

## **Final Report 2005/2006**

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### **Small-scale backyard integrated aquabioponics food production system and training program for Native Hawaiian working families in Hawai'i**

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#### **Overview**

After being awarded monies for this project, advertising for participants took place in local working class communities, newsletters and by word of mouth. Initially, four families and a non-profit organization, The Paia Learning Center, were chosen for participation in the Aquabioponics project. They verbally committed to the project for a minimum of three years and also agreed to help at least one family to set up another system. Five Aquabioponics systems were built by the families selected. All families were trained in a week long "hands on" workshop.

Paia Learning Center (PLC) was chosen because of its mission; to work with "at risk" families and teenagers, teaching vocational- technical skills. Moreover, the PLC is located adjacent to a working class neighborhood making it an ideal demonstration site for the project. In addition, the PLC is committed to sustainable aquaculture and agriculture production as a high priority for the vocational-tech curriculum that will be offered. It was decided that this would be an ideal demonstration facility to be used for future Aquabioponics workshops.

Due to the success of this project, the agriculture coordinator from the Maui County Office of Economic Development (MCOED) was given a presentation and a tour of a number of the systems. He was impressed with the production of vegetables, fish and herbs as well as the enthusiasm of the participants. A proposal was submitted to MCOED and funds awarded allowing the PI's to expand the program with five additional systems. Families have been chosen, materials and supplies purchased and the systems will begin to be installed in the next two to three weeks. One of these systems will be set up at Maui Community College to expand educational capacity with the Aquaculture classes.

An additional system has also been recently completed at Kamehameha School. The high school aquascience class has begun to use the system for educational purposes and will continue to do so throughout the school year.

A presentation about the project was given at the "Islands of the World Conference held on Maui July 29-August 3, 2006. There were almost thirty people in the audience and the presentation generated a lot of interest especially from participants from tropical island

regions. There is a possibility of expanding the program by collaborating with American Samoa Community College and the College of Micronesia located in the Federated States of Micronesia. The aquaculture extension agents from these institutions expressed considerable interest in developing this program for their clientele and discussion has begun about possible funding sources.

The following summarizes the status of the original five systems plus the new one at Kamehameha High Scholl.

## **Selected Families**

### 1) Family 1

Paia, HI

The head of the family is a retired police officer and has five others in the family spanning three generations. His home is located in a working class neighborhood in Paia, a small former sugar plantation community on the North shore of Maui. This system has been very productive. He estimates he has harvested over one hundred pounds of lettuce and tomatoes. He has also harvested bunches of green onions, cilantro and basil. He also uses the organic bio-fertilizer to irrigate terrestrial plants fruit trees located adjacent to the Aquabioponics system. It appears his system is more productive due to the rainfall and temperature differences relative to the location of the other families although recently lettuce production has curtailed due to the extremely hot weather. His total fish production was approximately fifty pounds and all went for family consumption. He has recently restocked the tank with Chinese catfish fingerlings.

### 2) Paia Learning Center

Paia, HI

The responsible for this system is the director of the Paia Learning Center and the “Teens on Call” Vocational work program. It was decided to set up a system at the PLC for a number of reasons. The school site is located next to a large working class neighborhood in the plantation town of Paia on the north shore of Maui. In addition, the PLC is committed to sustainable aquaculture and agriculture production as a high priority for the vocational-tech curriculum that will be offered. It was decided that this would be an ideal demonstration facility to be used for future Aquabioponics workshops.

Two weeks after the initial set up of the Aquabioponics system the school site was vandalized, the fish were killed and the system was subsequently shut down. Although the security at PLC has been upgraded, there was discussion about selecting another family and moving the system to another site. Instead of moving the system, we decided to restock with fingerlings and continue with the project.

Approximately fifty pounds of lettuce and tomatoes have been produced and harvested with this system. The vegetables have been distributed to some of the young adults working with the “Teens on Call” program. None of the fish have yet to be harvested but they are planning on having a fish fry for his work crews when the fish reach market size.

3) Family 2  
Haiku HI 96708

The responsible for the systems are two working parents and three children living at home. The site home is located in the upcountry area called Haiku on the North shore of Maui. After the initial set up some challenges were identified. Due to excessive rainfall during the winter and spring, there was some overflow of the system and dilution of nutrient concentrations.

Hydroponics plant production was changed to aquatic plants including water hyacinth. The water hyacinths are harvested and used as compost for fruit trees including avocados and papayas. Recently, water lilies were added. Both of these plants have commercial value in the aquarium industry. Approximately twenty five pounds of fish have been harvested for home consumption. The remaining fish will be harvested and the tank restocked with Chinese catfish fingerlings.

4) Family 3  
Haiku HI 96708

The home site are also located in the upcountry region of Maui, Haiku. Both adults are employed and they have one child in the family. Aside from the commitment to the project, another reason for their selection was there interest in environmentally sustainable agriculture production and membership in a neighborhood food production co-op. They have agreed to allow there site to be used as a demonstration and training location to expand the project to other families who may be interested in setting up Aquabioponics systems. Again, due to excessive rainfall in Haiku over the winter and spring, there were challenges with the hydroponics production. After initial challenges with vegetables they started growing taro, a staple of the Native Hawaiian diet. New larger baskets and substrate were delivered and they have since had great success with the taro. The leaves are harvested weekly and consumed by the family or distributed to members of the farm cooperative. After six months of agriculture production and fish growth some challenges have developed in the system. An infestation of snails has taken over the system and affected the bacteria in the bio-filter. The remaining taro plants have been removed; the fish transferred to another tank and the system has been dried out for a shot period and will be back in production soon.

5) Family 4 replaced by Family 5  
Pukalani, and Lahaina, HI

The home site is located upcountry on Maui is a large neighborhood in Pukalani at approximately 2300 ft in elevation. It is a working class family with both parents employed, five children and three generations in the same household. They had some challenges with the system, in particular with the hydroponics. Generally, they were irrigating the garden too frequently, not feeding the fish enough and diluting the nutrient concentration in the system. These problems were addressed and more plants were added to the hydroponics bed. The organic fertilizer from the clarifier was being used to irrigate collared greens which are growing very well.

Due to problems not completely understood by the principal investigators the family 4 decided to no longer participate in the program and to shut down and return the system so that it may be used by another family. They were producing vegetable crops and herbs hydroponically and the organic fertilizer was being used to irrigate row crops such as collared greens and cabbage. The fish were also growing well. Reasons stated for opting out of the program was time commitment and the loss of space in the backyard. The system was located in the area where corn was grown and the family preferred to return to corn production.

The system was removed and was set up with the family 5 located in Lahaina. The family 5 has nine family members spanning four generations. They are a fishing family who has a small garden in the backyard.

The system has been restocked with Chinese catfish fingerlings and the hydroponics bed was planted with lettuce, herbs and tomato plants.

Kamehameha High School  
Pukalani, HI

The Kamehameha School Maui campus is located in Pukalani at the 1,600 foot elevation. The Maui campus is one of three campuses located on Maui, Oahu, and the island of Hawaii. The Kamehameha Schools were founded to educate Native Hawaiian children and are funded through Bishop Estate. Founded in 1996, the Maui campus enrolls 1,100 students in its K-12 program. The academy (9-12) started an aquascience program in 2005 and the instructor contacted the Maui County Aquaculture Specialist in early 2006 with the intention of developing an aquaculture component to the program. Materials and supplies were purchased over the summer and when the fall semester began an integrated SAAR system was set up with the students assisting in its construction. Fingerling Chinese catfish were stocked and vegetables and herbs planted in the hydroponics bed in early September. The students weigh the fish weekly and adjust feed rates accordingly. Weekly water quality tests are also carried out. The students are learning math, chemistry, biology and ecology concepts and principles through "hands on" learning.

## **Summary**

The system removed from the family 4 residence has recently been successfully transferred to the family 5 in Lahaina. It has been restocked with Chinese catfish fingerlings and seeded with hydroponics vegetables. The Maui County Office of Economic Development has released funding for five additional systems. Families have been chosen, materials and supplies purchased and the systems will begin to be installed in the next two weeks.

A system has also been recently completed at Kamehameha High School. The high school aquascience class will be using the system for educational purposes throughout the school year. We will set up a SAAR at Maui Community College to expand educational capacity with the Aquaculture classes.

A presentation about the project was given at the "Islands of the World Conference held on Maui July 29-August 3, 2006.

Recently, we were awarded with a second year grant which will make possible to add more five families. Including the six SAARs already in place plus ones from Maui County Office of Economic Development and five more for 2006/2007 grant, we will have sixteen SAAR in Maui in this coming fiscal year.

These SAAR will provide the development of an organic sustainable healthy diet self food supply to these families and an excellent opportunity to training students and native Hawaiian in aquabioionics natural food production system. Our main objective is to have families producing their own food and increase consumption of natural-organic raised food in their diets as well as selling production not consumed, as an additional sustainable income source.