

FAO/UNDP BAIT CULTURE PROJECT
IN WESTERN SAMOA*

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Abstract

A pilot bait culture project launched in Western Samoa in 1978 is aimed at annual production of 5 tons of live top minnows (Mollies, Poecilia mexicana) and other species in 2 acres of ponds located in a mangrove swamp.

Fry produced in a brood pond containing 5000 large (over 8 g) females are transferred into a fry pond and stocked within two weeks at 100/m² in rearing ponds operated through tidal flow. The bait sized fish are harvested 6 weeks later.

Preliminary sea trials showed that the potential of topminnows as live bait is improved by mixing with a few milk fish or natural bait.

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In Western Samoa as in other territories in the South Pacific, shortage of live bait is considered a major drawback to the development of pole and line fishery of skipjack tuna (Katsuwonus pelamis). In an effort to alleviate this shortage, a pilot bait culture project was launched with the support of FAO/UNDP.

The project was started in 1978 following reports of similar trials to rear top minnows (Poecilia vittata) in Hawaii (Baldwin, 1977) and in Pago Pago, American Samoa. In sea trials there (Brian, 1978) these fish proved promising as live bait. Project activities include culture of topminnows and other species and sea trials.

1. Culture of top minnows

The project which is located in Vaitoloa near Apia is aimed at producing 5 metric tons of live top minnows (Poecilia mexicana) annually. This species was chosen since it was present in Western Samoa (introduced previously for mosquito control). The project consists of 8 equal earthen ponds dug in a small mangrove swamp. The ponds totalling 2 acres were constructed during the second half of 1978. The ponds are drained and filled with brackish water from a nearby creek - through tidal fluctuation only. The latter is limited in Western Samoa to about 1.0 meter between high and low spring tides. This dictates the small depth of the ponds which ranges between 25 to 65 cm (gradual slope), the ponds are completely drainable to allow total harvesting and eradication of unwanted organisms. The water flows in and out of the ponds through screened wooden sluices. The boards in the sluices are set in a level that permits twice daily water exchange of 10-50 percent (depending on tidal range) of the water.

Water temperature in the ponds varies between 22 and 35°C with daily fluctuations of up to 8°. Salinity fluctuates between 8 and 25 ppt and varies according to precipitation levels. Oxygen levels are usually over 5 ppm during daytime when over-saturation is often experienced. When ponds are heavily stocked aeration is provided at night through air stones to eliminate serious oxygen depletions.

A broodstock of 5000 large (8 to 10 g each) females was built up and is kept together with several males in a separate breeding pond. The sides of this pond are lined up with fresh mangrove branches which are replaced twice monthly. The later provides shelter for the newly born fry (topminnows are live bearers) and minimize cannibalism. Fry are hand netted and seined out of this pond and transferred into a fry pond which is previously treated with rotenone to eliminate predators and adult topminnows. The fry pond is rotated monthly. Fry that reach 0.1 - 0.2 g, by weight (over 2 cm) are stocked into rearing ponds a density of 100 per square meter.

The fish are fed 4 times daily with fish meal, quantity depending on feeding activity. Average daily food consumption for the project is about 40 kg dry fish meal. Food conversion appears to be 2.5 to 1. The fish reach bait size of over 1 g in weight (over 5 cm total length) in 6 weeks. At this stage they are harvested by seining, which is not very efficient and with a trap which is set outside the sluice when tide runs in. Most of the fish accumulate in the trap.

A serious problem of predation by Therapon jarbua, eels, Eleoteres and Gobiids was solved by double screening and sealing of the ponds. Predation by birds and crabs is negligible and may even be beneficial since injured and weak fish are mostly caught and removed from the ponds through this predation.

No disease or parasite problems have been encountered. This is probably due mostly to fluctuations in salinity since most parasites are more sensitive than the fish to salinity changes.

Burrowing crabs are a major problem since they deteriorate dykes and cause labourious repair works. Several methods of coping with this problem are experimented with. These include lining dykes with coral sand and coconut boards.

Based on a short term experience topminnows (Poecilia mexicana) appear to be most suitable for culture under conditions prevailing in Vaitoloa. This is because they are extremely hardy and resistant to handling, fluctuation in salinity, temperature and low levels of oxygen and free of disease.

2. Sea Trials

Several sea trials with cultured topminnows produced at the project were carried out on board the Tautai Samoa, the pole and line fishing boat that belongs to Fisheries Division. The small boat (24 ton) is equipped with bait wells and spraying system.

The bait was used solely or mixed with other wild bait or cultured milk fish. The results of these preliminary trials confirmed the potential of topminnows as live bait. The fish did not sound, stayed near the boat if it was not moving too fast and attracted schools of Tuna. Stomach contents of tuna examined immediately after catching included large numbers of topminnows.

A ratio of 1/20 bait to catch was obtained when using cultured bait mixed with small quantity (2%) of wild bait or milkfish (chanos chanos). Catch ratios of 1/15 were obtained when using top minnows alone.

The better performance of milkfish as live bait for pole and line fishing was demonstrated also by the great percentage of the latest in stomach contents of captured fish in spite of their small portion of the total bait.

The topminnows appear to justify the effort of culture despite of their being less attractive bait than the silvery fast swimming milkfish.

The preliminary observations suggest that mixing top minnows with even small quantities of wild bait or milkfish substantially improves their performance as live bait.

3. Culture of other fish and prawns :

Despite an effort to locate local fry or milkfish (Channs chanos) only small numbers were sighted and collected in the vicinity of Vaitoloa.

This fish has a great potential as live bait because of the following reasons:

1. It is as hardy as topminnows and resistant to handling and changes in physical parameters.
2. It grows more than twice faster than topminnows.
3. Its food conversion rates are far better than those of topminnows (based on experience in Fiji and elsewhere) since it feeds mainly on blue algal complex which is abundant in the ponds.
4. Due to its physical qualities (fast swimmer and shiny silvery colouration) it is an excellent live bait fish.

Tilapia mossambica also grows faster than top minnows in the ponds but has several drawbacks:

1. Uneven growth. Some of the fish grow much faster than the rest. Thus creating problems in harvesting.
2. It is a difficult fish to harvest since it sinks into the mud.
3. Males dig holes into the bottom and dykes of the ponds to serve as breeding nests.
4. It is not considered favourably as live bait because of its dark colouration, slow swimming and tendency to sound upon chumming.

Experiments to culture prawns were conducted at the project upon the request of the Government. Fry of both fresh water prawns (Macrobrachium rosenbergi) and marine prawns (Penaeus monodon) were imported from the hatchery of CNECO in Tahiti and stocked at low densities together with top minnows in two separate rearing ponds.

Both species performed relatively well obtaining 20-30 g (for P. monodon) and 12-32 g (for M. rosenbergi) within 8 months. Survival rates however were 55% for P. Monodon and 30% for M. rosenbergi. It is felt that these results can be improved.

The location of the culture site in the mangrove swamp in Vaitoloa is highly recommendable. This is because (1) the close proximity to Apia and the fisheries vessel anchorage, (2) the muddy soil is rich in nutrients and (3) suitable for pond construction. The most important factor however is (4) the low ground elevation which enables operation by tidal fluctuation.

The production of topminnows is progressing well and the target of 5 metric tons annually will be achieved if not surpassed by mid 1980.