. Greenwood as the new president of the UH, the Board of Regents has done its duty to ensure a smooth transition at the top leadership position. Dr. Greenwood is a nutritionist by training and has established her research career in obesity research, an area covered by our HNFAS and MBBE departments. We welcome her appointment and her engagement with our programs. Dr. Reed Dasenbrock arrived in early April to assume the Vice Chancellor for Academic Affairs position. UH Manoa is now able to move forward with our chief academic officer in place. His leadership is needed for dealing with the current budget reduction and campus program realignments.

Dr. Douglas Vincent will be returning to HNFAS to serve as Department Chair on July 1. Dr. Vincent has served effectively as the Special Director of Contracts and Grants for almost seven years. He has worked tirelessly to assist our faculty with grants and contracts, and has managed our special grant portfolio. He is also a major contributor to *CRN*. We will miss his presence in Gilmore Hall. Doug will take over the helm from Dr. James Carpenter at HNFAS. We owe Jim a big Mahalo for his leadership moving HNFAS forward during these trying times! Dr. Carpenter will be retiring this December as he needs some time to graduate his current graduate students and complete his research projects. We will soon begin an internal search for a new director.

In this month's *CRN* we are pleased to feature Dr. Dulal Borthakur of the Molecular Biosciences and Bioengineering department. Dr. Borthakur is a molecular biologist by training, with particular interest in nitrogen fixation in tree species. Plants with nitrogen fixation ability can reduce the amount of fertilizer needed for normal growth. Dr. Borthakur's work on Koa, an important tree for the Native Hawaiians and their culture, is an excellent example of how modern science can benefit the survival of a local tree species. Dulal and his students are also working on another important species: Leucaena. Our faculty are continuing to test the best way to use Leucaena as cattle feed for beef production. Dr. Borthakur is not only a productive researcher, but is also a caring mentor who always has the students' best interest in mind. He has also been a major contributor to our Research Symposium each year. We are so fortunate to have Dulal in our CTAHR ohana!

Enjoy your summer vacations, and we will see you here in August.

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

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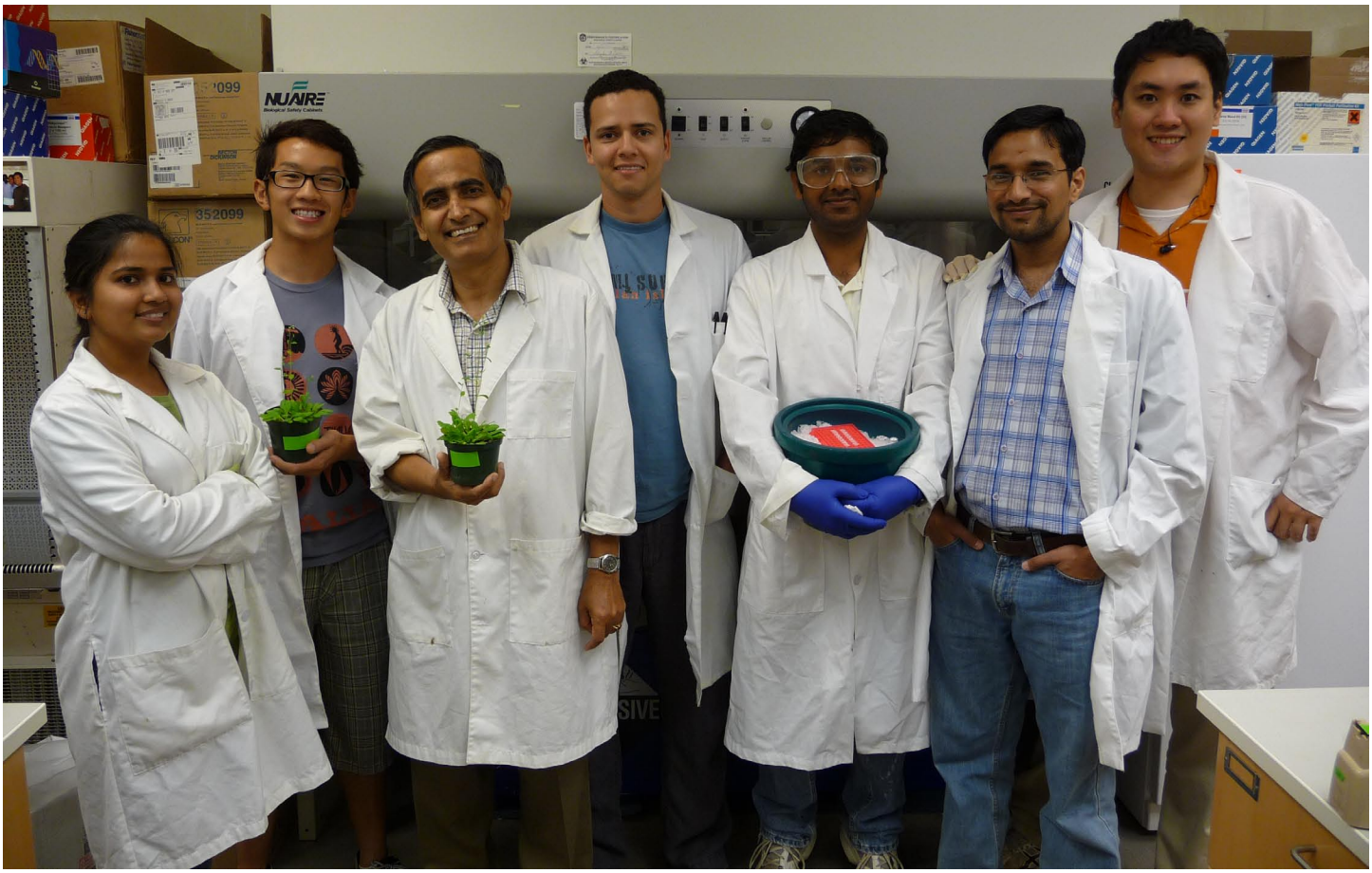
Enhancing productivity of tree legumes in Hawaii through symbiotic nitrogen fixation

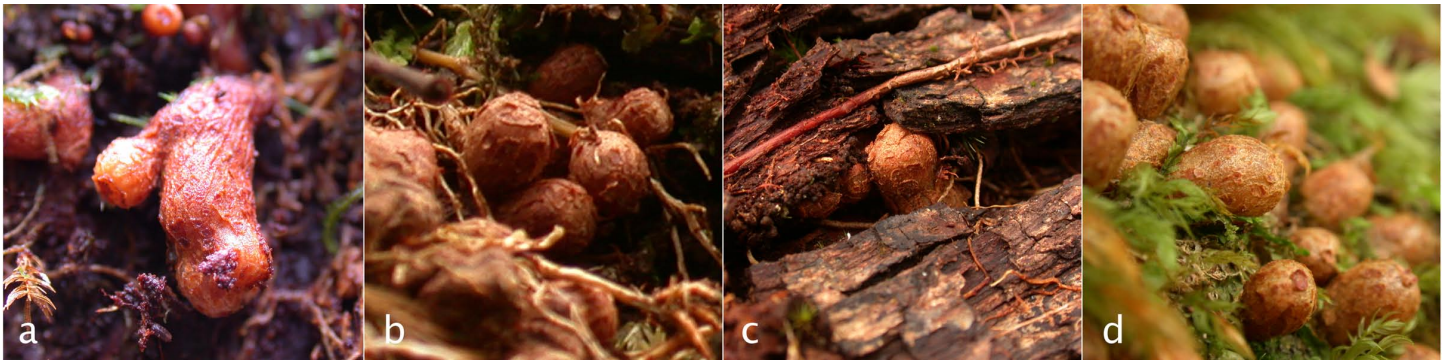
By Dulal Borthakur, Professor
Department of Molecular Biosciences and Bioengineering



L-R. Archana Pal (India), Robert Thach (The Netherlands), Dulal Borthakur (India), Sandro Jube (Brazil), Ratnesh Singh (India), Vishal Negi (India), Richard Liao (USA),

Trees are essential components of the forest ecosystems in Hawaii. Trees such *Acacia koa* (koa) is a source of valuable timber that is important for Hawaii's economy. In recent years koa has been grown as a plantation tree to regenerate koa forests in several degraded pasturelands in Hawaii. Koa is a nitrogen-fixing tree-legume that converts atmospheric nitrogen into ammonia in root nodules formed by symbiotic bacteria called *Bradyrhizobium*. Only some bradyrhizobia that are specific for koa can effectively nodulate and efficiently fix nitrogen. For enhancing productivity of koa, it is essential that we select those koa-specific bradyrhizobia and apply them as inoculants at the time of planting koa seedlings in new locations. We have collected nodules from koa trees from the major Hawaiian Islands and isolated bradyrhizobia from these nodules. Molecular characterization of these strains showed that there is a large diversity among these isolates.

During our search for nodules from koa trees, we discovered a unique phenomenon which we termed, 'canopy nodulation'. We observed that mature koa trees formed nodules in the adventitious root systems established within the canopy. Canopy nodulation can be profuse, with high nodule density in a localized area. On one tree, for example, we recorded over 550 nodules within a two square foot area. The canopy nodules of koa are indeterminate, with most nodules measuring 5-10 mm in length, 2-4 mm in diameter, and with 1-2 meristematic apices. We observed nodule sections under bright field microscopy and found that the morphological and anatomical features of the



Canopy nodules of *Acacia koa*. The nodules shown above are 3 – 5 mm in diameter. (a) One branched canopy nodule which is attached to an adventitious root; (b) a section of the canopy pocket rhizosphere with a nodule cluster; (c) a koa nurse log on the forest floor containing apogeotropic nodules originating from the roots of an adjacent koa; and (d) high-density nodulation within a bryophyte mat on a terrestrial slope. Photos: courtesy of James Leary.

canopy nodules were indistinguishable from those of healthy and effective terrestrial nodules. Our research has established that koa is unique among tree legumes for its ability to form nitrogen-fixing nodules on both adventitious and terrestrial roots, and it requires a specific group of *Bradyrhizobium* for nodulation and nitrogen fixation.

Koa is a tetraploid species with the cytological characteristics of an allo-tetraploid and a disomic model of inheritance. Because of its outcrossing breeding system, koa populations are highly heterogeneous. Future improvements in koa productivity will depend upon successful selection and maintenance of superior mother trees for seed collection and nursery production. Development of suitable genetic markers for selection of superior attributes at the seedling stage is also required for koa improvement. We recently developed 31 microsatellite markers for koa and applied them for accessing genetic diversity in koa populations in the islands of Kauai, Oahu, Maui and Hawaii. Our results show that the oldest of the four islands, Kauai, had the most diverse populations of koa. Our data revealed that koa from Kauai formed a clear distinct group from those of the neighboring islands of Oahu, Maui and Hawaii. Cluster analyses partitioned the koa populations into three distinct clusters; *A. koa, A. koaia*, and a third, termed as 'the variant'. They are found mostly on the island of Kauai with intermediate characteristics of *A. koa* and *A. koaia*. 'The variant' populations had the highest genetic diversity and total number of unique alleles. No correlation was observed between geographic distance and genetic distance. The microsatellite markers developed in this study will be useful in future koa breeding and improvement programs.

Trunk of a big koa tree in Humuula on the island of Hawaii. Photo: courtesy of Daniel Adamski.

Improving Leucaena

We are also conducting research to enhance productivity of another tree legume *Leucaena leucocephala* (leucaena) through symbiotic nitrogen fixation. Leucaena foliage is used as a protein-rich fodder for cattle in many tropical and subtropical countries. In recent years, with the development of many high-yielding leucaena varieties for growing in different soil and climatic conditions by Dr. James Brewbaker at the

One trasngenic *Arabidopsis thaliana* plant expressing an ACC deaminase gene from Sinorhizobium BL3 (right). An untransformed wild-type plant is shown on the left.

University of Hawaii, leucaena has become an important fast-growing tree for rapid reforestation. Leucaena forms nitrogen-fixing root nodules in symbiosis with a bacterium called *Rhizobium*. We discovered a unique phenomenon in the leucaena-*Rhizobium* symbiosis. Leucaena can be effectively nodulated by only some *Rhizobium* strains that contain genes for degradation of mimosine, which is a toxin present in leucaena. In the past few years, we have isolated and characterized the genes for mimosine degradation by *Rhizobium* strain TAL1145. Mimosine degradation by *Rhizobium* involves two major steps. First, mimosine is degraded to 3-hydroxy-4-pyridone (HP) by enzymes encoded by the *mid* genes. HP is then converted into ammonia, pyruvate and formate by enzymes encoded by the *pyd* genes. At least 13 genes are necessary for mimosine degradation in *Rhizobium* TAL1145.

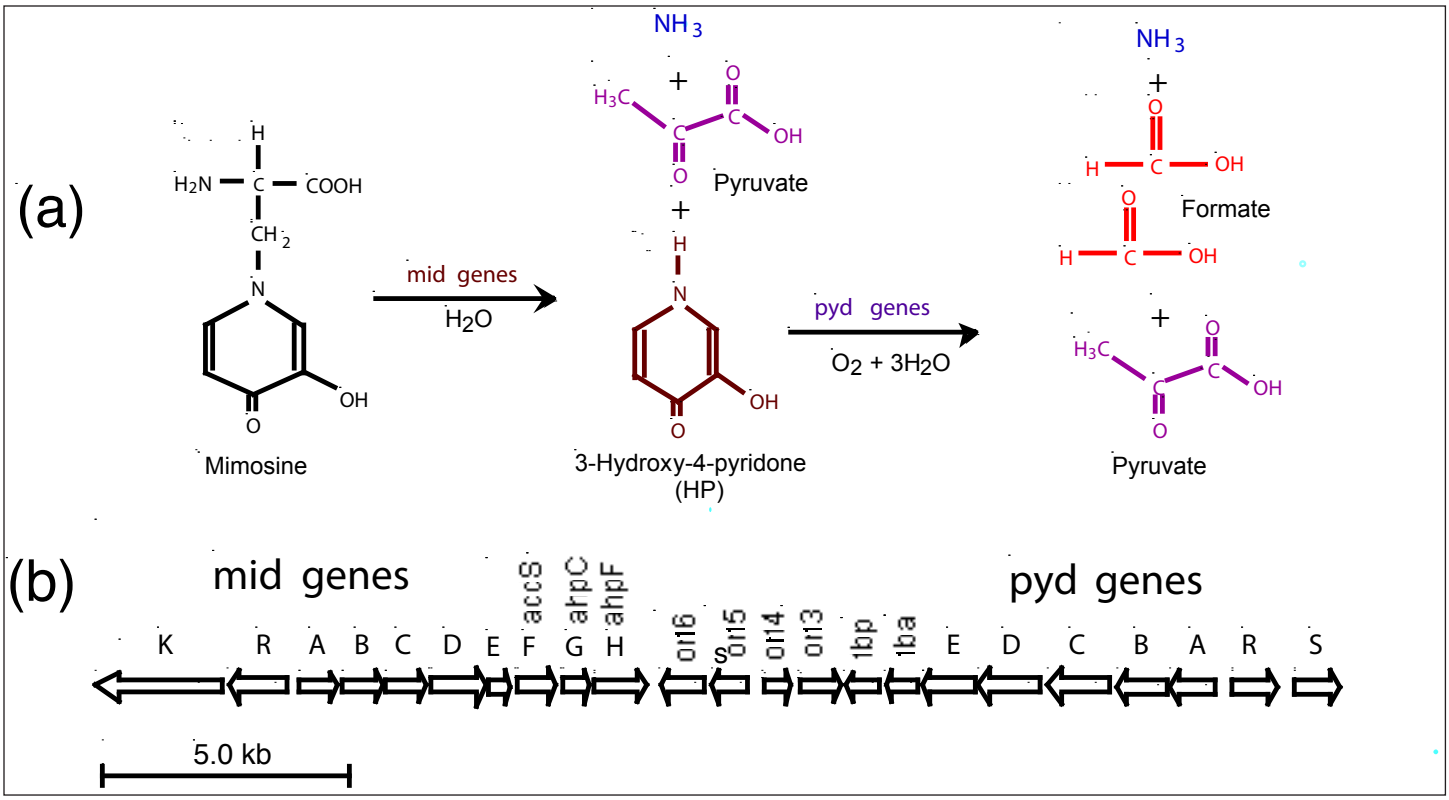
During characterization of genes for mimosine degradation from *Rhizbium* TAL1145 by sequencing, we serendipitously identified the *acdS* gene for ACC deaminase within the *mid* gene cluster. We have also cloned the *acdS* gene from a *Sinorhizobium* strain, BL3. Since ACC is a precursor in ethylene biosynthesis, higher ACC deaminase activity in *Rhizobium* may reduce ethylene biosynthesis in the nodule, which may affect nodule senescence and root growth. Derivatives of *Rhizobium* TAL1145 carrying multiple copies of the *acdS* genes from TAL1145 and BL3 were used to inoculate leucaena seedlings. After sixteen weeks, plants were harvested for data collection. Multiple copies of the native- and BL3-*acdS* genes in TAL1145 resulted in significant increases in the numbers and dry weights of nodules compared to plants inoculated with wild-type strain or its AcdS$^-$ mutant. The multiple copies of these genes in TAL1145 also resulted in higher root dry weights of leucaena compared to those inoculated with the wild-type strain or its AcdS$^-$ mutant. These results indicate that increasing expression of the *acdS* gene in the symbiont can promote nodule development and root growth in leucaena.

Ethylene is a plant hormone that induces ripening in fruits and senescence in leaves, and inhibits elongation of roots. Therefore, it is likely that by reducing ethylene biosynthesis in plants, we may be able to enhance plant growth. In an effort to increase crop productivity, we are applying transgenic method to reduce ethylene production by plants. We have transferred the *acdS* gene from *Sinorhizobium* BL3 into *Arabidopsis thaliana*. Two of the transgenic plants expressing the BL3-*acdS* gene had a vigorous plant type, which was much bigger than the non-transformed plants. It may be possible to enhance growth and productivity of leucaena by developing transgenic plants expression the BL3-*acdS* gene.

Leucaena has no known diseases and is highly tolerant to drought. We are now isolating genes for disease and stress tolerance from leucaena. In an effort to develop mimosine-free leucaena, we have recently developed a genetic transformation protocol for leucaena. We have successfully used immature embryos from leucaena to develop transgenic leucaena plants expressing a gene for herbicide resistance and β-glucuronidase.

Isolation of novel unique genes by interspecies DNA subtraction

PhD student Vishal Negi has been working on isolating novel genes from leucaena, which remains as an unexplored tree-legume for isolation of genes. Leucaena can grow and survive in harsh environmental conditions such as high temperature and drought and it is highly resistant to diseases. Therefore, it is hypothesized that it contains some unique genes that are not present in other trees that are normally susceptible to many diseases. To isolate such genes, Vishal developed a new method which he termed, 'Interspecies DNA subtraction'. He

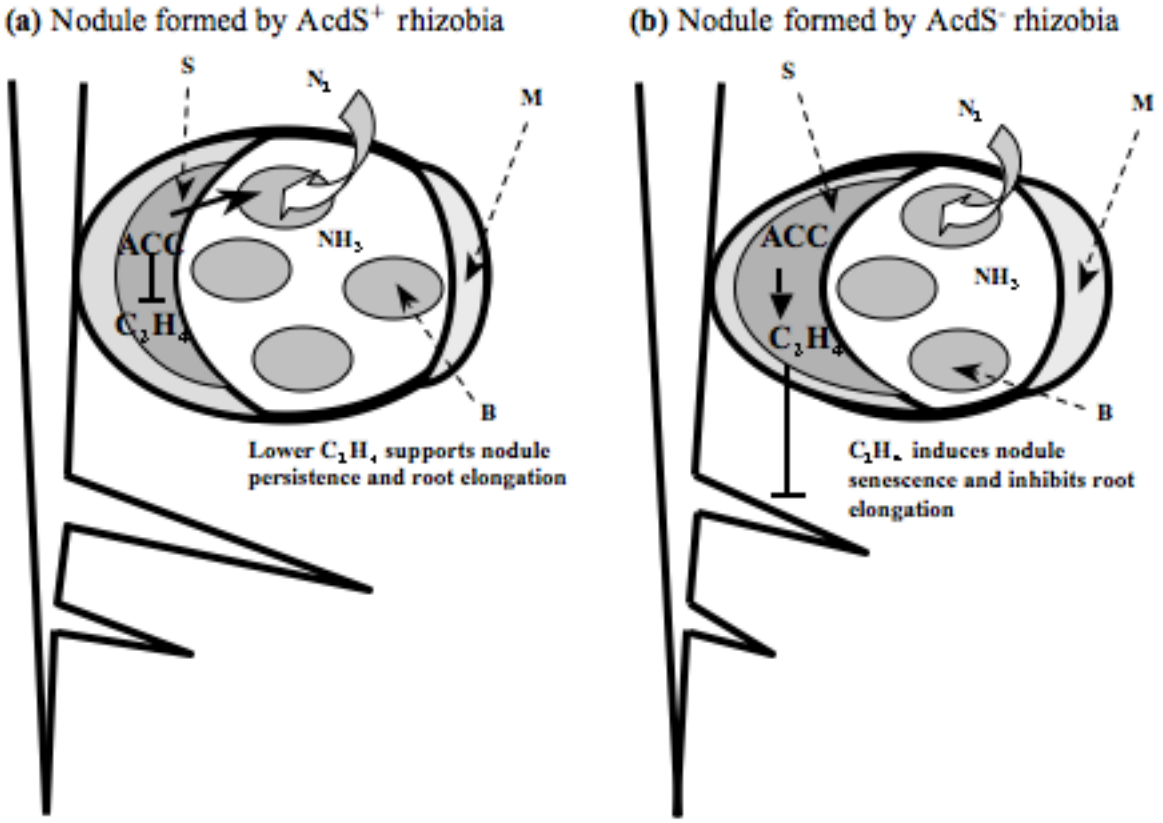


(a) Mimosine degradation by *Rhizobium* involves two major steps. (b) The enzymes for degradation of mimosine are encoded by *mid* and *pyd* genes located within a 25-kb region of the TAL1145 chromosome.

used DNA of another tree-legume, *Acacia confusa* (acacia), to subtract leucaena DNA. The new method is as follows.

The genes that normally express in the foliage of leucaena and acacia were converted into complementary DNA (cDNA). For an organism that has a nucleus in the cell, such as plants, genes are normally isolated as cDNA. The cDNA made from leucaena and acacia were cleaved into small pieces using restriction enzymes. Then through a process called subtractive hybridization, the small cDNA fragments of acacia were subtracted from the cDNA fragments of leucaena. The process was repeated three times to remove nearly all cDNA that were common in both species. At the end of subtraction, it was expected that the cDNA fragments that were unique for leucaena but were absent in acacia would remain. These fragments were cloned and sequenced. By analyzing the sequence of several hundred cDNA fragments, Vishal identified many unique cDNA fragments that were absent in acacia. He also found some cDNA that expressed highly in leucaena but at low levels in acacia. He then looked for the complete cDNA sequence for some of these fragments. He extended the DNA sequence of these fragments in both directions through a method called RACE. Leucaena is unique among tree legumes that it produces mimosine. Interestingly, two of the genes that Vishal found from leucaena are related to mimosine biosynthesis and degradation.

Another PhD student, Ratnesh Singh, is also currently working on characterizing some of the unique cDNA fragments from Vishal's work. Ratnesh has been successful in obtaining the full-length cDNA for six of these unique fragments. Richard Liao and Archana Pal, who joined recently my lab as graduate students, also started characterizing some of the unique cDNA fragments that Vishal isolated from leucaena through interspecies DNA subtraction. Two of these DNA fragments appear to encode genes for chitinase, the enzyme that degrades cell walls of fungal pathogens. It is expected that these genes will provide resistance to fungal pathogens when expressed in any plant species. To test this idea, Richard is planning to express these cDNAs in transgenic *Arabidopsis* plants. Archana is also working for developing transgenic leucaena that express some of the stress-related genes. Introduction of these stress-related genes into susceptible crops may



Schematic representation of leucaena nodules formed by (a) rhizobia having ACC deaminase activity (AcdS$^+$) and (b) rhizobia without ACC deaminase activity (AcdS$^-$). It highlights the possible effects of increased ACC deaminase activities on nodule senescence. Our results show that leucaena nodules formed by AcdS$^+$ rhizobia were larger than those formed by AcdS$^-$ rhizobia. AcdS$^+$ rhizobia also produced increased root weight in leucaena. Ethylene production in nodules formed by AcdS$^+$ rhizobia may be reduced due to ACC deaminase activities. As a result, AcdS$^+$ rhizobia may form bigger nodules with relatively smaller senescence zone and larger nitrogen-fixing bacteroid zone. The increased root size of leucaena seedlings inoculated with AcdS$^+$ rhizobia may be caused by either increased nitrogen fixation by AcdS$^+$ rhizobia or direct sequestering of ACC from the growing roots by AcdS$^+$ rhizobia on the root surface. B: bacteroid, M: meristematic zone, S: senescence zone.

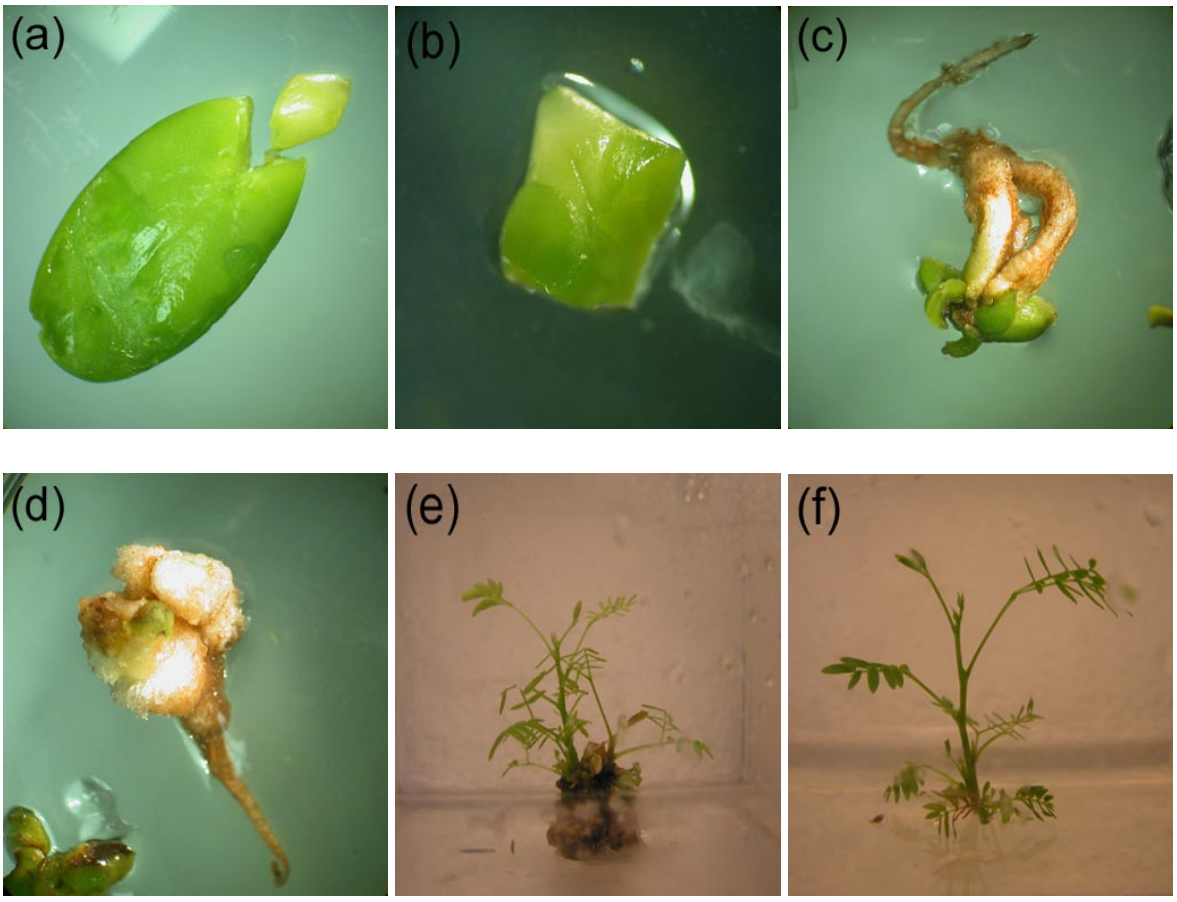
be a useful strategy for developing stress resistance in agriculturally important crops.

Research in my lab is mostly done by graduate students. Ten graduate students from my lab completed Ph.Ds. and another ten students completed MS degrees (plan A). Another two visiting students from Thailand also completed their PhD research in my laboratory. Three MS plan-B students and many undergraduate students have conducted research in my laboratory. These students contributed immensely to the research program in my laboratory. I enjoy working with students, and they have made my laboratory an interesting place for research. Over the years, many of my students have been awarded prizes for their efforts in the CTAHR Student Research Symposium, ASM Hawaii, Symposium and the Biomedical Symposium.

From molecular biology to cell biology

I teach Molecular Biotechnology (MBBE 401), which is a 3-credit course for both undergraduate and graduate students. I also teach a 2-credit summer course 'Biotechnology for Teachers'. Research projects in my laboratory involve molecular aspects of bacteria and plants. Over the past few years, we started a new research project for developing vaccines against *Mycobacterium tuberculosis* that causes the infectious disease tuberculosis in humans. Protection from tuberculosis infection is mediated by cell-mediated immunity and therefore knowledge of cell biology is required to conduct research on molecular immunological aspects of vaccine development against this disease. Knowledge of cell biology may also provide additional tools and avenues of research in plant biology. With this view in mind, I have developed

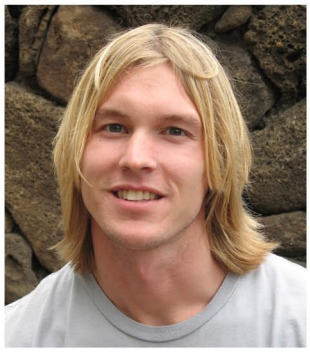
a new graduate-level 3-credit course, called 'Molecular Cell Biology' (MBBE 601), which will be taught for the first time during the fall 2009 semester. This course will focus on fundamental concepts and dynamic characteristics of the molecules of the prokaryotic and eukaryotic cell, their biosynthesis and regulation, and the mechanisms that regulate cellular activities. The course will be offered every year.



Transformation and regeneration of leucaena: (a) excision of zygotic immature embryos from green seeds; (b) embryos were cut through main axis; (c) elongation of split embryos; (d) callus initiation from dissected embryos; (e) shoot formation from callus tissue; (f) shoots excised from callus tissue and placed in medium for root regeneration.

Undergraduate student Richard Liao (left) and graduate student Archana Pal (right) are seen making poster presentations at the CTAHR Students Research Symposium on April 3, 2009.

Kehaulani Lee (left) received the first prize for oral presentation among the undergraduate students in the 2009 CTAHR symposium. She has been working on expressing the *Sinorhizobium* ACC deaminase gene in *Arabidopsis.* Daniel Adamski (middle) received the first prize for oral presentation among M.S. students in the 2008 CTAHR symposium. He worked on developing and using microsatellite markers for *Acacia koa.* Sandro Jube (right) received the first prize for oral presentation among PhD students in the 2008 CTAHR symposium. Sandro has been working on developing mimosine-free leucaena.


Dulal Borthakur

Hometown: Assam, India
Joined CTAHR: 1989
Education: PhD: John Innes Institute, University of East Anglia, Norwich, England (1987); MS: Punjab Agricultural University, Ludhiana, Punjab, India (1977); BS: Assam Agricultural University, Jorhat, India (1975).

Specialization: Molecular biology
Current research: Genetic improvement of leucaena and jatropha, vaccine development against *Mycobacterium tuberculosis*.
Languages spoken: English, Assamese and some Hindi

Selected recent publications

Jube S, Borthakur D (2009) Development of an *Agrobacterium*-mediated transformation protocol for the recalcitrant tree-legume *Leucaena leucocephala* using immature zygotic embryos. Plant Cell, Tissue and Organ Culture (PCTOC): *Journal of Plant Biotechnology* 96: 325-333.

Fredua-Agyeman R, Adamski D, Liao RJ, Morden C, Borthakur D (2008) Development and characterization of microsatellite markers for analysis of population differentiation in the tree legume *Acacia koa* (Fabaceae: Mimosoideae) in the Hawaiian Islands. *Genome* 51: 1001-1015.

Walton CB, Inos ABH, Andres OA, Jube S, de Couet HG, Douglas JT, Patek PQ, Borthakur D (2008) Immunization with hybrid recombinant *Mycobacterium tuberculosis* $H_{37}Rv$ proteins increases the T_H1 cytokine response in mice following a pulmonary instillation of irradiated mycobacteria**.** *Vaccine* 26:4396-4402.

Selected grants

D. Borthakur and Qing Li. Producing mimosine-free *Leucaena leucocephala* through metabolic pathway engineering. National Science Foundation Award No. CBET 08-27057; $272,132; 2008 - 2011.

D. Borthakur. Analysis of hybrid recombinant protein to increase the specificity and coverage of in vitro diagnostic kits for *Mycobacterium tuberculosis*. Hawaii Community Foundation. Award No. 2005-0974; $59,630. 2006-09.

TSTAR decisions made

By Doug Vincent
Special Program Director for Grants and Contracts

The Pacific Basin Administrative Group met to make TSTAR funding decisions on June 16-17, 2009 in Honolulu. This funding cycle competition was very keen. Of the 63 proposals that were submitted, only 19 were funded (16 from Hawaii and 3 from Guam). Also funded were two management grants, one to Hawaii and one to Guam. Many excellent proposals were submitted but unfortunately we did not have sufficient funds to fund them all. This year 2-year proposals were submitted and fully funded, thus given the amount of funding available to the TSTAR-Pacific program, we anticipated funding only 18-22 proposals.

As a result of the 2008 Farm Bill the TSTAR Pacific was expanded to include the other Pacific Land-Grants. This year we were pleased to welcome the research directors to the Pacific Basin Administrative Group, which is made up of the following individuals:

- Dr. C.Y. Hu, Associate Dean/Associate Director for Research, CTAHR
- Dr. Greg Wiecko, Associate Director for Research, University of Guam
- Mr. Ross Manglona, Director, CNMI Cooperative Research, Extension and Education Service, Northern Marianas College
- Dr. Singeru Singeo, Dean, Land Grant Programs, College of Micronesia
- Dr. Dan Aga, Dean, Agriculture, Community and Natural Resources, American Samoa Community College
- Dr. Mike Harrington, Executive Director, Western Association of Agricultural Experiment Station Directors
- Dr. Dennis Gonsalves, Center Director, USDA ARS Pacific Basin Administrative Group

- Dr. Thomas Bewick, National Program Leader for TSTAR, USDA CSREES
- Dr. Doug Vincent, Program Manager, TSTAR Pacific, CTAHR (ex officio, non-voting).

We hope those that were not funded will take the reviewer comments into consideration and resubmit their proposal for a future TSTAR cycle or to other funding opportunities.

University of Hawaii Projects

PD Name	*Unit*	*Title*
Alvarez, Anne	PEPS	Pineapple Heart Rot Disease Containment and Management Through Pathogen Detection and Exclusion from Latently Infected Planting Stocks
Bingham, J.P.	MBBE	Investigating the Application of Peptide Pesticides: Diversifying Molluscicide Targeting Capabilities and Enhancing Biodelivery
Borthakur, Dulal	MBBE	Identification of *Fusarium* Wilt Resistance in *Acacia Koa*
Bruland, Greg	NREM	Using Diffuse Reflectance Spectroscopy to Quantify and Predict Soil Carbon Content in Agricultural Soils of Hawai'i
Cho, Yangrae	PEPS	Engineering a Signal Transduction Pathway in a Fungus for Industrial Protein Production
Dunn, Michael	HNFAS	Identifying Tropical Plant-derived Sources of Dietary Iron: Linking Tropical Food Production and Consumption to Consumer Health
Hu, Ching Yuan	ADMIN	Tropical and Subtropical Agricultural Research (TSTAR) for Hawaii: Management 2009.
Hu, John	PEPS	Multiple Resistance to Viral and Fungal Diseases of Banana Using Gene Silencing
Jun, Soojin	HNFAS	Innovative Nanoparticulate Surface Coating Technology to Minimize Fouling and Electrochemical Reactions During Tropical Juice Pasteurization
Khanal, Samir	MBBE	Lignocellulosic Biomass Conversion into Ethanol through Syngas Fermentation with Simultaneous Recovery of Acetic Acid Using Mesoporous Silica Nanoparticle Materials
Litton, Creighton	NREM	Impacts of Ungulates on Nonnative Plant Invasions, Fire Dynamics, and Ecosystem Structure and Function in Agroecosystems and Native Forests in Hawai'i
Messing, Russell	PEPS	Indirect Effects of Biological Control Against Invasive Pests: Competition, Multi-parasitism, and Hyper-parasitism in Aphid Parasitoids
Nerurkar, Pratibha	MBBE	Pilot and Feasibility Feeding Studies for Long-Term Consumption of Anti-Diabetic Vegetable *Momordica Charantia* (Bitter Melon)
Paull, Robert	TPSS	Construction of a High Density Genetic Map of Pineapple for Genome Sequencing and Marker-assisted Selection
Rubinoff, Daniel	PEPS	Evaluating the Efficacy, Biological Interference and Nontarget Impacts of a Fireweed Biological Control Agent Release
Schara, Gonul	MBBE	Probing Hawaii's Undiscovered Genome: A Metagenomics Approach to Find Unique Enzymes for the Biofuel and Bioprocessing Industries
Wieczorek, Ania	TPSS	Assessing Risks of Cross-Pollination from Genetically Engineered Crops to Endemic Hawaiian Species

University of Guam Projects

Gong, Hui	Guam	Genetic Variability Study of Specific Pathogen Free Pacific White Shrimp, *Penaeus vannamei* on Guam
Marler, Thomas	Guam	Pollination of Guam's Endangered *Cycas micronesica*: A Key to Horticultural Conservation Management
Wall, George	Guam	Improvement of Papaya Cultivars from the Mariana Islands for Uniformity and PRV Tolerance
Wiecko, Greg	Guam	Tropical and Subtropical Agricultural Research (TSTAR) for Guam: Management: 2009

The research calabash

By Doug Vincent
Special Program Director for Grants and Contracts

Governor Lingle to Visit CTAHR's Magoon Facility

Governor Linda Lingle is scheduled to visit the CTAHR Magoon (Woodlawn) Facility on **Monday, July 6, 2009 at 10:30 – 11:30 am**. The visit is to draw attention to **Hawaii Aquaculture Week** and CTAHR's aquaculture programs. CTAHR's Aquaculture Extension Specialist **Clyde Tamaru** (MBBE) is coordinating. But while the Governor is present, she will also visit the newly renovated glasshouses with the tour led by **Joe DeFrank** (TPSS). She will also visit the anthurium and orchid breeding programs with **Tessie Amore** (TPSS). And we can't forget sustainable agriculture with **Ted Radovich** (TPSS)

CTAHR Dean Andrew G. Hashimoto to step down in June, 2010

Dean Andy Hashimoto announced on June 15, 2009 that he will be stepping down as Dean of the College of Tropical Agriculture and Human Resources on or before June 30, 2010, closing out ten years as Dean of our College. Vice Chancellor for Academic Affairs **Reed Dasenbrock** will be organizing a nationwide search for a new Dean, starting in Fall, 2009 with the plan to have a new Dean recruited and selected by next summer to take over for Dean Hashimoto. This will prevent the need for Interim Dean's as occurred with the two previous searches. More information about the recruitment will be forthcoming throughout the Summer and Fall. Stay tuned.

Other Changes in the Dean's Office

CTAHR's Director of Administrative Services, **Ruddy Wong** is retiring on **June 30, 2009**. We offer Ruddy best wishes and thanks on his retirement. Also, **Doug Vincent** is moving from the Dean's Office from being Special Program Director for Contracts and Grants back to the Department of Human Nutrition, Food and Animal Sciences to be Department Chair. The appointment is effective July 1, 2009. Recruitment for a replacement for Doug is underway.

RTRF Sharing for Interdisciplinary Research

A new policy has been enacted regarding the sharing of the indirect cost return funds (RTRF). Typically RTRF has gone to the home of the project PI. But there have been interdisciplinary research grants received where the PI is not within the PI's unit and as such has not benefited from a portion of the RTRF. With this change in policy, effective June 15, 2009, different units may share RTRF when joint grants are funded. See **Gary Ostrander's June 15, 2009 memo**. When a grant is funded, the UH Office of Research Services will have multiple PI's complete the ORS Form 5(d) to establish sharing of the RTRF. ORS will manage the process. More information on ORS Form 5(d).

Seeking your kokua when submitting grant proposals

With the passage of the America Recovery and Reinvestment Act, otherwise known as the "Stimulus Package," finally, there may be new or unanticipated funding opportunities. Regardless, there may be greater traffic through your Department offices, the CTAHR fiscal office, the UH Office of Research Services (ORS) and through Grants.gov. Please work closely with your Department fiscal APT to assist with budgeting and preparation of the final paper work to help lessen the load on CTAHR administrative staff. One way to make things move more quickly is to give people as much time as possible to review your proposal. The preferred time frame is to give those that review your proposals **10 working days in advance of the submission deadline**. The CTAHR Fiscal Office is again short staffed, with Alan Young leaving us. ORS is also asking for your kokua and requesting that you **email ORS in advance of your proposal submission.** They are requesting, via email to helpline@ors.hawaii.edu, the following information:

1. Principal Investigator and PI's Contact Information
2. PI's Campus and School
3. Funding Agency (Sponsor) Information and Submission Deadline
4. Link to RFP and/or project announcement or attach the RFP to the email.

Western Sustainable Agriculture Research and Education RFAs released.

The Western Sustainable Agriculture Research and Education (WSARE) program has just released its RFAs for FY 2010. SARE advances farming systems that are profitable, environmentally beneficial and good for communities through a nation wide competitive grants programs. You can find more information at the WSARE web site including the latest edition of "Simply Sustainable" the WSARE newsletter. Other information available is tips about writing WSARE proposals.

Successful WSARE proposals are those that specifically address the goals of the WSARE:

- Promote good stewardship of the nation's natural resources by providing site-specific, regional and profitable sustainable farming and ranching methods that strengthen agricultural competitiveness; satisfy human food and fiber needs; maintain and enhance the quality and productivity of the soil; conserve soil, water, energy, natural resources and fish and wildlife habitat; and maintain and improve the quality of surface and ground water;
- Enhance the quality of life for farmers and ranchers and ensure the viability of rural communities, for example, by increasing income and employment - especially profitable self-employment and innovative marketing opportunities in agriculture and rural communities;
- Protect the health and safety of those involved in food and farm systems by reducing, where feasible and practical, the use of toxic materials in agricultural production, and by optimizing on-farm resources and integrating, where appropriate, biological cycles and controls;
- Promote crop, livestock and enterprise diversification; and
- Examine the regional, economic, social and environmental implications of adopting sustainable agricultural practices and systems.

New USDA CSREES Requests for Applications

USDA CSREES through its AFRI program has recently put out a request for applications for research on **Angiostrongyliasis (rat lungworm)**. This has been a recent food safety issue in Hawaii. The deadline is **July 20, 2009.** Also due soon is the **Integrated Organic and Water Quality Program**, which is interested in funding comparisons between certified organic farms and conventional farms of sediment delivery, nutrient use and transport and overall water availability at the farm or field scale. Proposals are due via Grants.gov by **July 24, 2009.** Review other new **USDA CSREES RFAs**.

UH Office of Research Services June 2009 Newsletter

See the **June 2009** issue of the **UH Office of Research Services Newsletter**. This month there is new information on changes to submission process for NASA and NSF grants.

All NSF grants to use FastLane for submission

Due to increase traffic using Grants.gov with the processing of stimulus package grants, the National Science Foundation has announced that effective immediately, all new submissions to NSF will be submitted via FastLane. More information about FastLane here: https://www.fastlane.nsf.gov/fastlane.jsp. Find an FAQ about FastLane here: https://www.fastlane.nsf.gov/NSFHelp/flashhelp/fastlane/FastLane_Help/fastlane_help.htm#fastlane_faqs_introduction.htm

Grants.gov converts to Adobe Acrobat - reprise

Go ahead you can un-install your PureEdge Viewer for submitting your proposals to Grants.gov. As of **March 4, 2009**, Grants.gov has transitioned away from PureEdge Viewer to Adobe Acrobat Systems. Now and forever more (or until they change their minds), you must use Adobe Acrobat Reader or Adobe Acrobat Professional to prepare your grant proposals forms for Grants.gov submissions. In the past when you clicked on the "Download Application Package" the executable file would load up PureEdge Viewer, now that same process should open up one sort of Adobe Acrobat system automatically. But

not all versions of Adobe Acrobat Reader works but it now appears that Grants.gov has sorted out issues with Microsoft Vista and Mac users. See the Grants.gov web site for more information and to download compatible Grants.gov Adobe Acrobat software for free. There have been problems with something called a "Broken Pipe Error" with some of the Adobe Acrobat software – currently **Adobe Acrobat Reader 8.1.3 and 9.1** do not have this problem. A reminder that any thing appended to your Grants.gov application must be in .PDF format – the proposal narrative, budget narrative, CVs and other appendages. If you do not have software to convert document files (.doc, .txt, .rtf) to .PDF format, you can also download conversion software. From Grants.gov:

Computer	Operating System	Forms Program	Compatible
Mac	Tiger	Adobe Reader (8.1.1,8.1.2, 8.1.3, 9.0, 9.1)	Yes
Mac	Leopard	Adobe Reader (8.1.1,8.1.2, 8.1.3, 9.0, 9.1)	Yes
PC	Windows XP	Adobe Reader (8.1.1,8.1.2, 8.1.3, 9.0, 9.1)	Yes
PC	Windows VISTA	Adobe Reader (8.1.1,8.1.2, 8.1.3, 9.0, 9.1	Yes

CTAHR Research Portfolio Available for Download - reprise

The CTAHR Office of Research has produced a **2009 CTAHR Research Portfolio.** Over the last year, **Associate Director C.Y. Hu** requested "one-pagers" outlining the research expertise of the CTAHR Faculty with research appointments. Originally, these were prepared to share with Chinese institutions with interests in sending students to CTAHR. The "one-pagers" have been compiled into the **2009 CTAHR Research Portfolio**. This 123 page .pdf file is sorted by Department and each one pager has contact information, research interests and recent publications of CTAHR faculty with research appointments. If you have any questions about the portfolio or need to update information, contact Dr. Hu at 956-8131.

Kudos and Congratulations

Promotion and Tenure
The following CTAHR Faculty were promoted and/or granted tenure in the 2008-2009 cycle:

Promoted
Ali Fares, NREM

Promoted and Tenured
Ania Wieczorek, TPSS
Andrew Kaufman, TPSS
Gernot Presting, MBBE
Travis Idol, NREM
Loriena Yancura, FCS

Service Anniversaries
The following were recognized for their years of service in June 2009.

40 years
Chennant Gopalakrishnan, Researcher, NREM
Richard Tsuda, Research Support, PEPS

30 years
Ronald Matsuda, Agricultural Research Technician, TPSS

10 years
Sonia Campbell, Research Support, MBBE
Robert Oshiro, Research Support, PEPS

Dates and Events – Mark Your Calendars Today

Vegetable Gardening at OUGC – Saturday, July 11, 2009
Vermiculture Day at the OUGC – Saturday, August 8, 2009

Two **big events** this summer at the **Oahu Urban Garden Center at Pearl City.** Join the Oahu Master Gardeners for information about vegetable home gardening. Come on **Saturday, July 11, 2009 from 9:00 am – 12:00 noon.** There will be a mini plant sale and vegetable seed starters. Learn about resources from CTAHR to help you start and maintain your vegetable gardens. See vegetables growing at the Urban Garden Center. On **Saturday, August 8, 2009 from 9:00 am – 12:00 noon,** come learn about composting using worms. Businesses from Oahu will be setting up displays about vermicomposting with displays, information and products available for purchase. Free to the public, no reservations required. Please bring hat, sunscreen, and water. For more information or directions, please call 453-6055 Or email: OahuMg@ctahr.hawaii.edu.

Farm Bureau Federation Hawaii State Farm Fair – July 18, 19, 2009

The Hawaii Farm Bureau Federation and Hawaiian Electric Company will be sponsoring the **37th Annual Hawaii State Farm Fair**. The event will be held on Oahu at the Bishop Museum from **9:00 am – 8:00 pm on Saturday, July 18, 2009** and **9:00 am – 5:00 pm on Sunday, July 19, 2009**. Admission is $5 for adults and $3 for children. The fair includes **4-H livestock exhibits and auction**; a Farmer's Market, a huge plant sale plus other events for keiki and adults. Come see where your food comes from.

New Faculty Orientation and Faculty Staff Welcome back luncheon

The **CTAHR New Faculty Orientation** will be held **Tuesday, August 18, 2009 from 8:15 am – completion**. The Orientation will be held in **Ag Sciences 204**. Following the Orientation, CTAHR will host its annual **Welcome Back Luncheon**. Location tba, starting at **12:00 noon on August 18, 2009.** Come join for good food, fellowship and encourage your new faculty members to attend the Orientation.

14th Annual *Mealani's A Taste of the Hawaiian Range* – Friday, September 18, 2009.

Mark your calendars for Hawaii's foodie event of the year! The 14th Annual "Mealani's A Taste of the Hawaiian Range" will be held again at the Hilton Waikoloa Village on the Kohala Coast of the Island of Hawaii on Friday, September 18, 2009. See the "Taste's" web site for more information.

Faculty publications

Russell Messing (PEPS)
Muratori F.B., R.J. Gagne & R.H. Messing. 2009. Ecological traits of a new aphid parasitoid, *Endaphis fugitiva* (Diptera: Cecidomyiidae) and its potential for biological control of the banana aphid, *Pentalonia nigronervosa* (Hemiptera: Aphididae). *Biological Control* 50: 185-193.

Daniel Rubinoff (PEPS)
Gentz, M., D. Rubinoff and J.K. Grace. 2008. Phylogenetic analysis of subterranean termites (*Coptotermes* spp., Isoptera: Rhinotermitidae) indicates the origins of Hawaiian and North American invasions: Potential implications for invasion biology. *Proceedings of Hawaiian Entomological Society* 40: 1-9.

Cognato, A. and D. Rubinoff. 2008. New Exotic Ambrosia Beetles Found in Hawaii (Curculioinidae: Scolytinae: Xyleborina). *Coleopterists Bulletin* 62:421-424.

King, C., D. Rubinoff, and W. Haines. 2009. Biology and distribution of a recently rediscovered endemic Hawaiian leafroller moth, Omiodes continuatalis (Crambidae). (Cover Feature) Journal of the Lepidopterist's Society 63: 11-20.

Le Roux J.J. and D. Rubinoff. 2009.Molecular data reveals California as the potential source of an invasive leafhopper species, *Macrosteles sp. Nr. severeni*, transmitting the aster yellows phytoplasma in Hawaii. *Annals of Applied Biology* 154: 429-439

Sylvia Yuen (CoF)
Tom, A., Yuen, S., Fong, G., Nemoto, M., Hisatake, T., Choy, A., and Chang, W. (2009). Raising resilient children during touch economic times. Honolulu: University of Hawaii, *Center on the Family*.

Yuen, S., Tanaka, D., and Fong, G. (2009). Managing job loss and financial stress: A personal and family guide. Honolulu: University of Hawaii, *Center on the Family*.

Summer's here and it's time to write grants!

By Doug Vincent
Special Program Director for Grants and Contracts

Let's face it; summer can be boring without a big job to do! It's been nearly a month since the Spring Semester finished up. Fall semester is almost 2 months away. Why don't you sit down and start planning that next grant proposal? Find an RFA that fits your program. Review previous RFAs, start organizing your thinking. Make notes on what bits of information you'll need to make that compelling case? Do you still need some preliminary data? Why get into the lab and finish it off! Do you need to identify your stakeholders or plan for collaboration – make some calls or visit some colleagues? Work on your objectives – avoid an overly ambitious project. Get to the library and take the time to review the literature.

I realize it's hot and you'd rather be at the beach or on your lanai reading a good book – but now's the time to devote yourself to planning your next grant proposal. Before classes begin, before committee work starts up, before your calendar start filling up – now's the time, while you have it, to get yourself organized so you won't miss that deadline. Dr. Sharee Pepper, CTAHR's grant coach has once again prepared a listing of upcoming grant deadlines. Peruse this list and find a program that fits your work – or visit agency sites – identify areas where you can write a proposal. With the budget difficulties – funds will be at a premium! Give it a go!!

The following list includes some current funding opportunities that may be of interest to CTAHR faculty. If the deadline is too short for this year, it is still a good indication of the likely due date for next year. **Let us know if we can be of any assistance with developing and editing your grant application.**

For information on submitting grants electronically on grants.gov the following publication may be useful. **USDA, CSREES Grants.gov Application Guide – A guide for the preparation and submission of CSREES applications via grants.gov.**
http://www.csrees.usda.gov/funding/grant_forms/electronic_app_guide.pdf

Agriculture

$ - USDA, CSREES - Conservation Effects Assessment Program (CEAP)
Deadline: July 1, 2009
http://www.csrees.usda.gov/funding/rfas/conservation_effects.html

$ - USDA, CSREES - Integrated Research, Education, and Extension Competitive Grants Program: Conservation Effects Assessment Project
Deadline: July 1, 2009
http://www.csrees.usda.gov/funding/rfas/conservation_effects.html

$ - USDA, CSREES - Rangeland Research Program
Deadline: July 7, 2009
http://www.csrees.usda.gov/funding/rfas/rangelands.html

$ - USDA, CSREES - Critical Agricultural Materials
Deadline: July 7, 2009-06-03
http://www.csrees.usda.gov/funding/rfas/cam.html

$ - USDA, CSREES - Renewable Resources Extension Act Program-National Focus Funds
Projects
Deadline: July 15, 2009
http://www.csrees.usda.gov/fo/rreanationalfocusfundsprojects.cfm

$ - USDA, CSREES - New Era Rural Technology Competitive Grants Program (RTP)
Deadline: July 20, 2009
http://www.csrees.usda.gov/funding/rfas/new_era.html

$ - USDA, Western Sustainable Agriculture Research and Education (SARE) -
Farmer Rancher Grant (FRG)
Deadline: Dec 04, 2009
https://wsare.usu.edu/grants/RFA/FRG_10.pdf

$ - USDA, Western Sustainable Agriculture Research and Education (SARE) -
Professional + Producer Grant (PPG)
Deadline: Dec 04, 2009
https://wsare.usu.edu/grants/RFA/PPG_10.pdf

$ -USDA, CSREES - Western Sustainable Agriculture Research and Education Program
Sustainable Agriculture Tours
Deadline: Open until funding is exhausted
http://wsare.usu.edu/grants/docs/RFA_SAT.pdf

Education

$ - Asia and Pacific Islander Organization (APIO) - 2009 APIO Scholarships
Deadline: June 30, 2009
http://www.apio.org/scholarship/APIO_Scholarship_Application_2009.doc

$ - USDA, CSREES - Integrated Research, Education, and Extension Competitive Grants Program: Conservation Effects Assessment Project
Deadline: July 1, 2009
http://www.csrees.usda.gov/funding/rfas/conservation_effects.html

$ - USDA, CSREES - Rural Health and Safety Education Competitive Grants Program
Deadline: July 1, 2009
http://www.csrees.usda.gov/funding/rfas/rural_health.html

$ - Sustainable Agriculture Research & Education (SARE) - SARE Outreach Educational Sponsorship Program
Deadlines: July 15, October 15, December 15.
http://www.sare.org/events/support.html

$ - USDA, CSREES - Higher Education Multicultural Scholars Program
Deadline: July 28, 2009
http://www.csrees.usda.gov/funding/rfas/multicultural_selg.html

$ - USDA, CSREES - Small Business Innovation Research Program – Phase I
Deadline: September 3, 2009
http://www.csrees.usda.gov/funding/rfas/sbir_rfa.html

$ - USDA, Western Sustainable Agriculture Research and Education (SARE) -
Professional Development Program Grant (PDP)
Deadline: Nov 03, 2009
https://wsare.usu.edu/grants/RFA/PDP_10.pdf

$ - Human Frontier Science Program – Short Term Fellowship Program
Deadline: rolling – applications accepted year round
http://www.hfsp.org/how/appl_forms_STF.php

$ - NIH - Bridges to the Baccalaureate Program (R25)
Deadline: September 18, 2009
http://grants.nih.gov/grants/guide/pa-files/PAR-07-411.html

Environment, Water, Energy, Invasive Species Grants

$- NSF – Long Term Research in Environmental Biology (LTREB)
Deadlines: July 9 Annually
http://nsf.gov/pubs/2007/nsf07588/nsf07588.htm

$ - UNESCO - On the Frontlines of Climate Change (A Forum for Indigenous Peoples, Small Islands and Vulnerable Communities)
Deadline: July 15, 2009.
http://www.climatefrontlines.org/en-GB/node/191

$ - USDA, CSREES - National Integrated Water Quality Program
Deadline: July 15, 2009
http://www.csrees.usda.gov/funding/rfas/water_quality.html

$ - NOAA Broad Agency Announcement (for special projects)
Due September 30, 2009 (closes but applications accepted on a rolling basis)
NOAA Office of Education:
http://apply07.grants.gov/apply/opportunities/instructions/oppNFA-NFA-2008-2001388-cid2112140-instructions.pdf
National Marine Fisheries Services
http://apply07.grants.gov/apply/opportunities/instructions/oppNFA-NFA-2008-2001388-cid2112136-instructions.pdf
National Environmental Satellite Data Information Service
http://apply07.grants.gov/apply/opportunities/instructions/oppNFA-NFA-2008-2001388-cid2112133-instructions.pdf
National Ocean Service
http://apply07.grants.gov/apply/opportunities/instructions/oppNFA-NFA-2008-2001388-cid2112139-instructions.pdf

$ - U.S. Fish and Wildlife Service - Coastal Programs
Deadline: September 30, 2009
http://apply07.grants.gov/apply/opportunities/instructions/oppCOASTAL-09-cfda15.630-instructions.pdf

$ - National Forest Foundation: Community Assistance Program
Local Forest Partnerships Fund
Deadline: proposals accepted on a rolling basis throughout year
http://www.natlforests.org/consp_05_cap.html

Families, Youth and Children Grants

$ - CHS Foundation
Rural Youth and Leadership Development
Deadline: rolling – applications accepted year round
http://www.chsfoundation.org/programs/ryld.htm

Financial Grants

$ - Money Management International Financial Education Foundation,
Financial Education Grants
Deadline: rolling – applications accepted year round
http://www.mmifoundation.org/GrantSeekers.asp

Health, Nutrition, Food & Biomedical Grants

$ - USDA, CSREES - Rural Health and Safety Education Competitive Grants Program
Deadline: July 1, 2009
http://www.csrees.usda.gov/funding/rfas/rural_health.html

$ - Wood Johnson Foundation (RWJF) – Active Living Research and Healthy Eating Research
Deadline: Letters of Intent are required through July 17, 2009.
Invited proposals from the LOI will be due August 14, 2009
http://www.healthyeatingresearch.org/content/view/184/177/

$ - Robert Wood Johnson Foundation – Seeking Active Living Research Proposals
Deadline: July 29, 2009
http://www.rwjf.org/applications/solicited/cfp.jsp?ID=20804

Humanities Grants

$ - Hitachi Foundation: Business and Communities Grants Program
Grants Address Economically Isolated Communities
Interested organizations may submit an online inquiry to provide information about project ideas **at any time** and the Foundation's will determine if it fits their priorities.
http://www.hitachifoundation.org/grants/guidelines/index.html.

Rural and Community Development Grants

$ - USDA, Hawaii State Rural Development Office - Rural Cooperative Development Grant (RCDG) Program
Deadline: June 29, 2009
http://www.rurdev.usda.gov/rbs/coops/rcdg/rcdg.htm

$ - USDA, CSREES - Rural Health and Safety Education Competitive Grants Program
Deadline: July 1, 2009
http://www.csrees.usda.gov/funding/rfas/rural_health.html

$ - USDA, Rural Development - Rural Energy for America Program (REAP) for Hawaii & the Western Pacific
Deadline: July 31, 2009
http://www.rurdev.usda.gov/rbs/farmbill/index.html

$ - Rural Energy For America Program Grants/Renewable Energy Systems/Energy Efficiency Improvement Program (REAP/RES/EEI)
Deadline: July 31, 2009
http://www.rurdev.usda.gov/hi/

$ - USDA, Rural Development
Community Facilities Loan and Grant Program
Deadline: Applications accepted on an ongoing basis
http://www.rurdev.usda.gov/rhs/cf/cp.htm
http://www.rurdev.usda.gov/rhs/cf/brief_cp_grant.htm

$-Farm Foundation Grants
Deadline: Applications accepted on an ongoing basis
http://www.farmfoundation.org/news/templates/comm_template.aspx?articleid=357&zoneid=67

Science Grants

$ - National Geographic Society – Waitt Grants Program
Deadline: Rolling
http://www.nationalgeographic.com/field/grants-programs/waitt-grants-application.html

UH, Hawaii and Regional Grants

$ - UH, University Research Council - Faculty Travel Funds
Proposal Deadline: rolling – applications must be in >4 weeks before travel.
http://www.hawaii.edu/urc/pdf/factravel_g.pdf
http://www.hawaii.edu/urc/pdf/factravel_f.pdf