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Feeding some commercial diets in the captive breeding of the sea cucumber, *Holothuria scabra* in Iran

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ABSTRACT

There are several commercial diets used in the culture of the sea cucumbers, Holothuria scabra. In this study Algamac 3050, Algamac Protein Plus and Spirulina powder (Aquafauna Bio-Marine, Inc.) were used. Among them, Algamac 3050 was the least effective, while Algamac Protein Plus was significantly better.

Keywords: Feeding, Commercial diet, Sea cucumber.

INTRODUCTION

Several commercial feeds (i.e. Algamac 2000, Algamac Protein plus, Spirulina powder and shrimp feed) are used in breeding and culture of the sea cucumbers in hatcheries and nurseries [1-4]. These commercial feeds are mainly utilized in two ways in sea cucumber culture; to induce doliolaria larvae to settle on substrate and to feed juveniles during nursery. The aim of this report is to outline problems encountered using commercial feeds while breeding sea cucumbers in Iran.

MATERIALS AND METHODS

This work was carried out during autumn in the years 2010-2011. The larvae of *H. scabra* got through a project conducting on sand fish culture at the research station in Bandar-e Lengeh, Hormozgan Province, Iran. In these treatment, 3 commercial feeds (Algamac 3050, Algamac Protein Plus and Spirulina (Aquafauna Bio-Marine, Inc) were used.
In this project we tried using the commercial feeds in three ways:

Feeding auricularia larvae with Algamac 3050

First stage of holothurians larvae (auricularia) will be feeding unicellular algae. In this treatment, unicellular algae has tried to be replaced with at the same concentration of algae.

Inducing doliolaria larvae to settle

When first doliolaria observed, the conditioned settlement plates have to be put in the rearing tanks. In this treatment, the plates were to condition by two commercial feeds including Algamac 3050 (adding at a concentration of 0.25–0.5 g/m^3/day without any aeration for a few days) and painting plates with Spirulina powder (through painting the plates at concentration of 2 g/m^2).

Feeding juveniles

In this treatment, trying to use commercial diets including Algmac 3050, Spirulina powder, Algamac protein plus through adding at a concentration 0.25 g/m^3 without any aeration for a few hours. Experiment was initialled with juveniles 1 mm(Mean size) in each of the tanks. The effect of different diets was determined for 5 weeks.

For rearing larvae 250 l tanks were used. Three replicates were done.

RESULTS

Feeding auricularia larvae with Algamac 3050

In this treatment, there is not any growth (Fig 1) in these larvae fed with Algamac 3050 with respect those larvae had gotten unicellular algae ($p<0.05$).

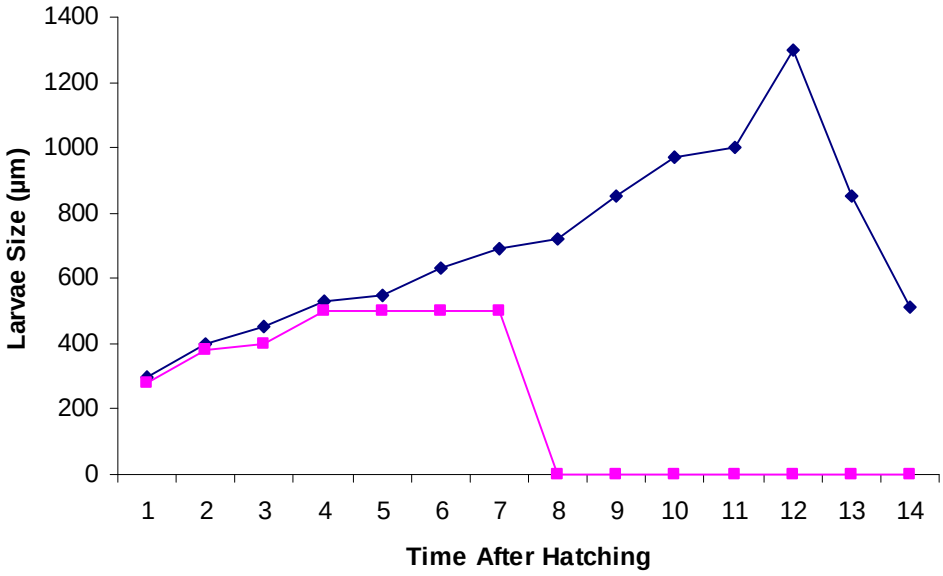

Fig 1 Feeding Larvae of *Holothuria scabra*(Blue: Unicellar algae; Pink: Algamac 3050)

Inducing doliolaria larvae to settle

There were significant differences between when the settlement plates were covered Algamac 3050 with regard to being painted with Spirulina powder. Algamac 3050 was unable to induce doliolaria larvae to settle on substratum ($p<0.05$)(Fig 2).

Fig 2 A view of settled larvae of *Holothuria scabra*

Feeding juveniles

In case the juveniles were only fed with Algamac 3050, the mortality was much more than with other feeds. Moreover, the growth was decreased(Fig 3). Among commercial feeds, Algamac Protein Plus was significantly more effective ($p<0.05$).

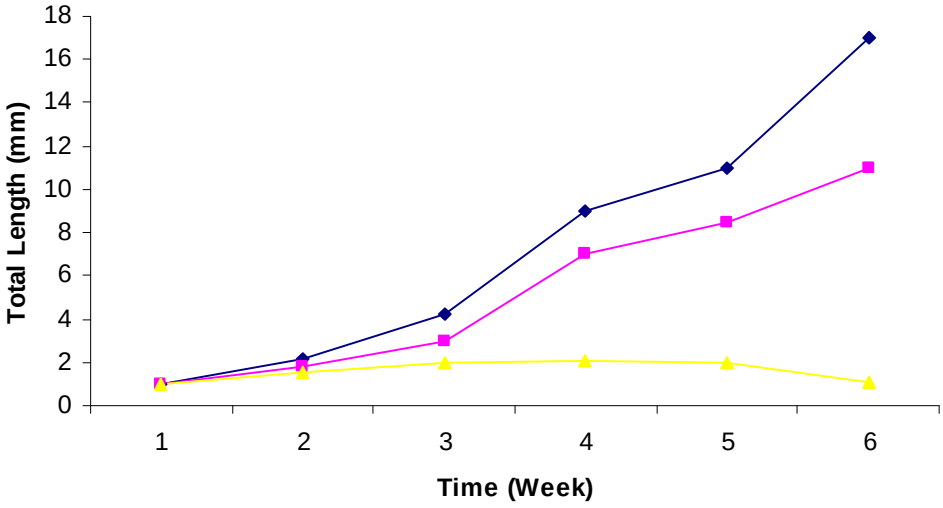

Fig 3 Mean growth of juvenile *Holothuria scabra* fed with fed with different diets (Blue: Protein Plus; Pink: Spirulina powder; Yellow: Algamac 3050)

DISCUSSION

When first stage of the holothurian larvae auricularia larvae hatch they need to be fed, using unicellular algae i.e *Isochrysis* sp. [5, 6]. Live feed can also improve the water quality too. May be due to the particle size of, Algamac 3050 which are 6-8 microns, auricularia larvae could not eat the cells.

When the doliolaria larvae develop they look for suitable substrate on which to settle [5]. Many methods are used to condition the settlement plates. Laxminarayana [7] and Dabbagh et al [8] used extract of *Sargassum* sp to induce settlement.. Algamac and periphytic diatoms also induced the doliolaria larvae to settle in India [2]. Spirulina were painted onto some settlement surfaces in Vietnam [3]. Asha and Muthiah showed that Algamac 200 can attract many pentactula larvae to settle on plates.

Results in our project indicate that painting the settlement plates with spirulina was the best method to induce the larvae using commercial dry materials. However Ivy and Giraspy[9] showed that the best feeds to induce settlement were a mixture of *Nitzschia* sp. and *Navicula* sp., which are not commercial products. Some researchers have also worked on the effects of various feeds on growth and survival of the sea cucumber [2, 4, 9]. Among commercial feeds mentioned Algamac protein plus is able to induced better growth in golden sandfish [1].

In this study, different feeds were used. However when Algamac 3050 alone was used mortality increased. This could have been caused due to the buoyant (floating) characteristics of this product.

In conclusion, commercial feeds may help to increase production in a hatchery, but some may also result in a decline. As we can see in the results have gotten by Giraspy and Ivy [1], indicated algamac 2000 had better growth with respect to Spirulina powder, but our results showed Algamac 3050 was unable to have any growth in juveniles.

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