

Preliminary Study on Effect of Different Feed Combinations on Captive Breeding of Anemonefish *Amphiprion Clarkii*

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Introduction

The marine ornamental fish trade began in the 1930s in Sri Lanka (Buckner, 2004). Harvesting marine species for home aquaria has started in 1980s (Andrews, 1990) and the exports have continued to increase in 1990s (Vallejo, 1990). The trade has expanded to a multi-million dollar business and 45 countries supply global markets an estimated 14-30 million fish annually. The largest suppliers are Indonesia and the Philippines, followed by Brazil, Maldives, Vietnam, Sri Lanka and Hawaii. Approximately 150 species of marine fishes are exported from Sri Lanka and all these come from the wild catches. Even though Sri Lanka has a vast potential for marine ornamental fish trade, it has not developed technology on breeding marine ornamental fish in captivity. Anemone fish, *Amphiprion clarkii* is a species which has a high demand among marine aquarists due to its attractive colours and behavioural display. The fish is caught from the wild destroying the natural habitats due to improper catching methods and may decrease the population. The genus *Amphiprion* represent the most important group of captive bred marine species (Olivia *et.al*, 2006) and the present study aimed to find the possibility of stimulating breeding in *Amphiprion clarkii* in captivity using two different feeds to reduce the pressure on the natural environment.

Methodology

Four glass tanks of the size (91.5 cm X 47 cm X 38 cm) were used for the study and all the tanks were set up in a same height providing equal amount of light and temperature. The bottom of each tank was filled with same amount of cleaned coral sand and gravel just enough to cover the bottom. Two cleaned clay pots were placed in each tank providing hiding places and a substrate to deposit their eggs. Each tank was connected to a triple pass type protein skimmer (400 l per hour) and a biological filter (Figure 1). All the tanks were supplied with aeration and were numbered. Purified and disinfected sea water was transported to Pannala from Marawila area. Each tank was filled with a volume of 129 l sea water and recirculation system was in operation throughout the study. Salinity of the water was adjusted around 30 – 31 ppt. Four pairs of anemone fish (Male: around 4 cm, Female around 8 cm) paired out naturally were obtained from the coral reef environment of Tricomalee sea. One pair of fish was introduced to each tank after circulating the water system for 24 hours. Two different feeds were prepared to feed the fish as formulated feed and the mussels. Mussel feed was prepared by grinding cleaned mussels and the formulated feed was prepared by grinding the cleaned ingredients; fish (50%), seaweeds and prawns (20%), cuttlefish (15%), mussel meat (15%) with garlic.

Feed preparation was done bi-weekly. Tank number one and three were fed with a formulated frozen feed and tank number two and four were fed with mussel meat at ad

libitum for three times per day. Changing and siphoning of water was done once a week and salinity was adjusted around 30 ppt. Fish were observed three times per day for their behaviors and all the information was recorded. Tanks were specially checked for eggs in the morning and afternoon. Salinity and temperature in the tanks was checked three times a day using a digital salinity meter and a temperature meter (YSI 30) respectively. Ammonia levels were checked with an ammonia meter (HANNA: HI 96733) twice/month and the level of ammonia was maintained between 0 - 0.001 ppt. Data were collected for three months and were analyzed with two proportion z test in MINITAB 14 statistical package.

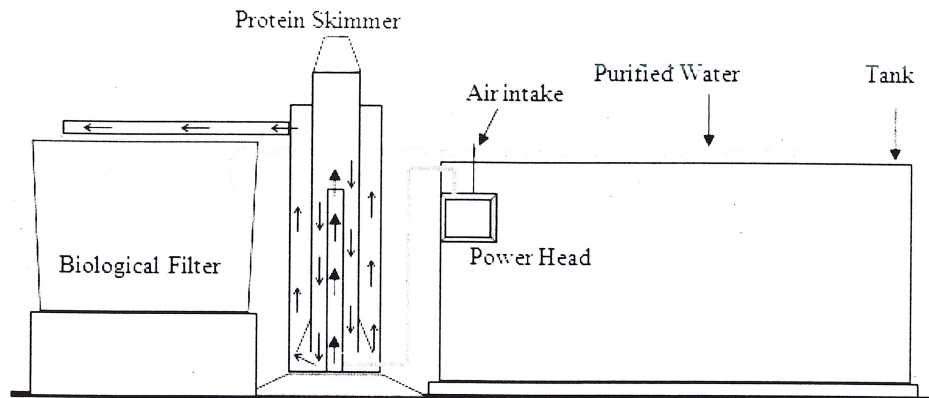


Figure 1: The water filtering and circulating system

Results

The fish that were fed with formulated feed diet started pre-spawning behavior after eight weeks after stocking while those fed with mussel did not show any spawning behavior. During the pre-spawning period fish rarely swam around the tank and at first, the female selected a specific place and stayed there and after several days same place was occupied by the male. Then, cleaning of the substratum was started by the female and later both male and female engaged in cleaning. The results indicated that formulated feed has a significant effect ($P < 0.05$) on stimulating spawning behavior in *A. clarkii*. The pre spawning behavior was limited to a period of fourteen days but spawning did not materialize. The environmental factors, salinity, ammonia, nitrate and nitrite remained constant during the experimental period but the temperature has shown fluctuations. The temperature showed a significant effect on the pre-spawning behavior ($P < 0.05$) and the pre-spawning behavior was interrupted when the temperature increased greater than 27°C .

Discussion

The results of the study has shown that the formulated feed has a significant effect ($P < 0.05$) on the breeding of *Amphiprion clarkii*. When the temperature level began to increase the pre spawning activities were stopped by the fish. According to the previous records, Dalia and Svedang (1997) has shown that water temperature has a very marked effect on the psychological and biochemical process in fish, and a raised temperature regime has a complex effect on fish reproductive, nerve and endocrine system. The

temperature presumably effect on both GtH (Growth Hormone) secretion and the responsiveness of target organ to hormonal stimulation. Increased temperature affects the fat synthesis, metabolism and endocrine system which results in the failure of the generative processes. The histological analysis revealed high frequencies of egg resorption and the gonads developed arhythmically (Dalia and Svedang, 1997) . Most of fish including *Amphiprion clarkii*, are external fertilizers. The external environment should have the ability to protect the eggs with suitable conditions. When the environmental factors are suitable, gametes are released to the environment by fish after having several behaviors (Pre spawning behaviors). These behaviors are induced by the endocrine state of the fish. According to Dalia and Svedang (1997) if the environmental temperature is raised, it is affected negatively to the endocrine system of the fish. According to Wood and McDonald (1996) there is a close association between reproductive behaviors and endocrine state, and any environmental factor (i.e. Temperature) that interferes with normal endocrine functions may also disrupt behavioral processes.

Conclusions

The formulated feed used in this study is a good source of nutrients as a brooder feed in breeding anemonefish, *Amphiprion clarkii* in captivity. The water circulating system which was used in tanks kept low levels of dissolved compounds and ammonia is efficiently removed by the system. The fish can survive without any disturbances up to 30⁰C, but the spawning activities has not taken place in temperatures above 27⁰C and higher temperatures affected spawning activities of *Amphiprion clarkii* negatively. The results are encouraging and need further research to succeed in breeding of *Amphiprion clarkii* in captivity.

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