Regional e-Notes ~ June 2012 Vol 4, Issue 6

Letter from the Director

Aloha,

As you are likely aware, we depend heavily on the importation of food in the Pacific Islands. In fact, about 80% of the food we consume, including seafood, is shipped here. A lesser known statistic, and perhaps one we choose to overlook, is that without importation we would probably run out of perishable food in less than one week. I'm sure you will agree that this is a serious problem that needs to be addressed.

Seafood has been critical to food security in the Pacific Islands for centuries. Unfortunately, declining wild fish stocks and a growing human population have jeopardized the supply of this staple protein. Now more than ever, we need to find innovative ways to produce food from the resources we have, including the EEZ. Unlike our colleagues on the mainland and elsewhere, we do not have large open spaces to conduct land farming. Instead, we have large open spaces in the ocean that are prime locations to conduct responsible offshore cage culture. Furthermore, we have the resources to develop food production technologies that efficiently utilize the limited land space we have available. A good example of this has been the local introduction of aquaponics.

It has been four years since CTSA funded its initial aquaponics project. We are happy to see that this technology has been well-received in island communities, and that more people are becoming aware of its ability to decrease our reliance on imported food. As we begin the FY12 CTSA development cycle, I am optimistic that this year's Pre-Proposals will contain more of your innovative ideas to work collaboratively towards securing the future supply of our seafood. It is my hope that together, we can sustainably use both natural resources and aquaculture technologies to generate food, provide economic opportunities, and help protect the environments of these beautiful islands.

Mahalo,

Cheng-Sheng Lee
Executive Director, CTSA

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Quick Links

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CTSA Announcements and Reminders

1: CTSA FY 2012 Pre-Proposals - Due June 29, 2012!
The Center for Tropical and Subtropical Aquaculture (CTSA) requests pre-proposals for applied research that addresses problems and opportunities in the regional aquaculture industry. Click here to view the Request for Pre-Proposals. If you have any questions, please contact Meredith Brooks via email at mbrooks@oceanicinstitute.org, or by telephone at (808) 259- 3176.

2: Oceanic Institute Marine Finfish Hatchery Training Workshop August 6-18
On August 6-18, 2012, the Oceanic Institute Finfish Department will conduct a workshop for

aquaculture technicians and farmers from the U.S. Affiliated Pacific Islands. The workshop is part of a CTSA-sponsored project to establish marine finfish farming in the CNMI and surrounding region. The workshop is free, however participants are responsible for their own transportation to/from the location, as well their accommodations while on Oahu. To register for the workshop, contact Dr. Chad Callan at (808) 259-3149 or ccallan@oceanicinstitute.org. There is very limited space available, so please register as soon as possible!

3: New SRAC Publication - Aquaculture and the Lacey Act
The Southern Regional Aquaculture Center has developed a new fact sheet, Aquaculture and the Lacey Act. It can be viewed on the following link:
https://srac.tamu.edu/index.cfm/event/getFactSheet/whichfactsheet/247/

4: Shrimp Farming and Marine Finfish Culture Short Course in Texas
If you are interested in participating in the 27th Annual Texas ***Shrimp Farming Short Course and Marine Finfish Culture Course***, to be conducted September 26-October 2, 2012, in Port Aransas, Texas, visit the following link:
http://texas-sea-grant.tamu.edu/OurPrograms/ShrimpCourse2012.html

Using Artificial Seawater for the Culture of Copepods

Clyde S. Tamaru (1), Benjamin Alexander (2), Karen Brittain (2), and James Jackson (3)
1) College of Tropical Agriculture and Human Resources (CTAHR)
2) Hawaii Institute of Marine Biology
3) UH Department of Zoology

Marine fish hatchery outputs are highly dependent on the production of live food organisms and represent a major bottleneck in overall production outputs. In years past the production of phytoplankton resulted in considerable expenditures with regards to labor, time and spacial requirements. However, with the availability of commercial phytoplankton replacement products (e.g. Instant Algae®) hatchery operations have become possible at a fraction of the costs and floor space that was previously needed. Recently concluded hatchery outputs of the Pacific Threadfin, Polydactylus sexfilis that were done under the auspices of a collaborative project with Hukilau Foods and the Hawaii Institute of Marine Biology resulted in a consistent harvest density of over 20 fry/liter at 25 days post-hatch. Not only was this achieved in three consecutive trials but more remarkable was that this was done without the use of any live phytoplankton culture.

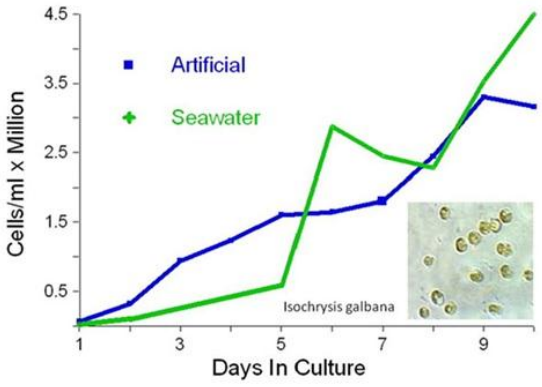

Figure 1. Temporal changes in cell density of I. galbana cultured in artificial and natural seawater.

While the successes reported are based upon the use of rotifers as the initial live food organism, copepods are also excellent feeds for most larval marine fishes and are often associated with significant advantages in survival, early growth rates, and color development over the more commonly used rotifers and brine shrimp Artemia. The use of copepods and particularly their early life stages (i.e., nauplii) as the initial larval feeds has generally improved survival over other rearing regimes and there are some fishes whose larvae are known to require copepod nauplii for any success.

However, early stage copepod nauplii are generally more costly to produce per unit than rotifers, related mainly to copepods' lower tolerance for high-density culture. Both are typically fed cultured microalgae, which requires technical staff and infrastructure. Under the auspices of a Center for Tropical and SubTropical sponsored project entitled, "Alternative Methods for Marine Copepod Production in Hawaii" the hypothesis that current cultured copepod species in Hawaii (e.g., the calanoids Parvocalanus and Bestiolina, and the harpacticoid Euterpina) can be adapted to low cost culture methods using artificial sea water and artificial feed particles would be tested. Both of these adaptations have reportedly been made with other copepod species although limited in number and

forms the basis for this report.

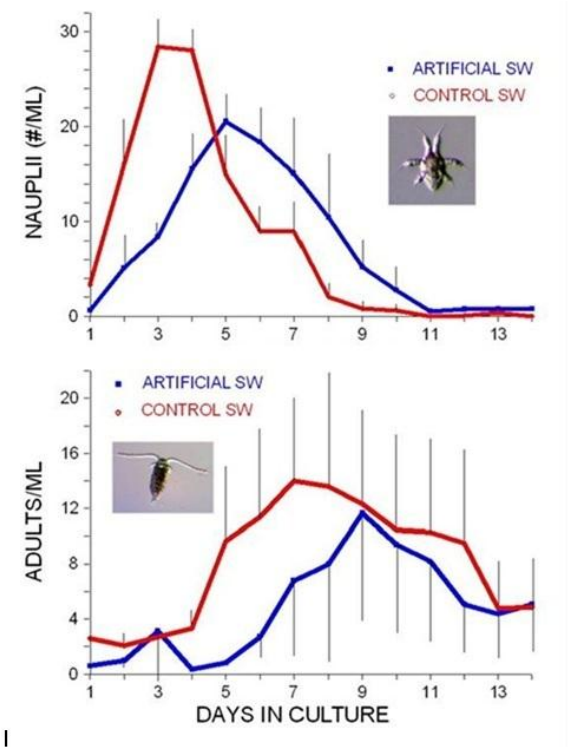

Figure 2. Temporal changes in density of nauplii and adult calanoid copepods cultured in artificial and natural seawater. Points are the means of three replicates and ± standard deviation.

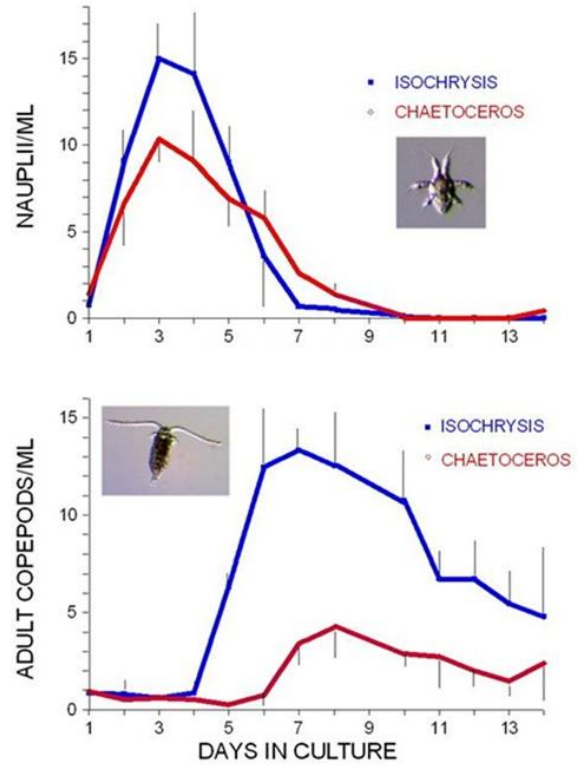

Figure 3. Temporal changes in densities of nauplii and adults of a calanoid copepod fed two different species of phytoplankton. Points are the averages of triplicate determinations and bars are ± S.D.

The first question that needed to be addressed was whether or not the source of seawater (e.g., natural or artificial) would have an impact on phytoplankton production which is the source of food for the various copepod species being used in culture. Although most mariculturist use natural seawater the use of artificial seawater continues to play important roles in culture processes because of the advantages of having a known chemical composition that can be consistently produced. Natural seawater is also not readily available to inland areas. There being a host of different artificial seawater media the project work group opted to use just one, Instant Ocean®, a well-known and readily available commercial product.

Isochrysis galbana is normally used for culturing our initial target calanoid copepod, and standard protocols being used at the Hawaii Institute of Marine Biology (HIMB) bottomfish hatchery facility were followed with regard to micronutrients, aeration, and sterilization procedures. The only difference in the culture process was the source of seawater with one being artificial seawater (Instant Ocean®) and the other natural seawater. The results obtained with I. galbana is summarized in Figure 1 but we also obtained similar results for two (Chaetoceros gracillis. and Tetraselmis chui) other phytoplankton species. All of the algal species examined grew similarly irrespective of whether the source of seawater was Instant Ocean® or natural seawater from Kaneohe Bay. The results clearly indicate that the source of seawater in all likelihood will not be a factor in culturing live phytoplankton.

Our focus would switch to evaluate the impacts of the two sources of seawater on copepod growth and development and that was done using I. galbana cultured as the food source and the calanoid copepod Parvocalanus crassirostris. To be consistent copepods that were being cultured in natural seawater were fed with I. galbana that was produced in natural seawater and likewise, copepods grown in artificial seawater were fed phytoplankton cultured in artificial seawater. The production of both nauplii and adult stages of copepods have been summarized in Figure 2. Although there is a bit of variation between the use of different

seawater sources the data is not statistically different from each other. This same result would also be obtained when the harpatacoid copepod, E. acutifrons, was examined and based on the results obtained to date the source of seawater apparently will also have little or no impact on copepod production. While these results may not seem earth shattering to say the least when combined there is some degree of comfort in knowing that at least the source of seawater will apparently be of lesser concern than other factors in the culture of copepods.

Using only artificial seawater for the production of three species of phytoplankton (T. chui, C. gracillis, and I. galbana) the harpatacoid copepod, E. acutifrons, was grown in artificial seawater and the results are summarized in Figure 4. The results clearly show that for both nauplii and adult stages the use I. galbana does not support its production in culture. A similar experiment conducted with the calanoid copepod but with only two species (C. gracillis., and I. galbana) of algae also show that for this species of copepod I. galbana was found to be superior in its production. The combined results clearly indicate that the type of phytoplankton rather than the source of seawater will ultimately play a larger role on culture outputs for copepods.

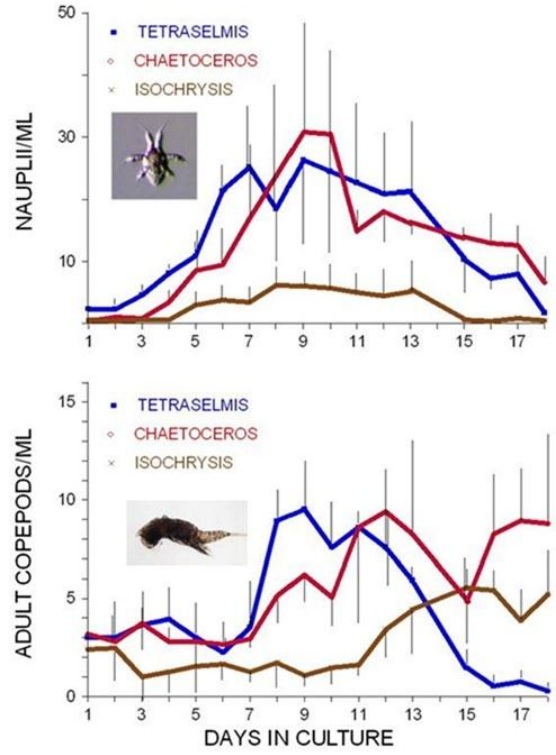

Figure 4. Temporal changes in nauplii and adult stages of E. *acutifrons* provided three different phytoplankton species as a source of food.

Answering the question about the longevity of copepods being cultured in artificial seawater was addressed by using a 40-L culture vessel and using only artificial seawater for the culture of both phytoplankton and the calanoid copepod. The copepod culture was stocked and operated as a static system at a salinity that ranged between 30 - 33 ppt while being supplied with a continuous source of aeration. I. galbana was used as a source of food and provided at a density of 2.0 x 105 cells/ml on a daily basis. At approximately two weeks duration the culture is completely drained, tank cleaned and culture restocked using the same individuals harvested. Density of the nauplii and adults are monitored and a summary of the temporal changes in nauplii and adult density is provided in Figure 5. The typical bloom of nauplii that occurs with each restocking of the tank is routinely observed followed by a rise in the number of adults. This nauplii bloom is one of the mechanisms that can be used to provide nauplii stages of the copepod to first feeding fish larvae that require this particular live food organism. Clearly, the culture of this calanoid copepod can be done using only artificial seawater and for extended periods of time. Future work should include focus on the recycling of the artificial seawater as it represents a substantial investment and warrants its reuse. While the results clearly show that artificial seawater, for all intents and purposes, will work well for culturing copepods a cost-effective artificial diet for producing the copepods that were investigated remains elusive and will require continued research.

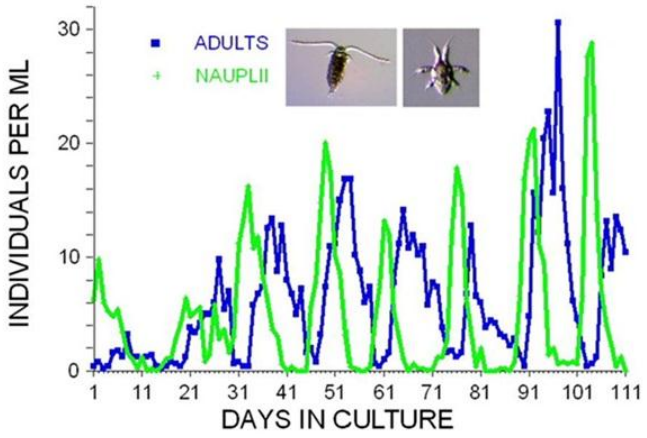

Figure 5. Temporal changes in nauplii and adult stages of a calanoid copepod being cultured using only artificial seawater.

Pacific Island Spotlight: CNMI Aquaculture Farmers Awarded $90k to Develop Local Workforce

by Meredith Brooks, CTSA Information Specialist

Photo of CAPA group, courtesy of Marianas Variety Newspaper

The CNMI Aquaculture Producers Association (CAPA) was recently awarded $90,000 to develop a local aquaculture workforce in Saipan. The group of tilapia and shrimp farmers, led by farmer Pete Arriola, was awarded the money as part of a $1 million grant from the U.S. Department of the Interior intended to revitalize the economy and build a local workforce.

Michael Ogo, aquaculture extension agent of Northern Marianas CREES, stated that the $90,000 will be used over a period of 12 months to support the Aquaculture Workforce Development Program. This program is critical to the success of the aquaculture industry in the CNMI, according to Mr. Ogo, especially considering recently-passed legislation that will result in a steep reduction of foreign workers in the CNMI in the coming years.

The year-long program funded under the award entails two seperate cohorts, each lasting six months. The first cohort is currently in session with eight participating students. Each week day, students receive an hour of online aquaculture training through the University of Hawaii's newly-developed ATOLL program. After online training, they go outside to work hands-on with shrimp and tilapia at the CREES aquaculture facility. In addition to this training, students are expected to participate in three expert-led workshops on the culture of shrimp and tilapia. They are also required to take an Agriculture Science course, as well as an Introduction to Business course. According to Mr. Ogo, the business course was implemented due to the fact that "without a business background, aquaculture enterprises are more likely to fail."

Recent promotional efforts and success in local aquaculture ventures have increased the industry's popularity as a viable economic activity, and Mr. Ogo is hopeful that this program will help the CNMI take advatange of current and future opportunities for growth.

To learn more about aquaculture in the CNMI, watch CTSA's short videos profiling farmers and aquaculture activities in the island chain:
Aquaculture in the CNMI
Island Farmer Spotlight: Gus Maratita

AquaClip: Blue Ocean Mariculture Now Selling Kampachi

By SeafoodSource staff. June 13, 2012.

Blue Ocean Mariculture has announced that Hawaiian Kampachi is now available throughout the United States.

Blue Ocean began harvesting its first internally produced Hawaiian Kampachi in May. The company announced that it completed the acquisition of Kona Blue Water Farms on 4 June, the final step in a two-year transition for Blue Ocean to become the exclusive producers of kampachi in Hawaii. The fish is available twice weekly from top distributors in Hawaii and the U.S. mainland.

"We've completed the business turnaround and we've now able to offer a consistent, reliable supply of healthy 5 to 6 pound Hawaiian Kampachi," said Tood Madsen, Blue Ocean president. "We see tremendous opportunity for this high-quality, 'Made in the USA' product."

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.