



Hawai'i Industry Development

Aquaculture Extension Specialist: Clyde S. Tamaru



Introduction

University of Hawai'i Sea Grant College Program efforts in aquaculture have a significant and positive impact on the industry, reflected by a continued rise in production output by Hawai'i aquaculture farmers. The aquaculture sector is now the fastest growing group in Hawai'i's diversified agricultural commodities and UH Sea Grant aquaculture specialists and agents continue to target industry expansion and diversification.



Clyde Tamaru explains the intricacies of aquaculture research in Hawai'i at the WCC Aquaculture Complex.

Species diversification will promote the Hawai'i aquaculture industry's expansion into niche markets with new food species and encourage development of a freshwater and marine ornamental aquarium industry.

UH Sea Grant extension agents track the latest technologies, industry developments and field-testing activities, and help transfer those technologies to benefit users.

This technology transfer includes providing farmers with technical information and recommendations on topics such as pond preparation, seed stock supplies, stocking rates, feeding regimens, fertilization procedures, water management, hatchery operations, husbandry practices, disease management, harvesting and processing.

The general public, researchers, educators and administrators are informed about these activities by UH Sea Grant aquaculture outreach programs to build support for sustainable aquaculture development efforts, increase awareness of opportunities for careers, research initiatives, small businesses, and stimulate demand for local aquaculture products.

1999-2003 Sea Grant Funding

UH Sea Grant: \$318,274; matching funds: \$540,321

Activities

University of Hawai'i Sea Grant Extension serves a critical role in promoting aquaculture on O'ahu and state-wide through activities that include:

- Serve as the lead agency for implementing the Center for Tropical and Subtropical Aquaculture (CTSA)- funded project: *Transitioning Hawai'i's Freshwater Ornamental Industry*
- Continuously investigate new organisms that have aquaculture potential for the Hawai'i industry

- Place species deemed important to the Hawai'i aquaculture industry on the Department of Agriculture list of species that may be imported into the state
- Collaborate in multi-cropping strategies for increased aquaculture development
- Lead implementation of the CTSA-supported project: *Aquaculture of Marine Invertebrates for the Marine Ornamental Trade*

Results and Impacts

University of Hawai'i Sea Grant Aquaculture Extension efforts on O'ahu have:

- Produced six contributions about topics in aquaculture for various newspapers, including research results and special interests
- Produced two manuals that provide step-by-step guidelines for particular culture processes
- Produced technical workshops on the islands of Hawai'i, Kauai, Maui, and O'ahu on topics important to aquaculturists
- Provided farmers with human chorionic gonadotropin (HCG) for induction of spawning Chinese catfish and other ornamental fish species on a cost return basis
- Collaborated with the state aquatic veterinarian to provide ornamental fish farmers with masculinizing feed for use in manipulating freshwater ornamental fish sex ratios
- Evaluated the use of OVAPRIM for the induction of spawning in Chinese catfish and various freshwater ornamental fish species

Education

University of Hawai'i Sea Grant Extension provides information and technical assistance to develop aquaculture-based programs and community education, including:

- Development and field testing of Department of Education science/culture standards-based curriculum for grades 4-12 using Hawaiian fishponds
- Collaboration with Project Kāhea Loko, Pacific American Foundation, and the U.S. Department of Education to develop Hawai'i Department of Education



standards-based curriculum for grades K-12 using the loko i'a as a tool

- Collaboration with the Pacific American Foundation and the U.S. Department of Education to develop a mentoring program for Hawaiian gifted and talented children
- Collaborate with UH Sea Grant Extension Specialists from Maui County, County of Hawai'i, American Samoa, and Kauai County to establish an extension and outreach network serving Hawai'i and the greater Pacific

Selected Publications

Published refereed manuscripts

Asano, L., H. Ako, E. Shimizu, and C.S. Tamaru. 2003. Limited water exchange production systems for freshwater ornamental fish culture. *Aquaculture Research*. 34:937-941.

Montgomery-Brock, D., V.T. Sato, J.A. Brock, and C.S. Tamaru. 2001. The application of hydrogen peroxide as a treatment for the ectoparasite *Amyloodinium ocellatum* (Brown 1931) on the Pacific threadfin *Polydactylus sexfilis*. *World Aquaculture Society*, Vol. 32:250-254.

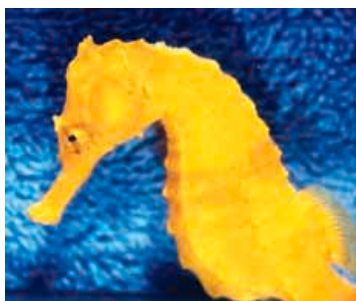
Tamaru, C.S., H. Ako, and R. Paguirigan. 1997. Essential fatty acid profiles of maturation feeds used in freshwater ornamental fish culture. *Hydrobiologia* 358:265-268.

Tamaru, C.S., C. Carlstrom-Trick and H. Ako. 1996. Induced final maturation and spawning of *Epinephelus microdon* captured from spawning aggregations in the Republic of Palau, Micronesia. *Journal of the World Aquaculture Society*, 27:363-372.

Iwai, T., C.S. Tamaru, L. Yasukochi, S. Unger, and M. Mitsuyasu. 1996. Natural spawning of captive big eye scad *Selar crumenophthalmus* (Bloch) in Hawaii. *World Aquaculture Society*, 27:332-339.

Lee, C.S., C.D. Kelley and C.S. Tamaru. 1996. Hormonal induction of maturation in striped mullet, *Mugil cephalus*. *Asian Fisheries Society*, 9:9-20.

Tamaru, C.S., F. Cholik, J.C.-M. Kuo and W. FitzGerald. 1995. Status of the culture for striped mullet (*Mugil cephalus*) milkfish (*Chanos chanos*) and grouper (*Epinephelus* sp.). *Reviews in Fisheries Science*, 3(3):249-273.



The Hawai'i-aquacultured Sun Fire sea horse

Invited summary manuscripts

Tamaru, C.S., K. McGovern-Hopkins, G. Takeshita, and M. Yamamoto. 2003. Creating the homozygous genotype for lyretail swordtails. *Tropical Fish Hobbyist*, #566, Volume LI(9):66-70.

Tamaru, C.S., H. Ako, V.T. Sato and R.P. Weidenbach. 2003. Advances in the culture of rotifers for use in rearing marine ornamental fishes. In: C. Brown Editor, *Marine Ornamentals 2001: Collection, Culture and Conservation*, Blackwell Science Press. pp 265-273.

Cole, B., C.S. Tamaru, R. Bailey, C. Brown and H. Ako. 2001. Shipping practices in the ornamental fish industry. In: B.C. Paust and A.A. Rice (Editors): *Proceedings of the 2nd international conference and exhibition*, November 1999. Seattle, Washington. University of Alaska Sea Grant College Program, Report No. AK-SG-01-03, pp:73-86.

Ako, H. and C.S. Tamaru. 1999. Are feeds for foodfish practical for aquarium fish? *International Aquafeeds*, Issue 2, 1999: 30-36.

Tamaru, C.S. and H. Ako. 1999. Experiences on the use of commercial feeds on the culture and spawning of freshwater ornamental fishes in Hawai'i. *Proceedings of the 28th US-Japan Natural Resources Aquaculture Panel Joint Meeting on Spawning and Maturation of Aquaculture Species*. C.T. Tamaru, C.S. Tamaru, J.P. McVey and K. Ikuta (Eds.). November 10-12, 1999. Hawai'i. USA UJNR Technical Report No. 28:109-119.

Partners

- Pacific American Foundation
- Hawai'i Department of Agriculture Aquaculture Development Program
- Hawai'i Department of Land and Natural Resources Anuenue Fisheries Research Center
- Hawai'i Department of Education
- United States Department of Education
- Waikalua Fishpond Preservation Society
- USDA Center for Tropical and Subtropical Aquaculture
- USDA Cooperative State Research, Education and Extension Service
- UH College of Tropical Agriculture and Human Resources
- Maui County
- UH Hawai'i Institute of Marine Biology
- Windward Community College



University of Hawai'i Sea Grant Extension Specialist Clyde S. Tamaru leads multiple aquaculture projects and collaborates on many others, conducting cooperative research with various public and private institutions. These efforts are to ensure the aquaculture community is being provided with the latest industry developments.

Tamaru collaborates with various institutions that address specific stakeholder concerns, including the culture of marine ornamentals, development of a freshwater ornamental fish industry, and Department of Education standards-based curriculum development.

Tamaru earned his Ph.D. in Fisheries from the Department of Fisheries, Faculty of Agriculture, University of Tokyo in 1988 and joined UH Sea Grant in 1995.

In addition to his extension and outreach duties Tamaru is currently a lecturer for Interdisciplinary Studies 201: *The Ahupua'a* at Windward Community College.

Clyde S. Tamaru
University of Hawai'i Sea Grant
College Program
2525 Correa Road, HIG 205
Honolulu, HI 96822
Phone: (808) 956-2869
Fax: (808) 956-2858
ctamaru@hawaii.edu
<http://www.soest.hawaii.edu/SEAGRANT>

