

CENTER FOR
**TROPICAL AND SUBTROPICAL
AQUACULTURE**

*Regional
e-Notes*

Letter from the Director

Aloha!

In this month's issue of *Regional e-Notes*, you will find the CTSA Request for Pre-Proposals announcement for the FY2010 funding cycle. The deadline to submit a short pre-proposal is April 16, 2010. Please see below for more information on this and other funding opportunities. Also in this issue is an article about an inexpensive, relatively maintenance-free aquaponics system designed by CTSA researchers.

I would like to take this opportunity to introduce the newest member of the CTSA team: Maggie Ma, our recently appointed Administrative Assistant. Maggie will be coordinating the day-to-day operations of the CTSA office, and we look forward to working with her. With the addition of Maggie, our team of dedicated professionals will continue to improve on the service we provide to the industry and advance the mission of our organization.

If you have any suggestions, concerns, or comments, please do not hesitate to let us know.

Mahalo,

Cheng-Sheng Lee
Executive Director, CTSA

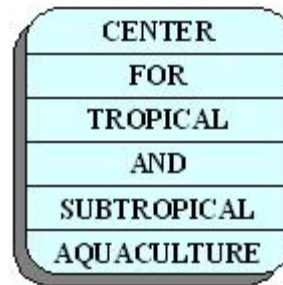
P.S. Please take a moment and celebrate the recent breakthroughs and accomplishments of our colleagues in the USDA Agricultural Research Service (ARS) Aquaculture Program's newly-released Summary of Research Accomplishments, [found on the CTSA website \(click here\)](#).

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CTSA FY 2010 Funding Opportunities

The Center for Tropical and Subtropical Aquaculture (CTSA) requests pre-proposals for aquaculture applied research that addresses problems and opportunities for the aquaculture industry in the CTSA region within the strategic areas defined below. Special emphasis will be given this year (CTSA Fiscal Year 2010) to the priorities specified under each strategic area. Pre-proposals that target these priority issues will receive highest preference. However, pre-proposals addressing critical problem areas not listed below are also welcome and will be considered. If you are submitting a proposal for an unlisted priority, it will be advantageous to prove that your project has industry support. Any projects that have farmer contact must include significant, deliverable extension efforts. CTSA strongly encourages interagency/interinstitutional cooperation and shared funding of priority projects.

[Strategic Areas and FY 2010 Priorities \(summary\)](#)

Species Development and Production: Highest priority will be given to pre-proposals targeting small farm viability through the development of new species for niche markets (especially for freshwater food fish); expansion of culture for white shrimp in low-salinity conditions; and multiple markets for a single species, etc.

Systems Development:

Highest priority will be given to pre-proposals related to the following areas: farm-appropriate alternative energy systems; integrated systems of aquaculture and plant crops, i.e. aquaponics (development and/or regional extension); and utilization of locally-available resources (i.e. using local by-processing products to develop feeds).

Information/Technology Transfer:

Programs utilizing workshops, videos, distance learning, and other multimedia to offer continuing education to aquaculture farmers in the region are sought.

Pacific Island Development:

Pre-proposals centered on technology transfer of existing technologies will receive highest priority. The USDA also strongly favors work done by researchers within the region.

Pre-proposals are limited to two pages in length; complete formatting guidelines are available on the CTSA website (link below). When submitting pre-proposals, researchers must identify the strategic area and priority targeted. All pre-proposals received by the deadline, Friday, April 16, 2010, will be reviewed by CTSA's Industry Advisory Council (IAC). Only some pre-proposals (selected by the IAC) will move forward with requests for a full proposal. Full proposals will receive both internal and external review for technical quality and industry impact. Full proposals approved by the CTSA Board of Directors and the USDA as part of the CTSA FY10 Plan of Work are expected to have funding available for implementation by July 2011.

CTSA typically does not fund projects for more than \$100,000 per year. CTSA gives preference to projects that will deliver the most benefits at the lowest cost. Due to its limited project budget, CTSA will distribute funding to the highest ranked proposals until it has exhausted all available funds.

For information on eligibility, proposal guidelines, and submission instructions, please see the full announcement on the CTSA website: [CTSA FY2010 Request for Pre-Proposals](#).

Aquaponics in the Pacific: Studies Using a Nutrient Flux Approach

By: Harry Ako and Adam Baker

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Our initial interest was to develop an aquaponics system for use in the Pacific Islands. Such a system could grow a cash crop for sale to restaurants, such as lettuce, along side fish, which are prized by local residents as food. In the system, fish would be fed and subsequently release metabolites into the water. These metabolites would be converted to non-toxic nutrients by bacteria in the water and would then be transferred to plants to provide nourishment.

Before we began developing our system, we completed a comprehensive literature review and found that after 15 years of research, there were no commercial aquaponics producers. This indicated that something was lacking in previous research, and this void had to be remedied. We also found that much of the lettuce people consume is produced by hydroponics, or growing plants in fertilized water. Realizing that multidisciplinary research saves time and effort, our initial research relied heavily on colleagues in plant sciences, including CTAHR Professors Bernie Kratky and Kent Kobayashi. We also leaned heavily on Ray Uchida's Agricultural Diagnostic Service Center for Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES).

In our research, we provided lettuce plants *Lactuca sativa* with a fertilizer whose composition reflected a consensus among hydroponics scientists (which saved us trial and error time). The

nutrients taken up over the full growout period (six weeks) were quantified by ICP-AES, and we obtained an assessment of nutrient needs for lettuce plants. We tested our list of nutrients needs by modifying concentrations in hydroponic solutions and observing whether lettuce plants grew as predicted or whether the hypothesized nutrient needs were inaccurate. The hypothesized nutrient needs were accurate. This provided a target amount of nutrients fish would need to provide. Without this target, many trial and error trials would have been required.

Tilapia *Oreochromis* sp. were stocked in 200 L shaded tanks that were vigorously aerated and provided with a biofilter. Shading was intended to prevent microalgae from growing and using up plant nutrients. Vigorous aeration was intended to provide oxygen to the fish, which were grown at high density (e.g., 20 kg/m³). The vigorous aeration prevented denitrification (conversion of nitrate, the plant fertilizer, to nitrogen gas, which would be lost). The biofilter converted toxic nitrogen metabolites to non-toxic nitrate. In the experiments, fish biomass and feed inputs were increased and fish water chemical profiles were determined, again by ICP-AES. Fish water suitable for 48 lettuce plants harvested once every 5-6 weeks was achieved when 2.3-2.5 kg of tilapia were fed 40-59 g of feed/day. This water contained benchmark levels of 44-49 mg/L nitrate nitrogen. This critical result and the hardware needed to obtain this result (only one air pump) defined the needs for an inexpensive and relatively maintenance free aquaponics system.

Several growth trials were conducted as a proof of concept. Mean head weights of lettuce plants were obtained during various times of the year. Controls were hydroponics, and experimental growouts were aquaponics. In all cases, the fertility of the water met specifications for aquaponics trials, with the exception of the September trial, which only met specifications during the rapid growth phase of the lettuce. Lettuce head weights varied from 157 to 345 g, and the size of the heads depended on the light available (shades of Biology 101, plant growth depends of the availability of light!)

Based on our findings, we were able to develop an inexpensive, easy-maintenance aquaponics system, and shared our results at the Governor's Aquaculture Week Proclamation held at Magoon Agriculture Research Station in May of 2009 (pictured). Our aquaponics system is suited for transfer to remote Pacific Islands, as well as transfer among aquaponics farmers and backyarders in Hawaii interested in a more sustainable lifestyle. Once we had enough preliminary data, we planned a small workshop for interested fellow aquaculturists. However, we were surprised when 205 people reserved seats for our workshop, held in November of 2009. Attendees included the usual aquaculturists, as well as non-traditional interest groups that do not frequent aquaculture workshops. These included dirt farmers interested in expanding into aquaponics, backyarders interested in a greener, homegrown, and more sustainable lifestyle, and a group of Hawaiian Homesteaders with a love of fish and fish culture.

There have been a large number of requests for extension services. Presently, the challenge has been to provide CTAHR-quality extension assistance to stakeholders in a timely manner. The assistance must be clear and concise, but most importantly, based on very sound research. We are attempting to assist the Department of Hawaiian Homelands to construct an aquaponics unit in each of the new solar panel-equipped homes they are building. We are also attempting to assist the Institute for Human Services grow their own vegetables for their homeless clients. Schools are using the system to teach the science involved with the nitrogen cycle to students. Some dirt farmers are expanding into aquaponics with the system, and several of our traditional clients are now attempting aquaponics.

Similar systems have also been developed by other members of the team. Preliminary experiments by Bradley Fox MBBE and Clyde Tamaru MBBE are yielding revolutionary results for the cultivation of kalo *Colocasia esculenta*. While this crop is in need of further research, aquaponics growth of this species seems to be occurring much faster than when using traditional dirt farming methods. We look forward to the future of aquaponics, and are excited to be a part of its constant evolution.

The system is only \$250 to construct, and is made from easy-to-find materials. [Please click here to download the how-to manual for our aquaponics system.](#)

March AquaClip - Aquaculture and Agriculture Funding

\$50,000 Available in Grants for Agriculture Businesses

Published: HonoluluAdvertiser.com (author unknown), March 2, 2010

O'ahu farmers, ranchers and agricultural entrepreneurs can get up to \$50,000 in grants for projects from the O'ahu Resource Conservation and Development Council.

A two-page proposal to "sell" the project to a steering committee is due April 5. Finalists will have to submit a more detailed request.

Example of projects funded in the past include \$6,000 to install fish tanks, \$35,000 to clear agriculture land, \$13,000 to upgrade irrigation, \$47,000 for processing equipment and \$21,000 for a greenhouse.

Awardees are required to provide at least 20 percent of the cost of their projects. Obtain the proposal form from www.oahurcd.org or e-mail O'ahu RC&D at admin@oahurcd.org or call 483-8600, ext. 122

The Center for Tropical and Subtropical Aquaculture (CTSA) is one of five regional aquaculture centers in the United States established and funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) under grants 2005-38500-15720, 2006-38500-16901, 2007-38500-18471, and 2008-38500-19435. The regional aquaculture centers integrate individual and institutional expertise and resources in support of commercial aquaculture development. CTSA was established in 1986 and is jointly administered by the Oceanic Institute and the University of Hawaii.