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Regional e-Notes ~ January 2013

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Letter from the Director

Aloha & Happy New Year,

January offers a chance to start fresh with a new year and new resolutions. This year, CTSA is resolving to strengthen our partnerships, and is encouraging others to work together for the benefit of our industry and our communities.

With limited funding opportunities, the future of aquaculture is dependent on efficient collaboration. Stakeholders must collectively decide that the impact and/or outcomes of research and demonstration projects are more important than determining who gets the credit. This is especially true considering the complicated conditions of our remote island environments.

CTSA projects primarily support the operation of the proposed work, and rely on other institutions to support the cost of labor. This method has led to many successes, and I am very pleased to see that several projects are achieving notoriety. A recent article in the Sea Grant newsletter discussed how the "Bivalve" project is helping start a new aquaculture industry in Hawaii. Another article in a Palau newspaper highlighted the "Mangrove Crab" project's efforts to restock juveniles of the overfished species. In addition, a manuscript about the CTSA-sponsored work being done to replace declining wild stocks of opihi will be printed in a forthcoming issue of WAS.

I look forward to seeing the results of our collective efforts in 2013!

Mahalo,
Cheng-Sheng Lee

"Seed Production of Mangrove Crab in Palau" Project Update: Crablets Reared and Released Into Wild

350,000 mangrove crablets were recently released in Palau in an effort to enhance local stocks of this species, which has decreased in population due to overfishing. The restocking was one component of an ongoing CTSA project to captivity culture mangrove crab in Palau. The following is an update from the project Principle Investigator Miguel Delos Santos:



To promote the development of aquaculture for mangrove crabs locally known as "chemang," and enhance the local resource to provide a steady supply of this high valued seafood commodity in

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New! Finfish Hatchery Training Manual and Video

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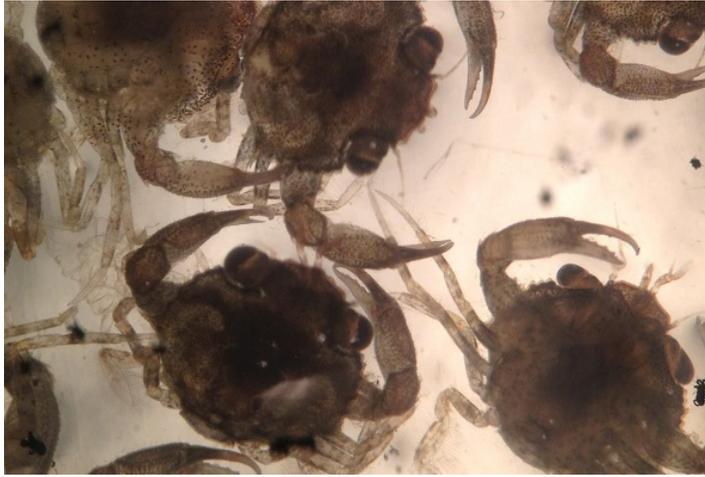
Marine Finfish Development in the CNMI

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the Republic of Palau, the project entitled "Seed Production of Mangrove Crab *Scylla serrata* Forskal in Palau" has recently begun under funding from the Center for Tropical and Subtropical Aquaculture (CTSA). This project is being implemented at the Multi-species Hatchery of Palau Community College-Cooperative Research and Extension (PCC-CRE) by Aquaculture Researcher, Miguel Delos Santos. With the success in the spawning of mangrove crab broodstock in captivity using the 1ton capacity tank, a preliminary larval rearing trial was conducted in December 2012. Six units of 10tons capacity tanks were used to evaluate the

effects of two different tank colors, black and yellow, on the survival rate of the larvae. The larval rearing tanks were stocked with 400,000 mangrove crab "zoeae" and were treated with equal feeding and water management protocols. After 17 days of rearing, the larvae molted to megalopa stage and about 390,000 were harvested. Highest survival rate, which was about 35% (104,250 megalopae), was recorded in one of the yellow tanks, while the average survival rate in all tanks was about 17.64%. It was observed that survival rate was higher in yellow tanks compared to black tanks. Another run will be conducted to verify the results of the preliminary larval rearing trial.

About 40,000 pieces of the harvested megalopae were transferred to 4units 2.5tons capacity tanks for nursery trials while the remaining megalopae were kept up to 5 days in the larval rearing tanks until they transformed into crablets.

As of January 18, 2013, the crablets that were kept in the nursery tanks have undergone 4 moltings. Their carapace length was already about 2cm and the average weight was 0.21g. Once the crablets reach the size of about 2 inches, they will be transferred to a crab pen inside the ponds or mangroves for grow-out trials.

On December 31 and January 2, 2013, about 350,000 healthy crablets were released near the mangroves of Ngemai Conservation Area in Ngiwal State and the Bkulengriil Conservation Area in Ngeremlengui, State, respectively. To determine the impact of the release on the recruitment of mangrove crabs in

the abovementioned conservation areas, a follow-up survey will be conducted by setting up crab traps at strategic locations in the mangroves this coming May 2013.



PCC-CRE Vice-President and CTSA IAC Member Thomas Taro and aquaculture staff Dannies Uehara and Lyndon Masami releasing the chemang crablets near the mangroves at Ngemai Conservation Area.

CTSA 2012 Annual Accomplishment Report

As 2013 begins, we would like to take time to assess achievements from 2012 and highlight research reported in our recently published [Annual](#)



Center for Tropical and Subtropical Aquaculture

2012 Accomplishment Report

In cooperation with



reported in our recently published [Annual Accomplishment Report](#). The report features a 2-page summary of each project active in 2012.

Since its inception in 1986, CTSA has funded 237 research, demonstration, development, and extension projects. Of the 24 projects active in 2012, the seven summarized below reached completion.

Analyze and Compile the Nutritional Composition of Potential Feed Ingredient Resources in American Samoa into a Feed Manual for Use in Tilapia Feeds

Feed is the largest single variable cost for aquaculture farmers. For remote or island locations, such as American Samoa, the cost of transportation of ingredients or feeds contributes considerably to the cost of production. The agriculture industry in Samoa generates a wide variety of plant and animal products and byproducts, some of which may be efficacious in feeds development for local aquaculture. Better

utilization of locally available feed ingredient resources may be key for development of regional aquatic animal production by lowering feed costs. Therefore, the purpose of this project was to analyze local ingredients and formulate a feed and feed manufacturing system for Samoan tilapia farmers.

Results At A Glance...

- A simple, at home feed manufacturing system was created for tilapia farmers in American Samoa.
- The nutritional composition data of locally-available products and byproducts generated by this project provided a valuable database in formulating sustainable, cost-effective feeds for the aquaculture industry in American Samoa.
- A simple diet for tilapia was created using locally-available ingredients in American Samoa.
- A children's feed manual (written in English & Samoan) containing simple ingredient proportions for batching and feed making was created and published, along with an adult feed manual.
- A training workshop was conducted where both children and adults learned about fish farming and making tilapia feed on the farm site.

Value Added Approach for Tuna Fish Roe: Local Ingredient for Shrimp Maturation Diet

Like many other domesticated aquatic species, shrimp reproduction performance in captivity is greatly affected by the quality of maturation diet. Many research attempts have been made to develop artificial shrimp maturation diets, and much progress has been made in recent years. Yet, there is currently no artificial diet that when used alone can yield reproductive performance as comparable to "fresh-frozen" maturation feeding regimes. The lack of a nutritionally complete, cost-effective and bio-secure maturation diet for shrimp broodstock remains a bottleneck for most shrimp hatcheries. Guam is home to several tuna loining operations that process fish for shipment. The tuna scraps from these operations are estimated at 3-4 tons per week, and they are viewed as waste and sent to the landfills at a cost. However, these scraps have the potential to replace high-cost ingredients that are currently shipped in for use in maturation feeds. This project aimed to investigate the feasibility of utilizing tuna fish roe as a local ingredient for shrimp maturation diet. The successful application of tuna roe will not only produce cost-savings for shrimp hatchery operations, but it also will turn a waste by-product into a value-added product, providing additional environmental benefits by reducing the amount of organic wastes.

Results At A Glance...

- Tuna fish roe can serve as an alternative maturation ingredient.
- High in HUFA. Tuna roe contained similar level of arachidonate (ARA), less EPA and higher DHA compared to bloodworm. This combination may be more beneficial for shrimp maturation process. No shrimp pathogen status is a good attribute for shrimp maturation diet.
- A semi-moist diet containing tuna fish roe was developed, and may be more suitable for female broodstock than male broodstock.

broodstock than male broodstock.

- Turning a waste by-product (tuna roe) into a value-added product provides additional environmental benefits.

Developing a Value-Added Product "Half- Pearls" from the Blacklip Pearl Oyster in Pohnpei FSM, Years 1 and 2

The pearl oyster usually ends its life after producing the round pearls, or when it becomes incapable of producing sellable pearls. These so-called "useless" pearl oysters are killed and sold to the shell market as materials for buttons, handicrafts and others. Hemispherical pearls (or "half pearls" or "Mabe pearls" as they are more commonly known) provide value-added opportunities to use the pearl oyster shells in the jewelry and handicrafts industries, particularly the local cultural carving and handicraft industry. In Micronesia where there exists a small, niche tourism industry, the half-pearls have potential to support a sustainable pearl business and rural development, particularly for small family and/or community-based enterprises. Production of half-pearls represents not only one form of adding value to the pearl shells, but also a low-risk means of generating revenue. Therefore, the project activities focused on demonstration and skill training for grading techniques of the shells and the half-pearls by a grading expert, as well as the half-pearl harvest and subsequent half-pearl accessory making involving all community members.

Results At A Glance...

- 8,000 oysters were used for demonstration and training in half-pearl seeding.*
- A total of 43 local youths were involved in half-pearl seeding training, and many more were trained in jewelry making.*
- Micronesian technicians produced high quality half-pearls that have received attention from pearl industry professionals for their quality, particularly their unique colors of light blue or green peacock with high luster.*
- Approximately 3,000 pieces of half-pearls were produced, and an estimated 10,000 pieces will be harvested in 2013.*
- A pearl jewelry display and sale event was conducted in Pohnpei. Although the display and sale was focused on the round pearls on the same tables, this trial sale fetched total of \$525 for 24 pieces half-pearl products out 60 half-pearls displayed.*

Pacific Aquaculture Development and Extension Support for the U.S. Affiliated Pacific Islands, FY 2010

The goal of this project is the re-establishment of a CTSA Pacific Island extension agent position. Prior to the start of this project in 2011, CTSA extension work has been unavailable in this region. However, it is urgently needed to cope with changing circumstances in aquaculture development as the model of effectiveness and impact.

Results At A Glance...

- Established a sea cucumber pilot system and conducted hatchery skill training in Yap.*
- Micronesian technicians trained under previous projects continued half-pearl grafting demonstration and skill training for local youth in Pohnpei and outer islands. This training regime ensures that skills are being transferred among Micronesians.*
- Continued half-pearl pendant and earring making at each outer island pearl farm and at Nett Point demonstration farm in Pohnpei.*
- Half-pearls and related accessories were sold on behalf of participating farms and individual trainees for the first time in Pohnpei.*

Development of Captive Culture for the Yellow Tang, Years 1-3

Yellow tang are one of the most popular fishes in the global coral reef species trade. They are found in public and private aquaria worldwide, with annual collection estimates ranging from 300,000 to 1 million fish per year. Each individual fish is valued at \$10 to \$15, making it a high-value marine ornamental. The vast majority of these fishes are collected from near shore reef systems in Hawaii, which puts additional strain on these sensitive ecosystems. Therefore, this project endeavored to develop captive culture technologies for yellow tang to provide an alternative to the current reliance on wild collection, and to create new economic opportunities for Pacific island communities.

Results At A Glance...

- Established a reliable year-round supply of high quality yellow tang eggs.*

- Developed a larval rearing system and protocols yielding excellent survival of yellow tang larvae through the highly challenging pre-feeding larval period.
- Identified eggs and early nauplii stages of *Parvocalanus* copepods as a suitable first-feed for yellow tang larvae.
- Developed highly efficient algae and copepod production systems with a mean output approaching 100 million copepod nauplii per day.
- Documented development of yellow tang larvae out to two weeks of age.

Alternative Methods for Marine Copepod Production in Hawaii, Year 2

Hawaii's aquaculture industry produces marine fishes that have larval stages requiring live feeds. These feeds are a significant cost item to the producers of these hatchery operations. Copepods are excellent feeds for most larval marine fishes, and are often associated with significant advantages (in survival, early growth rates, color development) over the more commonly used rotifers and brine shrimp *Artemia*. Therefore, the purpose of this project was to develop and transfer new information on higher-density and lower-cost production of marine copepods. Two species of copepods were the target of the investigations during the project period and they are the calanoid copepod, *Parvocalanus crassirostris* and the harpatacoid copepod, *Euterpina acutifrons*.

Results At A Glance...

- Researchers found that the major algal species (e.g. *Isochrysis galbana*, *Chaetoceros* sp. and *Tetraselmis* sp) that can be used to culture copepods grew similarly irrespective of whether the source of seawater was Instant Ocean® or natural seawater from Kaneohe Bay.
- It was determined that the calanoid copepod, *P. crassirostris*, and the harpatacoid copepod, *E. acutifrons* perform similarly irrespective of whether the culture was done in artificial or natural seawater.
- To date, only live phytoplankton can be used as a suitable food item for culturing copepods albeit in artificial seawater.

Determining Aquaculture Bottlenecks of Pacific Threadfin (*Polydactylus sexfilis*): Increasing Fry Survival, Growth, and Quality

Pacific threadfin broodstock maintained on saltwater well systems develop goiters over a period of several years, leading to the loss of highly valuable broodstock animals. The purpose of this project was to develop a pragmatic solution to improve broodstock performance while insuring or possibly increasing the survival and growth of moi larvae and fry.

Results At A Glance...

- Through a series of trials addressing the formation of goiters in moi, researchers determined that iodide supplementation of broodstock through either the water or diet, increased egg thyroid hormone content, showing that either approach is appropriate for mitigating thyroid deficiencies.
- A sausage diet supplemented with iodide and vitamins was developed, and fish consuming the diet have shown far superior reproductive output and egg quality than stocks maintained on previous diets.
- The most effective treatment method for goiters was the iodide and vitamin supplemented broodstock sausage diet without iodide supplementation of the hatchery water treatment.

AquaClip: Probiotics Help Fish Grow Faster, Healthier

From e! Science News, December 3, 2012.

Probiotics like those found in yogurt are not only good for people -- they are also good for fish. A new study by scientists at the Institute of Marine and Environmental Technology found that feeding probiotics to baby zebrafish accelerated their development and increased their chances of survival into adulthood. This research could help increase the success of raising rare ornamental fish to adulthood. It also has implications for aquaculture, since accelerating the development of fish larvae--the toughest time for survival--could mean a more efficient and safe system for bringing fish to the dinner table.

Tiny zebrafish are often used in genetic research because scientists can easily track changes in their

development and the fish grow quickly. They also share many of the same genes as humans and can be used for studying cellular and physiological processes and their impact on human disease.

[Click here to read the full article.](#)

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 2007-38500-18471, 2008-38500-19435, and 2010-38500-20948. 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.

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