CENTER FOR
TROPICAL AND SUBTROPICAL
AQUACULTURE

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Letter from the Director

Aloha & Happy Halloween!

It has been one full year since CTSA moved its main administrative operations to the University of Hawaii (UH). Hawaii Pacific University (HPU) continues to provide fiscal service to CTSA, which will be moved entirely to UH in 2021. As we celebrate our first anniversary on the UH Manoa campus, I would like to extend my sincerest appreciation to the many institutions and individuals that have helped to make our transfer as smooth as possible. Primarily, UH CTAHR and OI of HPU have provided copious hands-on assistance, and USDA NIFA has provided critical advice. While I would like to thank each and every person who has helped and is helping us in this transition, there are too many to name in this letter, so I will simply say a big MAHALO to you all!

In addition to spending much time learning the UH operational procedures, I have been trying my best to meet researchers from various disciplines and introduce them to the CTSA program and mission. I often encourage them to think about how they can utilize their expertise and technologies to participate in our efforts to secure the seafood supply through aquaculture. As Executive Director, it is my responsibility to operate the Center following the established operational procedures, and efficiently manage available research funds to address the issues brought up by our industry stakeholders. While aquaculture researchers are the primary experts to help us achieve this goal, there is also much value in identifying other researchers outside of aquaculture who can apply their field of expertise and unique skills to help solve the challenges facing our industry.

CTSA is currently developing the FY2019 plan of work. I appreciate the many new ideas that we received this year. However, our limited funding restricts the amount of concepts we are able to support. I would like to encourage those pre-proposals that were not funded during this cycle to re-present their idea in the future with a goal of obtaining full support from our stakeholders and CTSA review panel.

During the past year, I have also uncovered a plethora of resources at UH that can help CTSA achieve its mission. I have enjoyed my discussions with many new colleagues, and have learned new techniques through my activities on campus. I am discovering that combining our program resources and knowledge with the wide range of available expertise is creating unique opportunities to bring more sustainable aquaculture grants and funding to our region. It has reaffirmed my motto that we can accomplish more if we can work together, and...**Read More**

CTSA Project Breakthrough:
'Yellow Tang' Project Produces F2

Juveniles, Successfully Closing Life Cycle of Hawaii's Most Popular Ornamental Reef Fish

Report from Chatham Callan, Ph.D., Director of the Oceanic Institute Finfish Program.
Edited by Meredith Brooks, CTSA

The 3-year project "Improving the commercial aquaculture feasibility for Yellow Tang (*Zebrasoma flavescens*): Resolving early bottlenecks to improve culture yield" aims to improve the commercial feasibility for producing high-value species such as Yellow Tang. Specifically, this project is addressing key bottlenecks affecting larval survival. Overcoming these bottlenecks will improve the culture efficiency and reduce the total cost of production. This will in-turn, increase the likelihood of industry adoption of this technology and enhance the aquaculture industry in the region.

The first objective of the project is to maintain robust Yellow Tang broodstock populations to ensure reliable, and year-round, supply of eggs for research. Oceanic Institute is currently housing (3) groups of wild yellow tang broodstock. The first group is comprised of (6) fish that were acquired in 2001. The second group is comprised of approximately 20 fish that were acquired in 2005. The final group of approximately 25 fish was acquired in 2014. All three groups have been spawning regularly, with monthly peaks around the full moon. Combining spawns from these groups, we have been able to routinely obtain over 30,000 viable eggs per day to stock hatchery tanks. During peak spawning events in early Fall (2018) we were able to obtain over 75,000 viable eggs in a single day. We anticipate spawning will continue and should further improve as the most recently collected group becomes more established.

The second objective of Year 1 was to evaluate the onset of maturation and assess reproductive performance in existing F1 generation Yellow Tang broodstock. In 2015, we were able to (for the first time ever) successfully produce Yellow Tang juveniles. Those F1 fish were 3 years old at the onset of the current project (settled in October 2015). We began seeing spawning behavior just prior to the onset on this project and observed the first fertilized spawns in October of 2018. Over the reporting period, these fish (approximately 35 total) continued to spawn monthly, and we are routinely seeing daily viable egg production in the low thousands. We expect this spawning to improve as the fish age and grow and are encouraged to see that regular spawns persisted throughout the year as with the wild fish.

It is important to note that although the spawning performance is not yet matching wild broodstock, the onset of spawning occurred much more rapidly. In prior years, it sometimes took 5 years or more for wild stocks to begin spawning in captivity and to obtain viable eggs. We suspect that once the F1 group really comes into maturation, we will see excellent spawning performance from this group. We are also pleased to report that in July of 2019, we had a second group of F1 Yellow Tang begin spawning. These fish were produced in 2016, and were about 3 years old at the onset of spawning (as with the previous group). Egg production from this group will begin to be monitored and compared to that of the other F1's and wild-collected fish.

To compare the hatchery performance of larvae from F1 broodstock to larvae from wild stocks (Objective 3), Yellow Tang eggs were collected from both F1 and the three wild groups (eggs were combined from wild groups) of broodstock in June of 2019. Replicated 200L tanks (n=3) were stocked with 3,000 eggs each from the two treatments (wild or F1). The larval tanks were maintained according to established protocols outlined in Callan et al (2018) for seven days. On day seven post-hatch, the remaining larvae in each tank were counted to assess differences in survival between the F1 and F2 larvae. Unfortunately, survival in both treatments was far less than expected at approximately 4% and 2% in the F1 and F2 groups, respectively (Figure 1).
Figure 1. Yellow Tang larval survival to seven days post-hatch. Larvae were either F1 (from wild broodstock) or F2 (from F1 broodstock).

This low level of survival was not expected, as in the past we routinely observed survival of about 25% to day 7 (from wild broodstock). We also would have expected survival to be a little higher

in the F2 larvae (than in F1's), as their parents experienced heavy selection pressure to survive in hatchery conditions. However, it is very likely that the F1 broodstock egg quality was not as good as could be realized with more conditioning. This was later confirmed by examining survival to yolk-sac exhaustion (day 3) where we observed the majority (>70%) of this group's larvae were not surviving past this pre-feeding phase.

Despite low survival, we are pleased to report that we were able to still successfully rear some of the F2 larvae through to juveniles (August 2019) and have now fully closed the life cycle on Yellow Tang. This marks the first time that F2 surgeonfish of any kind have been produced in culture. This marks another tremendous milestone for marine ornamental... **Read More**

AquaClip: Kampachi Farms moving forward with macroalgae project in waters off Kona Coast

Kampachi Farms plans to begin testing next summer an underwater farm the mariculture company hopes will produce large quantities of limu - edible seaweed - off the Kona Coast.

During the three-year Blue Fields Offshore Native Hawaiian Macroalgae Demonstration Project, Kampachi Farms will study technologies and tools for growing offshore four native or endemic Hawaiian limu species on an array suspended about 30 feet below the ocean surface using only natural energy.

"Our initial target is food and feed and then long-term, for the next 10 or 15 years, show we can grow this for fuels," said Neil Sims, Kampachi Farms CEO. "The goal - if it works - is to move toward commercialization."

A final environmental assessment with a finding the project will have no significant impact was published last week by the state allowing the project to move forward.

A number of requirements must still be met before deployment, including securing a state conservation district use permit and a permit from the U.S. Arch Corps of Engineers because the project is proposed in U.S. waters.

If all goes as planned, and all permits, certifications and consultations are obtained, Lisa Vollbrecht, the project's research manager, is anticipating getting the array in the water next summer.

As proposed, the apparatus would be single-point moored in waters about 400 feet deep south-southeast of Kaiwi Point, about 1.5 miles out from Kailua Pier and adjacent to Pawai Bay. Only marker buoys and a wave-driven upwelling pump would be visible from shore.

Approximately 33 feet below, a submersible growth platform measuring about 33 feet by 131 feet and able to rotate 360 degrees will be suspended. On the platform, 98-foot "algal lines" will be strung for the macroalgae to affix and grow. Nutrient-rich deep sea water will be brought to the array via the wave-driven pump pushing water from a depth of about 985 feet through a 2,300-foot pipe.

The company stated it will not be seeking "exclusive use" of the area, meaning that fishing vessels and the public will be permitted to traverse the entire project area within safe operating distance from its infrastructure.

"The local community is going to find this is a great fish aggregating device (FAD) - it's going to attract and hold fish," said Sims.

Sims declined to provide a cost estimate for the project, saying it is proprietary in nature. A $499,000 Advanced Research Projects Agency - Energy grant from the Department of Energy is helping to offset costs.

Source: West Hawaii Today / **Read Full Article**

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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 Oceanic Institute of Hawaii Pacific University and the University of Hawaii.

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