Diversifying, Sustaining, Strengthening



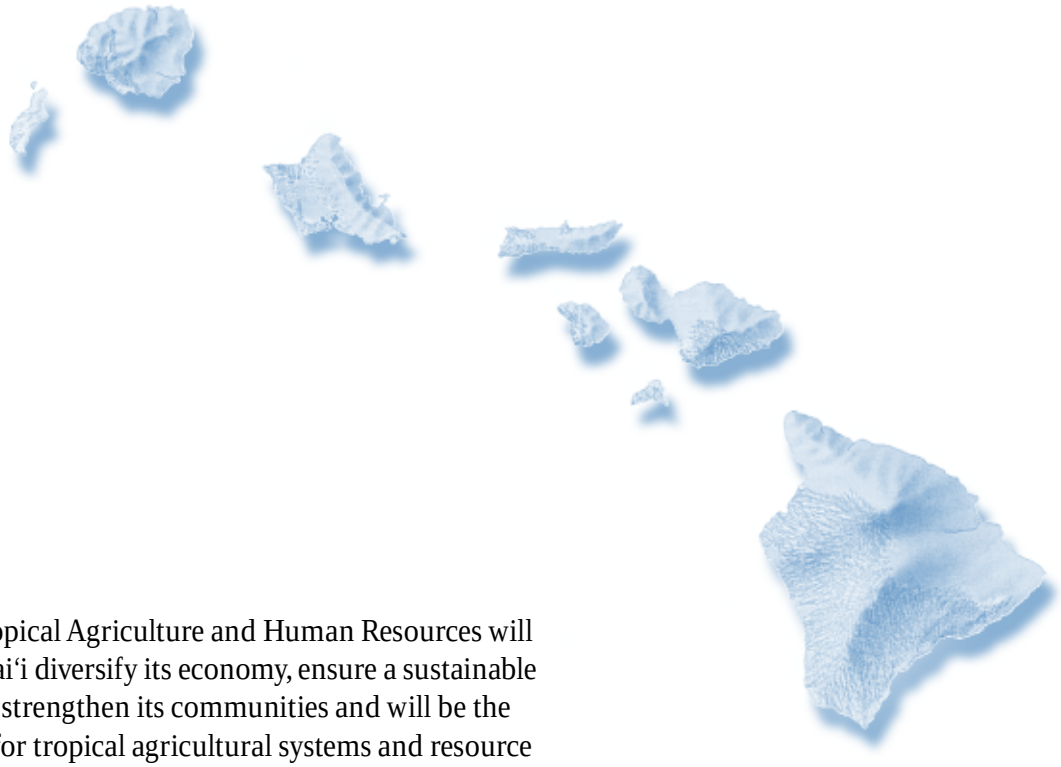



2006 IMPACT REPORT

Honoring Our Past, Securing Our Future

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

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



VISION

The College of Tropical Agriculture and Human Resources will actively help Hawai'i diversify its economy, ensure a sustainable environment, and strengthen its communities and will be the premier resource for tropical agricultural systems and resource management in the Asia-Pacific region.

MISSION

The College of Tropical Agriculture and Human Resources is committed to the preparation of students and all citizens of Hawai'i for life in the global community through research and educational programs supporting tropical agricultural systems that foster viable communities, a diversified economy, and a healthy environment.

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College of Tropical Agriculture and Human Resources—

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"We embark on CTAHR's second century committed to providing an excellent education for our students and fostering a diverse and vibrant economy, a healthy environment, and thriving families and communities for Hawai'i."

– Andrew Hashimoto, Dean, CTAHR

With the passage of 2006 and the arrival of 2007, the University of Hawai'i celebrates its centennial. The College of Tropical Agriculture and Human Resources (CTAHR) takes particular pride in the university's century of achievements. CTAHR, established in 1907 as the College of Agriculture and Mechanic Arts, is the founding college of the University of Hawai'i, and 2007 marks our first hundred years of instruction, research, and outreach as Hawai'i's land-grant institution.

We embark on CTAHR's second century committed to providing an excellent education for our students and fostering a diverse and vibrant economy, a healthy environment, and thriving families and communities for Hawai'i. These goals, which are central to our college's mission and vision, are also integral to securing the future of our state and the Pacific region. Encouraging job creation, protecting the environment, and providing community services are all essential to shaping a Hawai'i that can support our grandchildren and their grandchildren. Rather than competing against each other, these imperatives can best be met through approaches that balance and integrate them. As the following stories illustrate, CTAHR is contributing to these key aspects of a sustainable future.

The closing this year of Del Monte's operations on O'ahu reminds us of the transformation that Hawai'i agriculture has experienced in recent years. More than 100,000 acres that were formerly planted in sugarcane and pineapple are now available for new uses. Conserving important agricultural lands is fundamental to our future. Agriculture can improve Hawai'i's food and energy security while maintaining the state's green, open spaces and sustaining our rural communities.

This report highlights a small sampling of CTAHR's efforts to promote diverse, environmentally appropriate agricultural ventures. Members of our faculty are investigating how homegrown crops can replace imported fossil fuels; developing management practices for converting fallow fields to pasture for locally raised, forage-fed beef cattle; and reaching out to immigrant farmers to help them grow food safely, navigate risks, and maximize their yields. County agents of the Cooperative Extension Service assist Hawai'i's farmers and ranchers (as well as many other community members) through their many, varied duties. Our food scientists work to ensure the safety of Hawai'i's food products and to develop disinfestation methods that allow us to export our produce without spreading pests. An action strategy coordinated within CTAHR engages agricultural producers, among others, to minimize the impact of land-based pollution on our coral reefs. Student interns from the college apply their hard-won classroom knowledge to real-world agricultural problems in a process from which they and their employers mutually benefit. Landscaping professionals who pursue training through the Certified Landscape Technician program gain expertise in an expanding industry that adds value to our resorts, recreational lands, and real estate.

CTAHR's role in Hawai'i's future is not limited to agriculture. Also featured here are faculty and students who have created innovative commercial technologies to diagnose diseases, purify contaminated water, and facilitate further progress in the

biosciences. By studying mice, researchers are investigating how humans might avoid obesity and diabetes. And through programs that help young children explore their world and prepare for school, we are investing in our state's most valuable resource.

I thank the students, staff, and faculty of our college for their dedication and creativity. I am honored to take part in their efforts to create a sustainable future for Hawai'i.

Aloha,

Andrew G. Hashimoto
Dean/Director

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Growing Green Energy

A bioenergy industry can fuel growth in Hawai'i's agriculture and technology sectors and lessen our dependence on imported petroleum.

With mainland gasoline prices hitting record highs and Hawai'i prices surging higher still, the year 2006 brought home our dependence on oil. More than 90 percent of the energy consumed in Hawai'i comes from imported fossil fuels, mostly petroleum. The percentage of our energy derived from petroleum is the highest in the nation, and our gasoline and electricity routinely top U.S. price charts. Our reliance on oil makes us vulnerable to sudden disruptions in supply. And each tanker that arrives at our shores has the potential to spill its cargo and damage our fragile coasts.

Developing Hawai'i's renewable energy resources will improve our energy security and protect our environment. Among the most promising alternative energy sources are biofuels, including ethanol from biomass and biodiesel from plant oils. A biofuel industry can expand the state's agricultural and technology sectors, keeping cash in the local economy while conserving green countryside. Moreover, biofuels do not promote global warming as fossil fuels do. Biofuels are carbon neutral: carbon dioxide is removed from the atmosphere by the growing fuel crops and added back again once the fuel is used.

Photo: Richard Ogoshi

Jatropha curcas *is a promising potential source of biodiesel.*

Funded by the Agricultural Development in the American Pacific project, Drs. Goro Uehara, Robert Paull, and Richard Ogoshi of CTAHR and Dr. Mari Marutani of the University of Guam are examining crop options for biodiesel production in Hawai'i and other Pacific islands. One promising candidate flagged for further study is *Jatropha curcas*, a productive, drought-tolerant tree that can grow on marginal lands. Researchers hope to identify high-yielding *Jatropha* varieties that don't need irrigation as well as varieties with edible seeds from which animal feed could be a byproduct.

CTAHR is also working with Hawai'i landowners to assess what fuel crops are suited to their lands and aiding Hawaiian Electric Company's efforts to meet nationwide targets for the use of non-fossil fuels by electric utilities. Through bioenergy research, CTAHR is helping chart Hawai'i's sustainable future.

Photo: Jim Hollyer

Professor Goro Uehara, shown here with seedlings of Jatropha curcas*, is leading research to assess crops for biofuel production.*

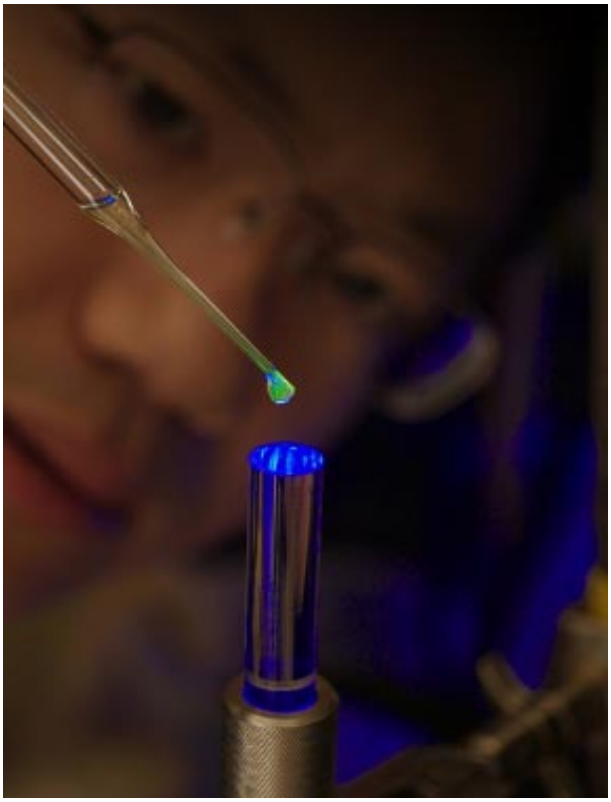
Innovative nanoprotein sensors can detect molecules in in vitro *diagnostic tests or inside living cells.*

Sensing New Possibilities

In years past, efforts to detect specific molecules in natural substances were a case of "you can't have it all." Tests to identify the coat protein of a virus in saliva, an illicit drug or a pregnancy-related hormone in urine, or a toxic biological agent intentionally used to contaminate fresh produce could be very fast or very accurate, but they couldn't be both.

Now, tiny proteins constructed in the laboratory of Dr. Wei Wen 'Winston' Su promise the quick, easy, and highly precise detection of target compounds in solution. The patent-pending sensor-protein technology can be used in diagnostic assays conducted *in vitro* (outside living organisms). *In vitro* diagnostic tests are a lucrative market with an estimated worth exceeding $23 billion worldwide. Alternatively, introducing the genetic instructions for the proteins into living cells allows researchers to monitor cellular events as they happen.

Photo: UH Creative Services



Professor Winston Su examines a droplet containing millions of sensor proteins, which fluoresce when exposed to blue light.

About 10,000-fold smaller than the breadth of a human hair, the nanosensor proteins glow with fluorescent light. The presence of the analyte, the molecule of interest that is being measured, causes easily detectable changes in this fluorescence. The sensor proteins permit simple "mix and read" assays in which the analyte need not be separated from the surrounding solution. Additional reagents or labels are not required, which saves money and limits hazardous waste. The proteins can be produced inexpensively in bacteria and can be built to measure a wide range of molecules.

Some of the nanosensors produced in the Su laboratory detect certain recombinant proteins (proteins produced through genetic engineering); others detect antibodies. These initial products have been developed to facilitate industrial protein production, life science research, and medical applications such as *in vitro* diagnostics and drug-screening assays. The work has been funded by a Hawai'i biotech start-up, BioXene, Inc., and by an Accelerated Research Commercialization grant from the University of Hawai'i. The first commercial nanosensor product is planned for 2007, a fitting accomplishment to mark the centennial of UH and its founding college, CTAHR.

Sweeping the Competition

Technologies developed at CTAHR took the top three prizes in the 2006 UH Business Plan Competition.

Placing first, second, or third in a contest of more than 50 teams is an admirable achievement. Taking home all three awards is something to celebrate.

Members of CTAHR's Department of Molecular Biosciences and Bioengineering invented the technologies that took the top three places in the Traditional Category of the 2006 University of Hawai'i Business Plan Competition. Their teams received a total of $60,000 in prize money to further their commercialization efforts.

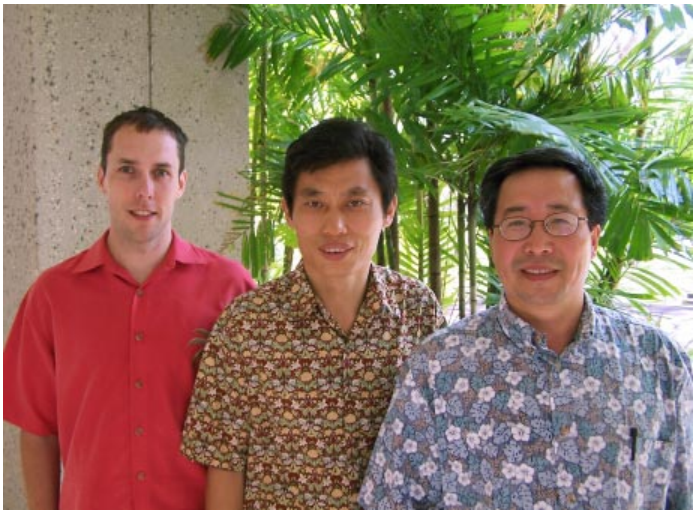


Photo: Miles Hakoda

Inventors Dr. Chad Walton, Liangjie Dong, and Professor Qing Li.

MicroNose, the product behind the winning business plan, was developed by then-doctoral student Liangjie Dong. An inexpensive filtration material that removes arsenic and other toxic metals from water, MicroNose holds great promise in helping the 100 million people worldwide whose drinking water is contaminated with naturally occurring arsenic, which is thought to cause more than 200,000 cancer deaths in Bangladesh alone.

The runner-up design, a tuberculosis test that Dr. Chad Walton created during his doctoral research in the laboratory of Professor Dulal Borthakur, addresses another global health threat. One-third of the world's population is infected with TB, and an estimated two million people are killed by the disease each year. The Akamai Diagnostics test uses synthetic proteins to elicit an immune response from a sample of the tested individual's blood or blood cells. Unlike the skin wheal test currently available, the Akamai test can distinguish an active TB infection from TB exposure or vaccination.

Professor Qing Li developed the technology behind the third-place business plan, Aqua Pura. His invention uses elemental iron to generate chemically reactive forms of oxygen that can kill microorganisms and break down solvents and pesticides. This approach can be more cost-effective than standard methods for cleaning groundwater because it destroys contaminants that currently are removed by filters and must be disposed of as hazardous waste.

We are delighted that the business professionals who judged the 2006 UH Business Plan Competition have honored these exciting new technologies designed to solve problems and improve lives.

Through internships, students gain insight into their prospective careers.

My Summer Vocation

Summer isn't just about sunning and surfing. In 2006, a U.S. Department of Agriculture Alaskan Native/Native Hawaiian-serving institutions grant helped five CTAHR students test-drive their prospective careers by interning with Kaua'i agribusinesses.

At Guava Kai Plantation (Kilauea Agronomics, Inc.), guava is grown and processed on site, and guava puree is shipped to customers here and abroad. Timothy Rodenberger and Meagan Suzuki spent six weeks learning about the guava we consume under the Meadow Gold and Hawaii's Own labels. Their field research, which shed light on factors relating to fruit growth rate and fruit loss from trees during maturation, will help Guava Kai predict the best time to harvest.

Erik Rook and Jennifer Tadina interned at Syngenta Seeds, Inc., a large international company that is one of the top producers of high-value commercial seeds. Jenn compiled data for the Trait Introgression Development group and worked for the nursery, assisting in the production and maintenance of field crops and sampling corn traits and genes. Erik helped develop a new geographical information system tool.

Clesson Higashi worked with another leader in agricultural seed technology, Pioneer Hi-Bred International, Inc. He assisted CTAHR alumnus Dr. Mike Austin in several experiments that addressed crop management techniques and sought to increase seed production efficiency. Clesson also developed and implemented the release of parasitoid wasps as a biological option for corn earworm control. He presented his own work and related findings by his mentor at CTAHR, Dr. Mark Wright, at the Hawai'i Crop Improvement Association's annual meeting.

Housing and transportation were provided for the interns, and weekends gave the students a chance to get acquainted with each other and with a sixth CTAHR student, Whitney Haraguchi, who interned with USDA's Natural Resources Conservation Service through an NRCS scholarship. Their Kaua'i tours included the Haraguchi Taro Farm and the archeological digs at Māhā'ulepā. The student interns describe their summer adventure as a rewarding, educational opportunity to gain valuable experience in both work and life.

Photo: Keith Horton

Student interns Meagan Suzuki, Jennifer Tadina, Erik Rook, Timothy Rodenberger, Whitney Haraguchi, and Clesson Higashi take time to enjoy Kaua'i.

Photo: Paul Russell

Jennifer Tadina collects crop data in a corn field.

A Select Fellowship

CTAHR is home to four of the 464 members of the Institute of Food Technologists honored as fellows.

To keep our food supply safe, wholesome, and nutritious, food scientists apply biology, the physical sciences, and engineering to the study of food and its selection, preservation, processing, packaging, distribution, and use. Their premier organization is the Institute of Food Technologists (IFT), a scientific society representing 22,000 professionals worldwide. Among the highest forms of peer recognition in the field of food science is election as an IFT fellow. CTAHR is home to four of the 464 IFT members honored as fellows, including two of the fellows elected in 2006.

CTAHR alumnus Dr. Wayne Iwaoka initially studied soil science. An interest in foods led him to a University of Illinois doctorate in food chemistry. A CTAHR faculty member since 1988, he has researched red tide toxins and the browning of foods. His award-winning teaching approach emphasizes critical thinking, problem solving, conflict resolution, group work, and leadership. He is the founding editor of IFT's *Journal of Food Science Education* and recently served as UH Mānoa's interim Vice Chancellor for Students.

A Fulbright scholarship to the University of Massachusetts helped Dr. Aurora Saulo pursue physical chemistry and food science. She developed new commercial food products for multinational companies before joining CTAHR in 1985. As an extension specialist she educates the food industry and the public on food safety, food technology, new products, and laws. She has clerked at the Hawai'i State Legislature and was elected to IFT's Executive Committee.

Original photo courtesy of the Institute of Food Technologists

Professors Wayne Iwaoka and Aurora Saulo are recognized as fellows at the 2006 annual meeting of the Institute of Food Technologists.

Professor emeritus James Moy was elected an IFT fellow in 1993. A food engineer, he researched food processing technologies, particularly gamma-radiation, during four decades with the college. His work contributed to the use of irradiation since 1995 to treat Hawai'i-grown fruits for mainland markets. He received the 2002 IFT International Award for his mentorship and technology transfer in food irradiation.

CTAHR's first IFT fellow, emeritus specialist in food technology Roy Moser, was elected in 1978. During a career that spanned more than 30 years, he worked with businesses and trade groups on issues of food safety, sanitation, and processing.

Congratulations and *mahalo* to our IFT fellows for this well-deserved recognition of your "outstanding and extraordinary contributions."

Photo courtesy of James Moy

Professor emeritus James Moy

Of Mice and Muscles

Muscle development in childhood may alter how the body uses fat, helping prevent adult obesity.

The 2005 Hawai'i Health Survey found that more than half of our state's adults are obese or overweight. This population is at elevated risk for many health conditions, including type II diabetes, high blood pressure, heart disease, stroke, and some cancers. Obesity-related medical expenses in Hawai'i are estimated to cost more than $290 million per year.

A recent finding by Dr. Jinzeng Yang and Baoping Zhao of CTAHR and Dr. Robert Wall of the U.S. Department of Agriculture suggests that muscle development in childhood may alter how the body uses fat, helping prevent adult obesity. The study used transgenic mice that have been genetically engineered to produce less myostatin, a protein that limits the development of skeletal muscles. In comparison to mice from the same litter that lack the added gene, the transgenic mice grow faster, have larger muscle cells, and show increased muscle development.

When adult transgenic mice and their non-transgenic (or "wild-type") littermates are fed a high-fat diet, the wild-type mice store the excess calories as fat and become obese, while the transgenic mice remain fit despite eating a larger amount of food. The wild-type mice on a high-fat diet also become less sensitive to insulin, a symptom of pre-diabetes. In contrast, the transgenic mice fed a fatty diet maintain normal insulin sensitivity.

Muscle tissue burns more energy than fat tissue. Building extra skeletal muscle early in life appears to shield the transgenic mice from the effects of a high-fat diet by shifting their metabolism away from storing fat and toward using fat as a fuel to maintain muscle.

The study has exciting implications for human weight management. Exercise during childhood and adolescence should offer the same advantages that the muscled mice have: effective fat utilization for muscle growth and maintenance rather than fat storage. Through physical activities that build their muscle mass, young people may be able to achieve a measure of protection against future obesity and its harmful health effects on adults.

Photos: Jinzeng Yang

In a wild-type mouse with normal levels of the protein myostatin (left), a high-fat diet leads to obesity and loss of insulin sensitivity. On the same diet, a transgenic mouse that produces less myostatin (right) stays lean and retains its insulin sensitivity. Adults who participate in muscle-building exercises during youth (far right) may get the same health benefit that the transgenic mice receive from diminished levels of myostatin.

Protecting the Sea from the Land

Managing our uplands wisely is essential to protecting our irreplaceable reefs downstream.

Hawai'i's coral reefs are among the state's most treasured assets. These rich, living communities are home to more than 5,000 species, about one-quarter of which are found nowhere else on earth. Reefs add nearly $1,000,000 per day in value to the state economy through recreational activities, scientific research, near-shore fisheries, and increased property values. More than half of Hawai'i visitors snorkel or dive during their stay, and net revenues from those recreational activities alone exceed $300,000,000 each year.

Land-based pollutants such as sediment from eroded soil and nutrients from fertilizers and animal and human wastes threaten more than 20 percent of the world's coral reefs and have been identified as a reef protection priority by the United States. In Hawai'i, the local action strategy to remedy threats posed by land-based pollution is administered by the Department of Land and Natural Resources' Division of Aquatic Resources and coordinated by CTAHR's Dr. Katherine Chaston under the direction of Dr. Carl Evensen. The strategy focuses on three watersheds: Honolua (Maui), Kawela (Moloka'i), and Hanalei (Kaua'i). Partners include state and federal agencies, environmental organizations, and landholders.

CTAHR plays several roles in implementing the strategy. As a liaison linking participating agencies with community members and as convener of the strategy's steering committee, Dr. Chaston builds consensus on reef protection actions. Grant writing and fundraising bring in federal and private dollars for pollution control and watershed restoration projects. Outreach efforts educate key constituencies. For example, the Maui County Council strengthened storm water ordinances in response to recommendations from the Center for Watershed Protection.

The college is also contributing to the strategy's research efforts. Dr. Ali Fares is among the scientists evaluating a computer simulation of non-point-source pollution. Adapting this model to local conditions, including steep slopes, eroded stream banks, landslides, and feral pig damage, will enable its use in establishing best management practices for the Hanalei watershed. Managing our uplands wisely is essential to protecting our irreplaceable reefs downstream.

Photo courtesy of the U.S. Geological Survey

Sediment and debris litter the reef wall at Hanalei Bay, Kaua'i following the heavy winter rains that fell in early 2006.

Photo: Katherine Chaston

From Fallow to Forage

Best management practices for converting former pineapple and sugarcane lands to pasture will help ranchers take advantage of new opportunities.

Like Hawai'i's sugarcane and pineapple industries, the state's long history of cattle ranching dates back to the nineteenth century. Today, acreage that once produced sugarcane and pineapple represents an opportunity for Hawai'i ranchers. A lack of suitable grazing lands has long limited the growth of the Hawaiian livestock industry, and many ranchers are now leasing or purchasing former sugarcane and pineapple fields on the islands of Kaua'i, Maui, and Hawai'i.

Photos: Mark Thorne

Research technician Matthew Stevenson stands in thigh-high grass on land that didn't receive nitrogen fertilizer (left); on a nitrogen-treated plot, the grass reaches his chin (right). This difference in pasture productivity may offset the cost of applying fertilizer.

To support grazing cattle, soil must contain adequate levels of mineral nutrients for plant growth. Soil pH is also an important factor because it can strongly influence the availability of soil nutrients. Years of high-intensity agriculture have left much of the sugarcane and pineapple lands now available to ranchers acidic and depleted, unable to produce sufficient forage for cattle, and vulnerable to invasive weeds that can out-compete forage plants on poor soils. Current recommendations for restoring the fertility of these lands are suited for returning them to crop-based agriculture but are too input-intensive and expensive for sustainable forage production.

To help ranchers use their new lands to best advantage, CTAHR extension faculty are developing best management practices for converting sugarcane and pineapple lands to pasture. With the help of cooperating ranchers on the Big Island, Kaua'i, and Maui, Drs. Mark Thorne, Linda Cox, Harold Keyser, and Jonathan Deenik are assessing the effectiveness, efficiency, and sustainability of various soil treatments, including application of fertilizer and lime, sowing of legumes that add nitrogen to the soil, and rotation of grazing animals. The ongoing study will determine how the treatments interact to influence soil fertility, forage growth, animal production, and changes in the pasture ecosystem over time.

Early results suggest that forage production on former sugarcane land can be doubled by adding nitrogen, indicating that the cost of applying fertilizer could be offset by increases in pasture productivity. The research will aid future efforts to help bring fallow fields back to productive agricultural use.

Photo: Glen Fukumoto

Sowing the Seeds of Success

Face-to-face outreach and translated training materials help immigrant farmers master risk management and the safe use of pesticides.

About one in five Hawai'i farmers was born outside the United States. Many have limited English skills that make their challenging occupation even harder, with potential harmful consequences. The Hawai'i Department of Health determined in 1997 that produce grown by Hawai'i's immigrant farmers was 12 times more likely than the national average to contain unapproved or excessive pesticide residues.

Dr. Sabina Swift, an extension specialist who has taught plant protection in Vietnam, Laos, and her native Philippines, started working with non-English-proficient farmers on O'ahu in 2001. The pesticide safety training program she developed emphasized face-to-face interaction and provided training materials in the farmers' native languages. More than 200 farmers and farm workers learned about pest identification, personal protective equipment, and the proper mixing, application, and disposal of pesticides, while program staff established relationships with respected immigrant community members and gained the trust of clients from the Philippines, Laos, Cambodia, Thailand, Korea, and Tonga, many of whom were wary of government employees.

The program grew to encompass risk management training in 2004. More than 120 underserved immigrant farmers on O'ahu and the Big Island were offered information on integrated pest management, soil fertility, pesticide safety, recordkeeping, crop and business plans, marketing, loans, and taxes by members of the CTAHR faculty, consultants, community leaders, and representatives from government agencies, sometimes aided by translators. The farmers gave the outreach efforts high marks, and many adopted new practices. Use of fertilizers to correct soil deficiencies greatly improved some of the growers' papaya yields. One farmer changed his planting regimen to allow year-round kabocha pumpkin production. Another grew basil for export to the mainland.

During the next three years the outreach program will primarily target Filipino growers, who make up 20 percent of Hawai'i's farmers. A century after the first Filipino plantation laborers, or *sakadas*, arrived in the islands, the college is helping their fellow immigrants and descendants develop their own safe, successful farming operations.

A vegetable grower sells his produce at a farmers' market. About 20 percent of Hawai'i's farmers were born outside the United States.

Photos: Sabina Swift

Hawai'i has 5,500 farms and ranches, but only 21 agricultural extension agents.

Extending a Helping Hand

It's October 26, 2006, and Alton Arakaki is a busy man. He has e-mails and phone calls to answer, farms to visit, familiar plant ailments to diagnose, and unfamiliar symptoms to photograph and sample for further study. With the help of agricultural technician Faith Tuipulotu, he's running a half-dozen field projects at the Moloka'i Research and Demonstration Farm. Later today, he'll be introducing grade-schoolers to production costs and recordkeeping as part of fellow extension agent Rogerene 'Kali' Arce's agricultural entrepreneurship project, the Moloka'i Radish Patch Kids. After that, there's a Moloka'i Community Service Council board of directors' meeting. And given what remains on today's "to do" list, tomorrow's schedule will be just as full.

Photos courtesy of Alton Arakaki

Extension agent Alton Arakaki works with members of the Moloka'i Radish Patch Kids (above) and taro growers attending a field day (below).

There's a good reason why Alton and his colleagues are in such high demand. Hawai'i has 5,500 farms and ranches, but only 21 agricultural extension agents working from nine offices on five islands. These men and women assist Hawai'i producers through individual consultations and site visits, workshops and training seminars, field trials, collaboration with extension specialists and researchers, and participation in community organizations. Their brochures, posters, videos, Web sites, newspaper articles, television appearances, and events make relevant, useful knowledge available to members of the community. In addition to working with agricultural operations of all sizes on issues that encompass crop and livestock production, food safety, conservation, and marketing, they also help gardeners asking questions about plant health, students working on classroom projects, and teachers seeking judges for the science fair.

Like the students they mentor, county agents find lessons and homework at every turn. As Hawai'i's agriculture diversifies, the array of crops that the agents must understand increases. Each year brings new pests and diseases that can have dire economic and environmental consequences. Rapid assessment and diagnosis can mean the difference between an isolated outbreak and an industry-wide threat. CTAHR's agricultural extension agents are few in number, but the impact of their service is profound.

Enriching the Early Years

Learning to Grow supports the efforts of parents, caregivers, and family service professionals to promote children's health, safety, and school readiness.

To flourish, young *keiki* need caring adults and stimulating experiences. The Learning to Grow project, directed by Dr. Grace Fong and Mary Ann Nemoto and funded by the Hawai'i Department of Human Services (HDHS), supports the efforts of parents, caregivers, and family service professionals to promote children's health, safety, and school readiness.

Some Learning to Grow initiatives help recipients of state aid. For parents applying for childcare subsidies, a booklet and video describe the traits of high-quality childcare, compare the available childcare options, and offer guidance on how to interview and evaluate childcare providers. About 3,100 families that use their subsidies for care provided by relatives or friends receive monthly packets featuring tips on child development and safety, helpful resources, and healthy activities for young children. Each packet includes a worksheet that can be completed and returned to Learning to Grow in exchange for a children's book.

Other parts of the project reach broader audiences. An annual campaign to encourage early registration for kindergarten helps families take advantage of programs that support their child's transition to school. Family Resource Network Centers established at 14 elementary schools and community agencies in four counties provide child- and family-related resource materials to families, teachers, and agency staff. Learning to Grow also partners with the Dollywood Foundation to provide a free book each month to more than 2,100 Hawai'i children ages four and under. *Keiki* can register with the Imagination Library program if they live in one of three locations: the Farrington School Complex Area on O'ahu, the Ka'u-Kea'au-Pāhoa School Complex Area on Hawai'i, or all of Maui County.

Still other aspects assist policymakers. HDHS has adopted the project's *Developmental Guidelines for Infants, Toddlers, and Young Preschoolers* as the framework on which to build state policies, regulations, and stipends to improve the quality of all home-based childcare. Through multifaceted outreach, Learning to Grow helps parents and their allies raise children to their potential and prepare them for school.

Photos courtesy of Grace Fong

The Learning to Grow project's publications include a children's book for keiki *preparing to enter kindergarten, early learning activities for infants and toddlers, and child development guidelines that aid family service professionals.*

The proven Learning Connections curriculum has been taught to more than 500 Hawai'i preschoolers.

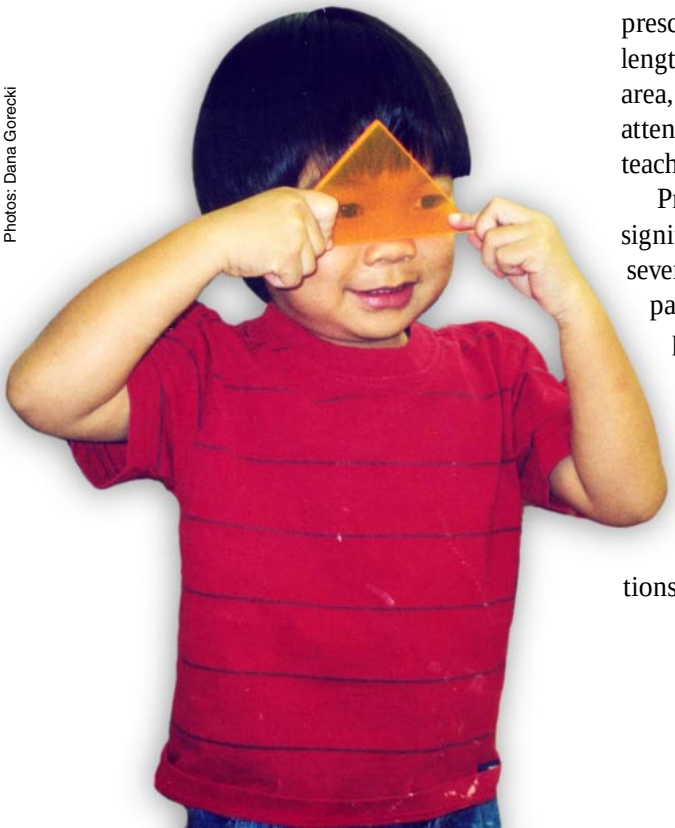
The Skills That Make School Fun

The first day of kindergarten scares many youngsters, but for children affected by poverty, the classroom often remains challenging after the first-day butterflies fade. On average, low-income students enter school less prepared than their wealthier classmates, and these early disadvantages can create barriers to future learning.

The federally funded Head Start program makes high-quality early childhood education and care available to more than 900,000 low-income kids nationwide, including more than 3,000 in Hawai'i. Although Head Start receives high marks for classroom climate, safety, and social interactions, many students still struggle to keep up in elementary school and beyond. To improve the school readiness of Head Start pupils, Dr. Barbara DeBaryshe and Dana Gorecki have developed Learning Connections, a curriculum that nurtures budding literacy and math skills.

Children measure and compare the heights of different structures they've made from blocks.

Learning Connections' literacy component helps children acquire a good vocabulary, hear the sounds within words, understand that print can convey interesting information, and experiment with first attempts at writing. The mathematics curriculum develops skills appropriate for preschoolers: understanding quantities; comparing objects by height, length, and weight; identifying shapes; and exploring the foundations of area, volume, and addition. The varied activities are tailored to short attention spans. The program also includes mentoring and training for teachers and at-home activities that involve parents.



Photos: Dana Gorecki

Preschoolers taught the Learning Connections curriculum score significantly higher than those taught Head Start's base curriculum in several measures of literacy and in math skills. More than 90 percent of parents rated the curriculum as excellent or good, and more than 90 percent of teachers were satisfied or very satisfied with their students' learning, their own mastery of the curriculum, and the mentoring and implementation support they received. Native Hawaiian teachers report that Learning Connections incorporates *aloha*, respect for and acceptance of differences, and *laulima* (working together cooperatively).

By building skills that promote school success, Learning Connections prepares *keiki* for the first day of class and the years that follow.

For Landscapes, CLT Means TLC

Hawai'i's landscape services industry has an annual worth of nearly $500 million and employs more than 10,000 people.

Not all cultivated land produces crops. Public and private parks and golf courses, botanical gardens, and the green grounds and lush lobbies of resorts and residences all shape the experience of living in or visiting Hawai'i. By conservative estimates, our state's landscape services industry has an annual worth of nearly $500 million and employs more than 10,000 people, adding about 130 jobs per year.

To meet this demand for skilled workers, CTAHR collaborates with the Landscape Industry Council of Hawai'i to train and certify landscape professionals. Established in 2000 through a Hawai'i Department of Labor and Industrial Relations grant to the Hawai'i Island Landscape Association, the Certified Landscape Technician (CLT) program currently operates on O'ahu, the Big Island, and Kaua'i. Education specialist Jay Deputy administers the program statewide and coordinates training on O'ahu, while extension agents Virginia Easton-Smith and Ty McDonald help conduct the certification exam on the Big Island.

Photo: Gloria Maker

Candidates (at right), judges (in orange vests), and other officials at the 2006 O'ahu Certified Landscape Technician certification exam, held in September at Ho'omaluhia Botanical Garden. Program administrator and O'ahu training coordinator Jay Deputy stands at farthest left.

The training includes evening classes on landscape maintenance and a two-day intensive course on irrigation. About half of the students opt to take the certification exam, a challenging, day-long, nationally standardized test offered in more than 30 states. The written and hands-on exam components cover varied topics: how to read plans, identify plants, conduct first aid, plant trees, lay sod, prune, program and repair irrigation systems, apply fertilizers and pesticides, and use plant and lawn care machinery. Both locally and nationwide, about 10 percent of test takers pass on their first attempt. In seven years, Hawai'i's CLT program has educated about 1,000 trainees and certified 135 landscape technicians.

Photo courtesy of Matt Lyum

A CLT exam candidate prepares to demonstrate his mowing skills.

Beyond its aesthetic and economic benefits, CLT training has implications for human and environmental health. Proper management can limit the spread of pests and plant diseases, overuse of water taxes a limited resource, excess fertilizer in runoff can suffocate aquatic ecosystems, and unlike most farmers, landscapers use pesticides in residential and heavily trafficked locations. By partnering with industry, CTAHR is helping keep our neighborhoods and our natural landscapes green.

COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

University of Hawai'i at Mānoa

3050 Maile Way, Gilmore Hall 202

Honolulu, HI 96822

www.ctahr.hawaii.edu

ADMINISTRATION

Andrew G. Hashimoto, Dean and Director, 808-956-8234

C.Y. Hu, Associate Dean and Associate Director for Research 808-956-8131

Wayne Nishijima, Associate Dean and Associate Director for Cooperative Extension, 808-956-8397

Charles Kinoshita, Associate Dean for Academic and Student Affairs, 808-956-6997

Kelvin Sewake, Interim Hawai'i County Administrator, 808-981-2823

Terry Sekioka, Interim Kaua'i County Administrator, 808-274-3471

Harold Keyser, Maui County Administrator, 808-244-3242

Ray Uchida, Interim O'ahu County Administrator, 808-956-7138

DEPARTMENTS

Family and Consumer Sciences

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Human Nutrition, Food and Animal Sciences

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Molecular Biosciences and Bioengineering

Harry Ako, Chair, 808-956-8384

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Plant and Environmental Protection Sciences

J. Kenneth Grace, Chair, 808-956-7076

Tropical Plant and Soil Sciences

Robert E. Paull, Chair, 808-956-8351

Impact Report Staff

Dale Uno, Director, Office of Communication Services
Kathleen Vickers, Writer
Dale Evans, Editor
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Diversifying, Sustaining, Strengthening






2006 IMPACT REPORT

Honoring Our Past,
Securing Our Future