CENTER FOR
TROPICAL AND SUBTROPICAL
AQUACULTURE

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Letter from the Director

Aloha,

On March 17, I participated in the webinar "UN Food Systems Summit: Opportunities for U.S. Engagement," which was a follow-up of the July 2020 UN summit attended by stakeholders from 150 countries. An overarching goal of these summits is to reduce 50% of food waste by 2030. To meet this and other similar goals, the United States has set five action objectives and guidance principles for national engagement. I enjoyed the opportunity to attend the webinar. As I have shared many times in my Letters from the Director, I am a proponent of “no waste” food production. This is especially true when it comes to aquaculture, as one species’ trash is often another’s treasure. By reducing processing waste, we can significantly increase the seafood supply; in fact, this has become a trend of international efforts.

The webinar is part of the preparation for the upcoming UN Global Food Summit (GFS) in September 2021. The GFS provides an unprecedented opportunity to engage public and private sector decision-makers, share new perspectives on the future of food production from the ocean and freshwater systems, and bring a deeper understanding of aquatic foods into global food dialogues.

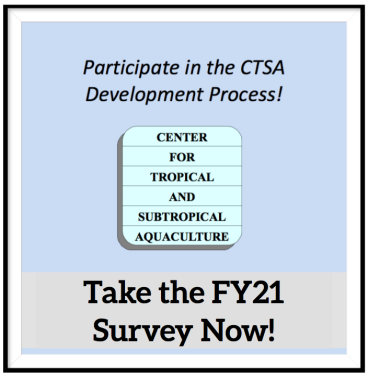
I am particularly motivated by --and encourage you to consider-- the following statement from the webinar Co-chair Roz Naylor: “In order to build a just, healthy, sustainable food system, we will need a much deeper understanding of how the extraordinary diversity of blue foods – thousands of aquatic food species being farmed or harvested using a great variety of technologies – affect nutrition, environment, equity, and economic outcomes at local to global scales. It is critical to identify trade-offs and winners and losers within the world food economy as the role of aquatic foods expands.”

To this end, CTSA is pleased to announce that our FY21 development process has officially begun with the release of the 'FY21 Priorities Survey' included in this month's newsletter. Please take a few moments to share your input on what types of projects CTSA should fund; the link to the survey is in the article below. As always, we are looking forward to hearing your ideas and suggestions for species, technologies and ideas that can help bring our region into a new and more sustainable era of aquatic food production.

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

CTSA FY21 Development Process - 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 FY2021 Priority Species and Areas survey to help us determine the priority species and areas of focus for the FY2021 development cycle. This survey lists the priority areas included in our FY20 'Request for Pre-Proposals,' released last year, and requests that participants indicate wether or not each area remains a priority for regional aquaculture development and funding support. . You are welcome to suggest any new focus areas that CTSA should address under each priority area. There is also an option to write in new priority areas that were not identified in FY20.

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 FY2021 Request for Pre-Proposals in May 2021, and will be developing the priority areas until that time with input from our Industry Advisory Council, Technical Committee, Board of Directors, and stakeholders like you!

CTSA Project Update: Diagnosing Diseases of Concern to Hawaii Aquaculture Producers

RuthEllen Klinger-Bowen, Research Corporation University of Hawaii, Lei Yamasaki, Hawaii Department of Agriculture, Karin Kurkjian, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, and Jenee Odani, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa

Global food fish consumption has outpaced population growth by two to one according to the 2018 Food and Agriculture Organization (FAO) report on the state of world fisheries and aquaculture (FAO, 2018). It is projected that aquaculture production must grow 70% to feed the world population by 2050 (FAO, 2014). This goal cannot be met without anticipating the potential setbacks from economic and management issues. FAO firmly states that disease control is one of highest priorities to accommodate future aquaculture growth. The U.S. aquaculture industry alone loses $6 billion per year to disease issues (World Bank, 2014), ultimately constricting production.

The transportation of live animals is essential to all animal-producing sectors of agriculture. Animals are moved for a number of reasons, including marketing, restocking, slaughter and genetic program enhancement. Although movement is necessary for the growth and development of industries, it plays a significant role in the spread of infectious diseases. Because of this, many national and state governments have strict animal health import requirements to reduce the risk of disease introduction.

As the aquaculture industry in Hawaii grows, updated information on diseases is needed to protect investments and to meet requirements to move animals in and out of the state. For example, koi producers in Hawaii test their animals for koi herpesvirus (KHV) and spring viremia of carp (SVC) to meet the import requirements of countries. Koi producers will often import new stock and perform post-entry testing to confirm that the lot of fish are negative for both pathogens. Tilapia lake virus (TiLV) is an emerging viral disease of tilapia that has had worldwide implications for the aquaculture community (Fathi et al., 2017; Behera et al., 2018; Jansen et al., 2018). Testing for TiLV may eventually be required for any shipment of tilapia in and out of Hawaii. The bacterium *Francisella orientalis* (previously named *Francisella noatunensis* subsp. *orientalis* or Fno (Ramirez-Paredes et al., 2020)) is well known in Hawaii, particularly on Oahu (Soto et al., 2013). It continues to cause morbidities/mortalities in cultured tilapia during the winter months, which reduces revenue for the fish farmer. Another bacterium, *Streptococcus iniae*, is reported to infect 27 freshwater, marine, and estuarine species, including causing up to 50% mortality in tilapia (Agnew and Barnes, 2007). Ominously, this potentially zoonotic bacterium has been found in wild populations near aquaculture facilities in other parts of the world (Colorn et al., 2002). *Ostreid herpesvirus 1* (OsHV-1) is an emerging pathogen of oysters (OIE, 2019a), resulting in significant losses in Australia, New Zealand, and Europe (Whittington et al., 2018). A variant of OsHV-1 was reported for the first time in the U.S. in 2002.

Although the Hawaii Department of Agriculture regulates the import of live animals, seafood products that are frozen or fresh (on ice) enters Hawaii without being tested for diseases. Testing marketed seafood would give the aquaculture industry an idea of what diseases are potentially introduced, and what they need to do to protect their investment.

To properly focus our project's objectives, we first determined the diseases of highest concern to Hawaii's aquaculture producers, via a survey that was sent via email and in person on four separate occasions. Based on the 13 responses, we also conducted a literature review to evaluate significance of the pathogens and our working group created a list of six pathogens that were determined to be of most concern: *F. orientalis*, TiLV, and *S. iniae* in tilapia, KHV and SVC in koi, and OsHV-1 in oysters.

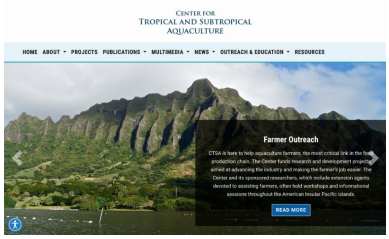
In response to these concerns, twenty animals were submitted for testing from two koi, four tilapia, and five oyster facilities. Up to five animals were purchased from separate markets, including four cyprinid, five tilapia, and six oyster vendors. Tissues were selected for testing based on likelihood of being an indicator for the pathogen and to obtain a mix of lethal vs. non-lethal samples (Figures 1 & 2). Tissues collected from tilapia included spleen, liver, gill, fin, eye, and anterior kidney. Spleen, liver, gill, and fin were the primary target tissues; however, in two market cases where the fish were sold gutted, eye and anterior kidney were used as substitutes for spleen and liver (both *F. orientalis* and TiLV can cause ocular lesions, while anterior kidney can harbor *F. orientalis*). Tissues collected from cyprinids included spleen, posterior kidney, gill, and fin.

Tissues collected from oysters included gill and mantle. No suitable non-lethal samples for OsHV were reported in the literature.

After sample collection, tissues were sent to the University of Hawaii Animal Diagnostic Laboratory (UHADL). The Qiagen Kit DNeasy Blood & Tissue Kit and the RNeasy Mini Kit were used for DNA and RNA extraction, respectively, following the protocol suggested by the manufacturer. A real-time PCR (qPCR) assays for TiLV, *F. orientalis*, KHV, SVC, OsHV-1, and conventional PCR assay for *S. iniae* were developed following previously published methods (Waiyamitra et al. 2018; Gilad et al., 2004; OIE 2019a-c; Mata et al., 2004). The qPCR assays were conducted in duplicates and analyzed within the Applied Biosystems 7500 Fast Real-Time PCR Systems (Applied Biosystems). The GoTaq probe qPCR Master Mix from Promega was used for qPCR analysis and the GoTaq DNA Polymerase Kit was used for *S. iniae* samples (Figure 3)

Of five tilapia farms tested, two had fish that were positive for *F. orientalis*. One farm had six of 20 fish test positive by PCR assay (spleen samples; 30% prevalence). The second farm had nine of 20 fish test positive by PCR assay (spleen samples; 45% prevalence). In the second farm, one of the nine fish had two tissues test positive by PCR (liver and spleen). These farms are located on Oahu, an island known to host *F. orientalis* in aquacultured and wild tilapia populations (Yamasaki et al., 2020, Soto et al., 2013; Klinger et al., 2012; Tamaru et al., 2011). In total, 321 PCR assays for *F. orientalis* were completed. Cycle threshold (Ct) values and copy numbers for the 16 samples that tested positive for *F. orientalis* are presented in Table 2. Ct levels are inversely proportional to the amount of target nucleic acid in the sample: samples with lower Ct values have a higher amount of target nucleic acid or copy numbers... **Read More**

New CTSA Website Now Live



CTSA has officially launched our new website! As we announced last month, the CTSA website has undergone a full remodel under the direction of the ongoing Information Services project, which spent several months working with Hawaii based designers to create our most robust program website to date.

CTSA is pleased to present this information resource for aquaculture stakeholders in the Pacific region and beyond. In addition to housing the existing Regional Aquaculture Center resources our stakeholders have come to count on, the redesigned website features a contemporary design and new comprehensive search engine that allows users to search current and past CTSA projects and publications based on species, location, technology and lead institution. The new site also features a layered regional map that users can utilize to explore CTSA projects throughout the region.

Click here to watch a short video highlighting some of the new user friendly features of the site.

Aquaculture Announcements

Hawaii Department of Agriculture's Micro-Grants for Food Security Program

Hawai`i Department of Agriculture (HDOA) is now accepting applications for the Micro-Grants for Food Security Program, which provides support for small-scale gardening, herding and livestock operations to help produce food in areas that are insecure.

In August 2020, the U.S. Department of Agriculture (USDA) awarded Hawai`i a total of $1,938,556.80 for this grant program which was established under the 2018 Farm Bill.

Information on the Request for Proposals may be found at the Hawai'i State Procurement website at: https://hands.ehawaii.gov/hands/opportunities/opportunity-details/20023 . The maximum award for an individual is $5,000 for a project of 12 months, $2,500 for a six-month project. Under the grant program rules, religious organization, food banks and food pantries may also apply. Applications/proposals must be emailed to hdoa.addrfp@hawaii.gov and received by noon, April 23, 2021. Please click this link for more information

AquaClip: Can hatchery waste be used to feed insects?

Norwegian researchers from the Institute of Marine Research tested whether black soldier fly larvae can be

fed on sludge from land-based fish farms. Four different feeding trials were performed with varying amounts of sludge from salmon hatcheries. They found that up to 60% of the insect feed could be replaced with sludge without affecting the growth of the insect larvae.

“Our experiments show that insect larvae that are produced with sludge from fish farms become rich in marine fatty acids such as EPA and DHA, and minerals such as iron, zinc and selenium,” said Nina Liland, researcher at the Insitute of Marine Research.

Large amounts of sludge are produced in Norwegian fish farms that consist mainly of uneaten feed and feces. Farms collect and dry the sludge, which in turn is burned up as waste or used in biogas plants. “Using sludge in insect production is a better solution if you want to take care of the valuable nutrients in the sludge,” said Liland.

Researchers also examined levels of heavy metals in insect larvae. Mercury and arsenic exceeded the permitted levels for feed ingredients set by the EU but only in the groups with more than 80% sludge in the feed. They also did not find residues in the insect larvae of typical viruses and bacteria that can cause disease in salmon.

But there is still a long way to go before researchers can conclude that sludge can be safely used as feed for insect larvae. “In sludge that is dried at high temperatures, such viruses and bacteria will not be a problem, but we must investigate further whether they can be transmitted from wet sludge. In addition, we must analyze the larvae when they have been turned into finished insect meal,” said Liland

Source: Aquafeed.com // Original 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 and 2018-38500-28886. 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.