CENTER FOR
TROPICAL AND SUBTROPICAL
AQUACULTURE

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Letter from the Director

Aloha,

2022 is off to a great start with recent news highlighting the importance of the seafood industry and its impacts across several aspects of our society. A third of participants in a Global Seafood Alliance survey indicated they will reduce their red meat consumption, 39% of whom will shift to consumption of seafood. Another study in Alaska confirmed seafood's significant contributions to the State's economy. Locally, Hawaii's governor has declared 2022 as the Year of Limu (macroalgae). Coupled with the strong support for national aquaculture from several political entities in our region, there is a lot of momentum for the expansion of U.S. seafood and aquaculture production. This is especially true in the Pacific Islands where abundant natural resources and tropical climates are able to support sustainable growth. Earlier this month, veteran farmer Mr. WM Okamura shared data and photos with me demonstrating that tilapia in Hawaii can grow upwards of 16 pounds! It is my desire for our program to continue investigating the many possibilities this region holds. To this end, and as you may have heard, the NAA will be conducing a comprehensive review of the Regional Aquaculture Center program over the next two years. CTSA is looking forward to receiving recommendations from the review panel experts to increase our impacts on regional and national aquaculture development.

Other exciting seafood-related news is the donation from Facebook founder Mark Zuckerberg and his wife Dr. Priscilla Chan to the University of Hawai'i at Mānoa's School of Ocean and Earth Science and Technology (SOEST). I am hopeful that their significant investment will increase our overall understanding of the ocean, and consequently the preservation and restoration of productive and healthy ocean ecosystems. Any resulting increase of seafood availability will help meet the growing consumer demand for seafood, up significantly since the start of the Covid-19 pandemic. The recently launched Seafood MAP by the Global Sustainable Seafood Initiative is also aiming to help meet that demand of more sustainable seafood for everyone. I hope that this joint effort by several entities including UN FAO will increase the world's supply of sustainable seafood from fisheries and aquaculture.

As always, I welcome your questions, comments and discussion!

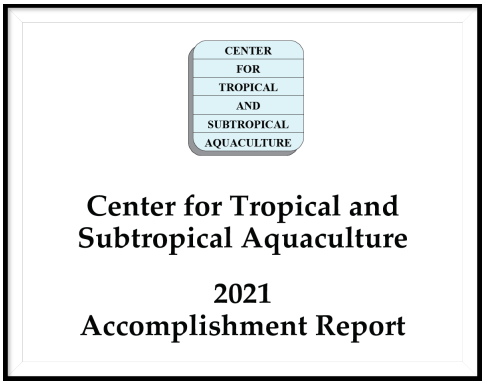
Mahalo,
Dr. Cheng-Sheng Lee
Executive Director, CTSA

CTSA 2021 Annual Progress Report Summaries Now Available for Download

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 2021. 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 download the Summaries. The following are brief highlights from some of the ongoing and recently completed projects:



Diagnosing Prevalent Diseases of Aquacultured Animals in Hawaii

The primary purpose of this project (completed in 2021) was to identify the diseases of concern to the fish-producing industry and then compare lethal to non-lethal methods of testing. The project also aimed to screen certain species of imported and domestic commodity fish for specific pathogens. Based on an industry needs assessment and literature review conducted by the PIs, a list of the six most diseases of concern to Hawaii producers was compiled: KHV, SVC, TiLV, Fno, OsHV, and *S. iniae*. Fin and gills were sampled as nonlethal methods from tilapia and koi and compared to lethal tissue sampling. Unfortunately, non-lethal samples could not be obtained from oysters. PCR assays were validated at the UHADL for the six diseases. 928 tissue samples were collected from participating farms and purchased from markets for analysis. All of the tilapia sampled from five markets were negative for Fno, TiLV, and *S. iniae*. Two of the four tilapia farms had positive detections for Fno (spleen +/- liver). All cyprinid samples (two farms, five markets) were negative for KHV and SVC. All oyster samples (four farms, six markets) were negative for OsHV. HDOA and local producers now know that the UHADL is able to perform PCR testing for these diseases of concern. Negative test results help assure the producers and HDOA confidence of freedom from specific diseases.

Establishing cost-effectiveness and efficiency of locally produced feeds and Moi farming technology in the Republic of Marshall Islands [Years 4-5]

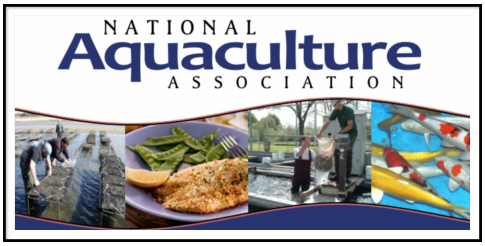
This ongoing 2-year project is aiming to refine local Moi feed and farming technologies in order to transition into commercial production and transfer aquaculture technology. Market research indicates that Moi has a great commercial potential. Plus, it is highly prized for excellent flesh quality, fast growth, and adaptability to conditions of captive culture. As with all RMI projects, training is an essential part of this project. In March 2021, three cages were stocked with juveniles for two trials; the cages experienced high mortality, likely due to feed that included contaminated fishmeal. The issue was resolved in Summer 2021, and results from the current cage trial are showing above 90% survival in the cages. The future trials in early 2022 will answer remaining questions. New protocols have helped increase survival, including changing the net out every month and sun drying. The project also continued training for the cage manager, two cage technicians, and two hatchery technicians. The five trainees learned hands-on hatchery husbandry (live feeds, larval rearing and nursery protocols), cage growout husbandry, proper feeding, water quality, operations of boats, boat engine maintenance, cage anchoring systems, cage net maintenance, rope tying and gaining experience with scuba. The trainees will continue to train throughout the second year of the project. This project is helping to increase local knowledge of fish husbandry and feed manufacturing. It is promoting waste reduction and the use of more agricultural inputs and outputs (feeds, fish). In addition, the project is hoping to increase production of fish for local and commercial consumption, and reduce dependency on imported goods and fuel, leading to improved self-reliance and food security. The project is also making strides in creating a local aquaculture workforce with an increased income.

Upgrading Black Soldier Fly Larvae Meal for Aquatic Feeds Using a Sustainable Microbial Process, Years 1 and 2

This project is seeking to develop black soldier fly larvae (BSFL) meals with improved nutritional values by employing solid state fermentation to increase protein content while reducing fat and chitin contents, utilizing GRAS edible microorganisms like *Aspergillus oryzae* and *Yarrowia lipolytica*. In addition to an initial study to establish culture conditions that support koji culture on BSFL meal, researchers have made good progress during the first project year in the design and testing of a packed-bed bioreactor for culturing the koji. The reactor / growth chamber is a box that can accommodate 5kg of powder, enough for one fish trial. The research group is currently working to consolidate wires into electronics with a smaller footprint, as they need to create a humid environment to grow microbes in the box. Boxes can be stacked to scale up production. The research group has also optimized and simplified the procedure to extract chitin from BSFL for analytical purposes. In addition, students and staff have been trained to conduct the initial studies. The proposed “microbial defatting” of BSFL meal is superior to oil extraction using organic solvents such as hexane, or by mechanical pressing. The proposed microbial conversion approach is intended not only to reduce the fat content in the BSFL meal, but also to convert the fat to additional proteins, in a way that is low-cost, scalable, and with low energy inputs.

Read More Project Results

NAA Conducting USDA Regional Aquaculture Center Programmatic Review



The National Aquaculture Association (NAA) proposed and has been funded by the US Department of Agriculture, National Institute of Food and Agriculture (NIFA), to conduct a programmatic review of the five US Department of Agriculture supported Regional Aquaculture Centers.

The NAA highly values the fundamental paradigm that undergirds the Centers. This paradigm consists of three interconnected efforts: farmer advisory committees, university or laboratory-based scientists, and aquacultural extension specialists. Functionality is achieved through farmers identifying, prioritizing and selecting research and demonstration projects conducted by scientists whose results are interpreted as actionable information for the farmer by extension specialists that bridge the gap, or extend that information, from the research community to the farming community. This structure is the envy of the world and for good reasons. This practice is an incredibly efficient way to target applied research and ensure it addresses critical bottlenecks faced by the farming community.

The NAA has engaged the services of a highly qualified review team, Dr. Carole Engle, Mr. Gary Fornshell, Dr. John Hargreaves and Dr. Gary Jensen, to complete the following activities over the next two years:

- Analyze the funded projects at each Regional Aquaculture Center from 2014-2021.
- Analyze investments against the Subcommittee on Aquaculture's National Strategic Plan for Federal Aquaculture Research (2014-2019).
- Assess industry involvement in each Center and in Center funded projects and determine if: 1) investments address critical industry needs and 2) if findings are well disseminated to stakeholders.
- Identify gaps and develop recommendations for future funding of regional aquaculture research that would provide the greatest benefit to US aquaculture.
- Identify gaps and recommendations to increase efficiency and impact of individual regional aquaculture centers.
- Create a technical report outlining the results of this comprehensive review.

The review team will work independently of the Centers and the NAA to complete the analysis, provide recommendations and write the technical report. The Team will conduct their work through virtual interviews and review of Center procedures and funded projects. Interviews will include Center staff and individuals that have worked with, or not worked with, the Centers to include farmers, researchers, and extension specialists. If you are contacted, please accept an interview invitation. Your participation and contribution to the review will be greatly appreciated. The NAA has contracted with Tony Vaught, Professional Aquaculture Services, to provide administrative support to the review team including scheduling virtual interviews.

AquaClip: Project uses flue gas and wastewater to make algae for animal feed

A three-year, $2.5 million Illinois Sustainable Technology Center (ISTC) engineering-scale project will be one of the first and largest to combine carbon dioxide (CO_2) from a coal-fired power plant with nutrients from wastewater treatment plants to cultivate algae for animal feeds. The project will demonstrate that producing algae for commodity animal products can be cost-effective and has added environmental benefits.

Algae has been used for decades in the niche markets of health and beauty. A more recent focus is its ability to use CO_2 from coal-fired power plants to make biofuels and protein-rich food products. Algae is fast-

growing compared with traditional terrestrial feed crops, so it's an attractive alternative for use in taking up CO_2 from power plants because it requires less land, according to ISTC principal investigator Lance Schideman. Researchers will use the algae species Spirulina because it is already FDA approved for use as a food ingredient and has a high protein content, which commands higher prices.

The algae cultivation system will be integrated with the City Water, Light and Power plant in Springfield, Illinois. Schideman is collaborating with University of Illinois researchers Joshua McCann and Carl Parsons, who will conduct the animal feed studies. Global Algae Innovations will provide the algae biomass production system to be demonstrated at field scale for this project. The project is co-funded by the U.S. Department of Energy National Energy Technology Laboratory.

"We're putting all the pieces together in a coordinated fashion and lowering the net costs of growing algae using industrial and municipal byproducts as inputs to improve the economic environmental sustainability of algal carbon capture," Schideman said.

This approach reduces pollution and replaces the costly CO_2 and nutrient inputs used in most algae cultivation systems. In the current commercial technology, managers buy liquid CO_2 and various commercial fertilizers for the nutrient supply. The wastewater, which is full of organic nutrients that support algae growth, will come from a local wastewater treatment plant.

"Using wastewater is cost saving in the production process and helps solve problems that wastewater treatment plants are experiencing in trying to minimize nutrient discharges in the environment," Schideman said. "In Illinois, the treatment plants are under increasing scrutiny, and regulations that are now voluntary are expected to become more stringent and potentially mandatory within the next decade."

Source: Aquafeed.com // 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 2016-38500-25751, 2018-38500-28886, and 2020-38500-32559. 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.

Center for Tropical and Subtropical Aquaculture
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