CENTER FOR TROPICAL AND SUBTROPICAL AQUACULTURE

Regional e-Notes ~ February 2024 ~ Volume 16, Issue 2

Letter from the Director

Aloha,

Earlier this month, CTSA participated in the 2024 Agriculture Awareness Day at the Hawai'i State Capitol in Honolulu. The annual event coincides with the beginning of the legislative session, and according to event sponsor Hawaii Farm Bureau, it is an opportunity for policymakers and the public to learn about Hawaii's agricultural industry and meet the organizations and people behind locally grown products.

The event complemented presentations to the Senate Committee on Water and Land by government officers, industry and researchers, who argued that Hawaii needs aquaculture to meet consumer demands. The projection that Hawaii can earn $600 million in annual revenue from aquaculture within the next ten years is only achievable if we all work together. However, farmers and would-be-entrepreneurs often indicate that current regulations are difficult and expensive to meet. We all care about the environment and want to protect it while simultaneously producing food from our pristine waters; we must create realistic ways to do this on a larger scale. Further communication between the government and commercial producers regarding regulations and regulatory processes is essential to our industry success. CTSA would like to see more contributions from our region to US aquaculture, such as those of the CTSA bivalves project (led by PI Dr. Maria Haws) to the mainland oyster industry. This project was highlighted as a major output of the RAC program in the recently completed NAA review (shared in an article below). The government must also take an active role in enticing businesses to stay in Hawai'i for the long term; otherwise, we run the risk of producers coming to Hawai'i to prove their concepts and then leaving to expand commercial operations in locations with more favorable aquaculture regulations and policies. This severely limits the benefits for our local economy and seafood supply.

The bottom line is that there must be more local government support for aquaculture in order for our industry to expand and meet the growing food security and economic needs of our islands, and to make Hawaii aquaculture strong again. I was fortunate to be a researcher in Hawaii during the heyday of aquaculture research in the 1980's - desirable products such as SPF shrimp were created and offered worldwide, putting us on the global aquaculture map. The time has come for us to rediscover what will set us apart in this new age.

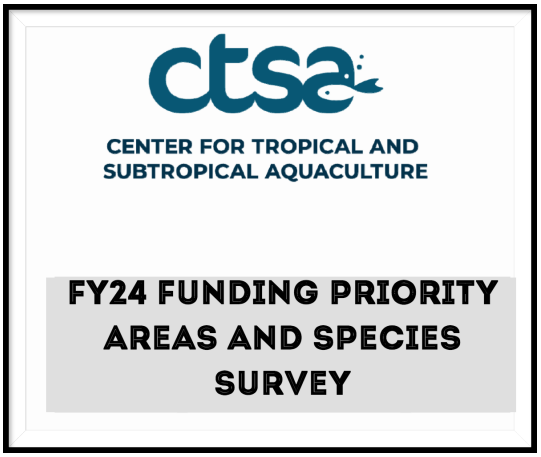
Aquaculture development in remote regions like ours relies heavily on partnership; it is an essential element to success. There is a clearly defined need and market for Pacific Island seafood, we just need to overcome the hurdles in front of us to find our unique products and share them with the world. To this end, we are very grateful to those of you who shared your thoughts on regional aquaculture development in our recent survey; the results are shared in the article below. As always, we welcome and appreciate your input and suggestions. This month, we are requesting your input on the priority areas for our FY24 funding cycle; please take a few moments to take the survey described below, and we will do our best to support research that addresses those issues.

Last but not least, I would like to take this opportunity to welcome the new CTAHR Dean Dr. Parwinder Grewal to the CTSA Board. We look forward to working with him for the future of aquaculture in our region. Click here to learn more about Dr. Grewal.

Mahalo,
Dr. Cheng-Sheng Lee
Executive Director, CTSA

Mahalo for Your Input! CTSA 'Aquaculture Development

Survey' Results and New CTSA FY24 Priority Areas Survey



CTSA would like to thank everyone who took the time to participate in our recent Aquaculture Development survey! The results provide a short but valuable snapshot of industry opinions:

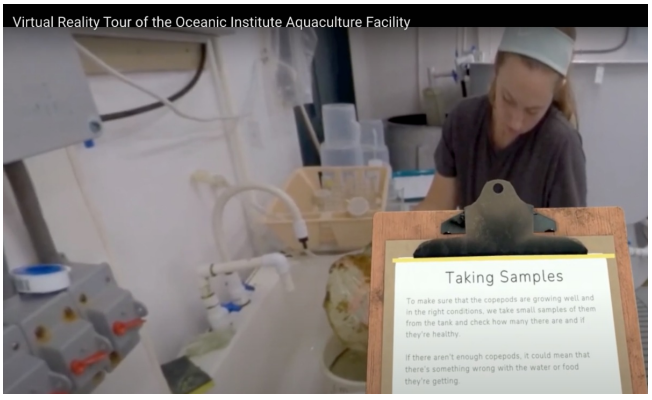
- 50% of survey respondents indicated that the development of new technologies is the single most important regional aquaculture development priority, followed by feed development.
- When it comes to important tools to stimulate aquaculture in the Western Pacific Islands, 71% of respondents indicated that virtual training would be beneficial, with 29% indicating that hands-on training is important.
- The survey also asked about CTSA-funded projects and species that have stood out for their positive impacts; respondents mentioned work on aquatic animal diagnostic testing, fish cage culture, marine ornamental fish, invertebrate culture, marine polychaete culture, ogo, and sea cucumbers, among others.
- Finally, we asked respondents to finish the statement: "many think that aquaculture is important for the future of Hawai'i and the Pacific Islands, but in order to move forward, the industry needs..." The following are the responses: better and more cohesive regulations between all state departments; better information sharing between departments and stakeholders; more attention to the needs of the Western Pacific Islands including Guam; more exposure to spark interest and growth within the aquaculture industry while being able to make a decent living for a sustainable future; more assistance at local, state, and federal level; more investment; more understanding of its end market and the economic realities of production and distribution; a training center; more funding for smaller projects; renewable energies for aquaculture; less government limitations; recognition that Hawaii is remote to the mainland USA and must work from its strengths (innovation); new people getting involved in the industry.

The results of the survey also played a role in the development of our FY24 Priority Areas survey. In an effort to get the most complete picture of the needs and priorities of our regional aquaculture industry, we are calling for your assistance and input. **Please click here to take our FY2024 Priority Areas and Species survey to help us determine the priority species and areas of focus for the FY2024 development cycle. Please complete the survey by March 31.**

This survey lists the priority areas included in our FY23 'Request for Pre-Proposals,' released last year, and requests that participants indicate whether or not each area remains a priority for regional aquaculture development and funding support. There is an option to write in new priority areas that were not identified in FY23.

The survey should only take a couple of minutes to complete. Please email Meredith Brooks at mbrooks@ctsa.org with any questions or other suggestions. We will release the FY2024 Request for Pre-Proposals in the April 2024 issue of e-Notes, and are developing the priority areas with input from our Industry Advisory Council, Technical Committee, Board of Directors, and stakeholders like you!

CTSA 2023 Annual Progress Report 'Project Summaries'



As part of our NIFA reporting requirements, CTSA must submit a comprehensive Annual Accomplishment Report to the USDA. This 100+ page report features full progress reports of ongoing CTSA-supported projects, as well as final reports of projects that were completed during the calendar year.

In an effort to consolidate information for our stakeholders, CTSA has prepared a 2-page summary of each project that was active during 2023. These summaries are included as one part of the AAR that will be sent to NIFA. Each summary provides a brief description of the project, as well as the

anticipated benefits, impacts, and current progress of the work being done. Click here to read the Summaries. The following are brief highlights from some of the recently completed projects:

Development of an Immersive Virtual Reality Experience for Increasing Engagement in Aquaculture
Access to aquacultural facilities is highly restricted, making the outreach of aquacultural practices to the community difficult and limited. At the same time, knowledge of the aquaculture industry among the general public often consists of misconceptions and prejudices. The result is declining interest in those considering aquaculture as a future career. This project, led by Dr. Jason Leigh (UH Manoa), explored the use of virtual reality (VR) capture and display technology to help overcome outreach limitations. The goal was to create a virtual aquaculture experience that allows individuals to experience various aspects of aquaculture as a profession without having to be physically present at an aquaculture facility. This project was conducted in partnership with the Oceanic Institute of HPU Finfish Department. The project developed a virtual tour covering 4 areas of Oceanic Institute: the Algae lab, Copepod Lab, Adult tanks, and Hatchery. The experience consisted of a mixture of navigating around the facility, viewing and listening to a 3D 360 video explaining of the work that took place in each of the locations, and an interactive experience where they had to look into a microscope to count the copepods. Once developed, the VR simulation was exposed to students with very little to no prior knowledge of aquaculture. The simulation was found to significantly increase their interest in the topic, with an average score of 75%. The VR experience was rated 80% for comfort level and 75% for the likelihood of recommending it to others and being interested in other courses taught in VR. Additionally, 75% of the participants became more favorable about virtual reality after the experience. The interactive components of the VR experience were preferred over traditional explanatory ones. A video of the VR experience is available:
https://vimeo.com/891697971

Design of a Harvesting System for the Marine Polychaete, *Marphysa sanguinea* (Phase 1)
It is estimated that >10,000 kg of frozen marine polychaetes are imported into Hawaii annually to support shrimp breeding activities (cost > $400,000 per year). To reduce this reliance on imports and with funding from CTSA, Dr. Dustin Moss and research team members at Oceanic Institute have collected and evaluated several polychaete species from Hawaii for their aquaculture potential and use as a shrimp maturation feed. *Marphysa* has been selected as the primary candidate for culture in Hawaii based on its large size (up to 25 cm), high palatability to *P. vannamei* broodstock, good to excellent biochemical profile, and excellent performance in a recent shrimp maturation trial. Culture techniques were developed under the previous project and a commercial-scale growout trial was recently concluded. As part of this trial, the lack of an efficient harvesting system was identified as a significant impediment to commercial culture of *M. sanguinea* in Hawaii. Thus, this Phase 1 project developed an engineering design and prototype for a harvesting system. Results from a worm production trial suggest that sand is best for worm reproduction and/or production of small juvenile worms. Also, coral rubble appears to be the best for production of large worms. Results also show that gravel is likely to poorest sediment of the three tested, as (in general) gravel had lower worm production (final biomass). As part of this trial, a harvesting system using a small concrete mixer was developed. The mixer is used to slowly churn the sediment while a seawater hose (~100 lpm) is used to flush the worms that have been separated from the sediment into a harvesting net. The system can process ~0.03 m3 of sediment in about 3 minutes and yield ~36 g of worms. While this system works very well for harvesting relatively small amounts of worms, a better system will be needed for the commercialization of *M. sanguinea* farming in Hawaii.

Upgrading Black Soldier Fly Larvae Meal for Aquatic Feeds Using a Sustainable Microbial Process, Years 1 and 2
Availability of affordable and sustainable feeds is a major challenge facing regional aquaculture development in Hawaii. Solutions to this challenge will likely come from using locally sourced ingredients, especially if these ingredients can be derived from wastes at low costs. To this end, meals of insect larvae reared on abundant organic waste substrates (e.g., food waste and farm organic waste) represent a promising source of proteins to replace costly and unsustainable fish meals. Among the insect species, black soldier fly (*Hermetia illucens*; BSF) has received the most attention as its adults are not pests and very dense larvae biomass can be produced in large scales using abundant organic wastes with relative ease. Hawaii has a sizeable hospitality industry and many large food establishments and major supermarket chains here generate a vast amount of food waste. Local agricultural production and processing also generate organic wastes that may be utilized toward insect farming. This project, led by Co-PIs Dr. Wei Wen Su (UH Manoa) and Dr. Armando Garcia-Ortega (UH Hilo), focused on developing BSFL meals with improved nutritional values by employing solid state fermentation to increase protein content while reducing fat and chitin contents, by employing GRAS edible microorganisms like *Aspergillus oryzae* and *Yarrowia lipolytica*.

In the first year of this project, the research team was able to verify that*Aspergillus oryzae*, commonly known as the koji fungus, can use the Black Soldier Fly Larvae (BSFL) fat as its main carbon source. In the second phase of the project, the primary objective was to further advance the optimization of the conversion of excess fats and chitin in BSFL meal into edible proteins. The research focus remained on enhancing the solid-state fermentation (SSF) process utilizing the koji fungus. A low-cost bioreactor was successfully developed to culture koji on BSFL meal in SSF under a controlled environment. Fermented and unfermented BSFL meals were produced and then subjected to proximate analysis, as well as measurements of amino acid and fatty acid profiles, to characterize the nutritional changes done by the koji fermentation process. The results demonstrated that the simple SSF successfully reduced the fat content in the BSFL meal while simultaneously raising the overall protein content. A feeding experiment with hybrid tilapia was performed in an RAS. Results indicate that fermented BSFL meal can be included in tilapia

feeds at levels up to 19% of the total weight of the diet or levels up to 25% of the total protein in the diet without significantly affect fish growth compared to FM-based feeds. The results also indicate a positive effect of BSFL meal dietary inclusion in the omega-3 fatty acids deposition/retention in fish compared to FM, as it appears to optimize the fatty acid utilization by the fish.

NAA Released In-Depth Program Review of RACs

The National Aquaculture Association (NAA) has released its in-depth programmatic review entitled **A Review of the Regional Aquaculture Center Program: A Unique, Farmer-Driven Program Advancing U.S. Aquaculture**. An independent Review Team consisting of Carole Engle, Gary Fornshell, John Hargreaves, and Gary Jensen worked for a two-year period interviewing 76 Center staff, farmers, researchers, and Extension representatives and examining Regional Aquaculture Center administrative procedures, reports, analyses, and websites.

CTSA would like to extend our appreciation to our PIs and research teams for their hard work and innovative solutions to regional aquaculture challenges. We would also like to thank the aquaculture community for your continued support of our program.

The Review Team's key findings were:

- Dramatically under-funded for diversity of U.S. aquaculture.
- Strong support to continue the program.
- Generated strong economic impacts on major sectors.
- Supported proof of concept for many species.
- Created foundation of knowledge to overcome husbandry bottlenecks.

The Review Team's key recommendation was:

- Increase the annual budget of the Regional Aquaculture Center program to $20 million per year, with periodic adjustments for inflation.

FINAL CALL! Deadline to Complete 2023 Census of Aquaculture March 1, 2024

The U.S. Department of Agriculture National Agricultural Statistics Service (NASS) has mailed the 2023 Census of Aquaculture to all producers who indicated in their 2022 Census of Agriculture that they produce and sell aquaculture products. The deadline to respond has been extended to March 1, 2024.

Farmers that did not receive a Census or lost their survey form are strongly encouraged to download, fill out the Census and mail it to Census of Aquaculture, 1201 East 10th Street, Jeffersonville, IN 47132 on or before March 1st.

An ag census special study, the Census of Aquaculture will provide comprehensive aquaculture data at the state and national levels, including production volume and methods, surface water acres and sources, and sales. Federal, state, and local governments, agribusinesses, trade associations, and producers use these data.

NASS has made survey response more convenient with their online Respondent Portal at www.agcounts.usda.gov. On the site, producers can complete their NASS surveys, view historical reports, and access other resources.

In addition, NASS has released data from the 2022 ag census. It is available online at nass.usda.gov/AgCensus.

Reminder About the New USDA Publications Policy

This notice is to inform CTSA subawardees and any other affected parties of an important update regarding compliance with the recently implemented USDA Departmental Regulation (DR) 1020-006. It is now a condition of all awards that published work from NIFA-funded projects must be deposited on PubAg.

Departmental Regulation (DR) 1020-006 makes all peer-reviewed, scholarly publications and digital scientific research data assets arising from unclassified scientific research, supported wholly or in part by the USDA, accessible to the public to the extent practicable. DR 1020-006 implementation began in FY 2023 (October 1, 2022) and applies to NIFA awards, contracts, and cooperative agreements.

Under this new regulation, all CTSA subawards are required to comply with the policy that mandates the reporting of all published work wholly or partially funded by CTSA on PubAg. This requirement has been integrated into the CTSA subaward reporting requirements and CTSA Publication policy.

Who does this apply to for NIFA funding:

· Awards, contracts, and cooperative agreements starting on or after October 1, 2022.
· Any awards, contracts, and cooperative agreements previously awarded which are active in FY 2023 and any fiscal years moving forward.

What types of items are covered by these requirements:
· This policy covers scholarly publications and digital scientific research data assets produced in whole or in part using NIFA funding.
· Awardees and contractors who use NIFA funding, but do not produce scholarly publications and/or digital scientific research data assets do not need to take these actions unless they generate either of those products during their funding's period of performance.

Resources on Public Access Requirement:
· https://www.nifa.usda.gov/public-access-nifa-funded-work
· How to Submit Publications to PubAg
· Frequently Asked Questions.

AquaClip: U.S. updates its National Aquaculture Development Plan for first time in 40 years

For the first time since 1983, the United States is updating its National Aquaculture Development Plan — and has opened a 45-day window for public comments on the draft.

The National Science and Technology Council's Subcommittee on Aquaculture is inviting public feedback on the draft Overview of the National Aquaculture Development Plan (NADP), which is comprised of three strategic documents.

Two of these, Strategic Plan to Enhance Regulatory Efficiency in Aquacultureand the National Strategic Plan for Aquaculture Research, were finalized in 2022.

The third document, the draft Strategic Plan for Aquaculture Economic Development, is now open for public comments until April 5, 2024.

Once all the strategic documents are finalized, they will form a comprehensive National Aquaculture Development Plan aimed at advancing aquaculture "to support public health and nutrition, resilient communities, a strong economy, and a healthy planet," NOAA Fisheries Office of Aquaculture said.

The authors of the new plan acknowledge that the update has been a long time coming.
In the introduction to the draft NADP Overview, they note that, "While the National Aquaculture Act [of 1980] called for periodic updates of the NADP, a comprehensive update has not been completed until now."

"The original NADP drafted four decades ago does not capture the progress the U.S. aquaculture community has made to develop and adopt scientific advancements and sustainable aquaculture practices," they continue.

The updated NADP — including the 3 thematic plans on research planning, regulatory efficiency, and economic development — identifies "specific opportunities to support ongoing research, foster new partnerships, and increase both internal and external awareness of the benefits and risks of aquaculture."

Source: WeAreAquaculture.com // Read Full Article

This newsletter is written and prepared by the CTSA Information Specialist Meredith Brooks.
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 active grants 2020-38500-32559 and 2022-38500-38099. 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 University of Hawaii and the Oceanic Institute of Hawaii Pacific University.

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