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3. CULTURE OF HOLOTHURIANS : HATCHERY AND PRODUCTION TECHNIQUES

A REVIEW OF THE HATCHERY AND CULTURE PRACTICES IN JAPAN AND CHINA WITH SPECIAL REERENCE TO POSSIBILITIES OF CULTURING HOLOTHURIANS IN INDIA

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ABSTRACT

Pioneering work on the hatchery and culture of holothurians is done by the Japanese. In recent years some work has been done in China. Both in Japan and China work is conducted on *Stichopus japonicus*. It is significant to note that both the countries do not import *beche-de-mer* due to their culture practices. In China transplantation of holothurians is done from north to south to enable them to spawn due to higher temperature. At present in Japan sea-ranching is restored on a large scale. In India *Holothuria (Metriatyla) scabra* has been successfully induced to spawn in the laboratory and there is a good possibility to culture the juveniles in farms.

INTRODUCTION

Culture of holothurians is the monopoly of the Japanese and Chinese. They took up the work on these lines in order to augment the natural populations as food for them. The work on these lines is so well developed and remarkable succes has been achieved. This is reflected by the harvest of good quantities and these two countries do not import any *beche-de-mer* and they are able to meet their requirements through culture. India can follow these countries in culture of sea-cucumbers, so that the *beche-de-mer* industry which is now facing crisis can once again be well organised.

REVIEW OF WORK

Japan

Pioneering work on the hatchery and culture of holoturians is done by the Japanese. As early as 1937, Inaba has attempted artificial fertilization in *Apostichopus japonicus*. Imai *et al.* (1950) reported the artificial rearing of *Apostichopus japonicus*. The survival rate of Auricularia larvae was found to be 5 to 25%. The mortality in Doliolaria, Pentactula and young stages is found to be very low. The young ones grows to 3 to 4 mm in length in two months. Densely covered eel grass was found to be a favourable nursery ground for the natural propagation of sea-cucumber. Ishida (1979) studied the production of juvenile sea-cucumbers and noted that the thermal stimulation gave good results to induce spawning. Larvae were fed on *Monochrysis* or *Phytocerus*. For mass production in one tonne tank, 5 lakh thousand sea-cucumbers were produced. Dried green algae were used to feed the juvenile sea-cucumbers. The juvenile sea-cucumbers changed their colour and shape according to feeding condition. Yanagibashi *et al.* (1984) studied the rearing procedures for the newly settled young ones of the sea-cucumber *Apostihopus japonicus* with special reference to supply food itms. It was found that the settlement of pelagic larvae is influenced by the presence of their foods, epibenthic diatoms. Those fed on frozen epibenthic diatoms grow two times faster than

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those fed on epibenthic diatoms which adhere to the plates. When they attain 1 g weight two species of *Sargassum* were dried and given. The young ones attained 1 g weight in 6 months time after fertilization.

China

As expected the Chinese have done considerable amount of research on the hatchery and culture of sea-cucumbers, because of their need. Again all the work is done on *Apostichopus japonicus*. Most of the work in China is of recent origin. In fact the earliest work in China is by Chang *et al.* (1957) who gave preliminary report on the artificial rearing and propagation of *Apostichopus japonicus*. During 1972-73 *Apostichopus japonicus* was induced to spawn by thermal stimulation. As a result of this experiment 1.7 lakhs of juveniles were produced. The juveniles were reared in concrete ponds and fed with dried powder of various algae like *Enteromorpha*, *Sargassum* and *Rhodomela*. Green mud scraped from the surface of rocks which is rich in diatoms and organic debris was also given. Sexual maturity reached within two years. A two year sea-cucumber could reach a length of 230 mm and a weight of 248 g. Shuxu and Gongchao (1981) conducted experiments on the southward transplantation and artificial breeding of *Apostichopus japonicus*. The natural habitat of the sea-cucumber *Apostichopus japonicus* is in the northern China Sea. Experiments were carried out to transplant them to southern China for the purpose of culture and artificial breeding. They were able to live in indoor concrete tanks. Both adults and juveniles developed very well at temperature 27° to 29° C in summer. After 4 months the adults attained sexual maturity and they spawne twice in April. The fertilized eggs hatched and developed into more than 20,000 juvenile. A part of them were reared in indoor tanks. By August, juveniles reached a lengh of about 20 mm. Food of the larvae mainly consisted of *Dicrateria shaniangensis*, *Platymonos*, *Nitzschia*, *Bunalcilla* and *Torulopsis* among the *Dicrateria* is the most favourable one. Shui *et al.* (1984) studied the artificial culturing of sea-cucumber seeds and the effect of artifically prepared feed for sea-cucumber larvae. The juvenile sea-cucumbers were fed with powder prepared from *Sargassum thunvergii*. The same authors studied the artificial ripening of *Apostichopus japonicus*. Shui *et al.* (1986) studied the technology for rearing of postlarvae and juveniles of sea-cucumbers in high density tanks.

It is of interest to note that in reent years Russians have also evinced keen interest in the artificial rearing of *Apostichopus japonicus* in Far Eastern Seas. Mokretsova (1973), Levin (1984) and Savvatea (1987) have published papers on artificial rearing and culture of sea-cucumbers from Far Eastern Seas.

Culture Possibilities in India

In India no culture work has been attempted though Nicholson made a mention about sea-cucumber farming in olden days (Anonymous 1917). The author conducted some culture experiments at Port Blair in 1978 on *Holothuria* (*Metriatyla*) *scabra*. About 500 juveniles of this species from 65 to 160 mm in length were stocked in an enclosed area of 1500 sq. m. In seven months time the sea-cucumbers juveniles were found to grow 190 to 290 mm in length. A project was taken up by the Central Marine Fisheries Research Institute in 1987 on the hatchery development of *Holothuria* (*Metriatyla*) *scabra* to augment the dwindling stocks in the natural beds due to over exploitation. Success was achieved in early 1988 by inducing *Holothuria* (*Metriatyla*) *scabra* to spawn in the laboratory for the first time. This breakthrough was achieved for the first time in the country. Specimens were induced to spawn by thermal stimulation by raising the water to 5° C. As a result of this three males and one female spawned in the laboratory. One female liberated nearly one million eggs. The eggs were round and varied from 180 to 200 μ in diameter. It transformed into first Dipleurula and later transformed into Auricularia larvae after 24 hours. The Auricularia larvae were fed on *Isochrisis galbana* and mixed culture dominated by *Chaetoceros* and *Skeletonema*. Some of the Auricularia larvae were transformed into Doliolaria stage on the tenth day. On the thirteenth day some of the Doliolaria transformed into Pentactula stage. At this stage they settled down to the bottom and feed like adults.

Nearly after an year some of them have reached a lengh of 8 mm. In view of the poor growth in the laboratory it is desirable to sea-ranch them in large numbers on natural beds to replenish the stoks as it is now done in China and Japan. India should go in for intensive seed production and large scale sea-ranching programme so that the effect of these studies can be felt in the natural beds. Much more works remain to be done in India on these lines.

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