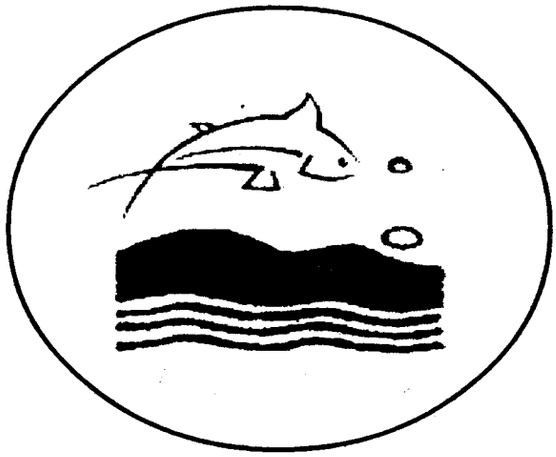
FISHERIES TECHNOLOGY



Proceedings of the

National Seminar on Development and Transfer of Fisheries Technology

Editors

V. Sundararaj

R. Santhanam

D. Sukumar

J. Stephen Sampath Kumar

Tamil Nadu Veterinary and Animal Sciences University

Fisheries College and Research Institute

Thoothukkudi

2002

CULTURE OF SEA CUCUMBERS IN PRAWN FARMS – A TAKE OFF IN TECHNOLOGY

D.B. JAMES, P.S. ASHA, M.K. RAM MOHAN & P. JAIGANESH
Central Marine Fisheries Research Institute, Kochi – 682 014

ABSTRACT

The seed of *Holothuria scabra*, commercially most important sea cucumber was produced for the first time in the hatchery of Tuticorin Research Centre of CMFRI in 1988. Since then, the seed is produced at a number of occasions. The juveniles of sea cucumbers produced can be grown along with in prawn farms since much of the feed given to the prawns goes as waste and settles down in the bottom of the pond enriching the farm soil. The sea cucumbers being detritus feeders, subsist on the organic matter present in the farm soil. They convert organic wastes into body protein and grow fast. The presence of sea cucumbers at the bottom of the pond in no way affects the activities of the prawns. In fact, the prawns grow faster since the pollution in the farm is reduced and the environment is kept clean. The average increase in weight of the juvenile sea cucumbers per month when grown at other places was only 10 g. Inside the prawn farms, the average increase in weight per month was more than 30 g. All the results regarding growth, mortality and organic content of the soil in the farm are presented in the paper

Key words : Sea Cucumber, Prawn Farm, Organic Carbon.

INTRODUCTION

Although the seed of the sea cucumber *Apostichopus japonicus* was produced and sea ranched more than 60 years back by Inaba (1937), no culture methods were evolved for sea cucumbers. In India, seed of *Holothuria scabra*, commercially most important species was produced for the first time by James *et al.* (1989). Since then, the seed of *H. scabra* was produced at a number of occasions (James and James (1993; James *et al.*, 1994a, 1994b; James 1994).

Shrimp farming, which was a promising industry in India got bogged down due to environmental problems caused by the change in ecosystem, and forced aquaculturists to think about alternative methods for maintaining the quality of the ecosystem. *Holothuria scabra*, the most valuable commercial species which is restricted to the inshore habitats, appears to be a good candidate for stock enhancement because of its bottom cleaning efficiency and high value. It grows rapidly at high densities on simple, low cost diets (Stephen and Bell, 1998).

MATERIALS AND METHODS

The seed produced in the hatchery grows to a length of 20 mm in two month time. At this stage it is desirable to transfer the seed to sea for further growth as it is expensive to maintain them in the hatchery till marketable size. Various experiments were conducted to grow the seed in Karapad Bay, Valinokkam Bay and at Krusadai Island in old one tonne tanks, rectangular cages, velon screen cages and netlon cages. The growth however was not good, since the organic carbon content of the substrate was low and no supplementary feed was given to them.

James (1996) and James *et al.* (1996) reported that the rectangular cages made of iron rods used to get rusted soon on contact with sea water. The velon screen cages get clogged with mud and algae, and the netlon cages become brittle when they remained in sea water for more than two months. In one tonne tanks, the circulation of water is not much since the tank is 50 cm in height and the soil in the tank becomes black due to hydrogen sulphide formation resulting in poor growth and mortality of the juveniles.

The prawn farm selected for the experiment to grow the hatchery produced seed was Eastern Aquafarm at Tharuvaikulam, Tuticorin. It is a modified extensive shrimp farm having four ponds of different areas. The ponds were stocked with tiger prawn *Penaeus monodon*. They were

fed on pelleted diets with 40 – 42% protein. The experiment was first conducted in a pond of 0.63 ha area after two month cultured period, having *Penaeus monodon* stocked at a density of 17 nos. / m^2. The prawns were fed daily with 15 kg ULTRA-TWL feed having a composition of 42% protein, 30% lipid and 13% ash.

The experiment was started in June, '98. Juveniles were first stocked in a concrete ring used in the construction of well, having 70 cm diameter and 30 cm height. The concrete ring was placed at a depth of 0.7 – 0.8 m diameter and at a corner of rectangular pond about 3 – 4 m from the edge of the ponds. Velon screen was kept at the bottom of the ring and tied tightly with a coir rope to prevent burrowing and escaping of juveniles. After setting the ring, the surrounding pond mud was scooped out and filled in the ring up to three-fourths of its height. After this, 11 juveniles were stocked and the top portion of the ring was covered with velon screen and tied tightly by coir rope to prevent entry of prawns and other organisms. The juveniles subsist on the organic matter present in the mud. The culture pond had four paddle wheel aerators which ensured the circulation of water and desired dissolved oxygen. During the experimental period, the initial organic carbon content of the farm soil and the concrete ring estimated as per the method given by Wakeel and Riley (1957).

In October '98, eight specimens from the broodstock tank with an average weight of 168.4g were transferred to the prawn farm. They were maintained in a separate concrete ring near the edge of the farm since the soil at the middle of the farm was black due to hydrogen sulphide.

RESULTS AND DISCUSSION

During the experiment period (June, '98 to January, '99), the salinity in the pond ranged from 28to40% and the temperature from 24 to 29°C. The water level in the pond varied from 90 to 150cm and the transparency of the water fron. 30 to 110cm. The initial organic carbon content of the pond bottom soil used for culture experiments inside the ring was found to be 0.885mg%. After one month, the value was reduced to 0.62mg% inside the ring and almost the same value was recorded in the pond bottom also. After the second month, the specimens were shifted to a new pond since the prawns were harvested in the old pond. In the new pond 0.575mg% organic carbon was recorded in the pond bottom soil after one month and a low value of 0.322mg% was recorded in the concrete ring. After the second month, the organic carbon was reduced from 0.575 to 0.437mg% inside the concrete ring, while in the pond bottom soil, a high value of 0.805mg% was noted. The organic carbon content of the pond bottom soil was increased considerably to 1.12 mg% after a six month period, while inside the concrete ring, it was reduced to 0.673mg%. During December, '98, the pond bottom soil organic carbon increased to 1.161mg% and inside the concrete ring, a reduction of 0.367mg% was noticed.

The analysis shows an increasing trend in the percentage of organic carbon in the farm soil due to more feed waste, excretory matter and due to the decomposition of plankton blooms. Reduction in the organic carbon content of the soil inside the concrete ring was noticed after every month which was due to the consumption by the sea cucumbers. The seed which was stocked with an average weight of 67g in June '98 increased to 72 g in July '98 showing an increase of 5g during the month. In August '98 it was 91g showing an increase of 19g. The weight increase during September and October '98, was spectacular being 72 and 62g respectively. During November and December '98 the weight dropped to 39g and 20g respectively which could possibly be due to low salinity.

During October '98, seven specimens with an average weight of 168g from the broodstock were stocked in a separate concrete

prawn farm. This average weight 1 to 232 g in November '98, the increase g 64g during the month. The average weight ncreased to 260 g in December '98 and 330 g in January '99. The increase during the months of December '98 and January '99 was 28 g and 70 g respectively. The lower increase in weight during December '98 may be due to the lower salinity in the pond.

CONCLUSION AND FUTURE PROSPECTS

The present study shows that the juveniles of *Holothuria scabra* grow very well in prawn farm making use of the feed waste. The weight increase per month in prawn farm is 36.1g, whereas, it was only 9.8 g when grown in harbour area under similar conditions. There was also no mortality of the seed. It is important to keep the concrete ring at the edge of the pond where there is no much hydrogen sulphide in the mud. If seed is produced in good numbers, it is advisable to stock them at the rate of 30,000 per hectare.

ACKNOWLEDGEMENTS

We thank Dr. M. Devaraj, Director, Central Marine Fisheries Research Institute, Kochi for his kind interest and encouragement. We also thank Mr. C. Suresh Babu, Manager, Eastern Aquafarm, Th uvaikulam for permitting us to conduct our experiments in their prawn farm and for providing all facilities.

REFERENCES

Inaba, D., 1937. Artificial rearing of sea cucumbers *Suisan Kenkyushi*, 35(2): 241-246 (In Japanese)

Iames, D.B., M.E. Rajapandian, B.K. Baskar and C.P. Gopinathan, 1989. Successful induced spawning and rearing of the holothurian *Holothuria (Metriatyla) scabra* at Tuticorin. *Mar. ish. Infor. Serv., T & E. Ser.*, No. 87 : 30-33.

s, D.B., 1994a. Seed production in sea umbers. *Aqua International*, 1(9): 15-26.

James, D.B., 1994b. A review of the hatchery and culture practices in Japan and China with special reference to possibilities of culturing holothurians in India. *In*. K. Rengarajan and D.B. James (ed). *Proc. of the National Workshop on Beche-de-mer. Bull. Cent. Mar. Fish. Res. Inst.*, 46: 63-65.

James, D.B., A.D. Gandhi, N. Palanisamy and J.X. Rodrigo, 1994. Hatchery techniques and culture of sea cucumber *Holothuria scabra*. *CMFRI Spl. Publ.* No. 57: 1-32.

James, D.B., 1996. Culture of sea cucumbers. *Bull. Cent. Mar. Fish. Res. Inst.*, 48: 120-126.

James, D.B., 1996b. Prospects for the culture of sea cucumbers in India. *In: Sustainable Aquaculture. Proc. National Conference*. Ramachandran (ed) Anna University, Madras. pp. 189-199.

James, D.B., 1996c. Prospects for hatchery and culture of sea cucumbers in India. *Proceedings of the Seminar in Fisheries – A multibillion dollar industry*. pp. 123-125. Aquaculture Foundation of India and Fisheries Technocrats Forum, Madras.

James, D.B., A.J. Lordson, W.G. Ivy and A.D. Gandhi, 1996. Experiments on rearing of the juveniles of *Holothuria scabra* produced in the hatchery. *Proc. Sym. Aquaculture for 2000 A.D.* Samuel Paul Raj (ed) pp. 207-214. Madurai Kamaraj University, Madurai.

James, P.S.B.R. and D.B. James, 1993. Ecology breeding, seed production and prospects for farming of sea cucumbers from the seas around India. *Fishing Chimes*, 13 (3): 24 – 34.

Stephen, C.B. and J.D. Bell, 1998. Potential of the tropical Indo-Pacific sea cucumber *Holothuria scabra* for stock enhancement. *Beche-de-mer Information Bulletin.*, No. 10: 37.

Wakeel, S.K., and J.P. Riley, 1957. Determination of organic carbon in detritus. *J. Du. Conseil.*, 22(2): 180-183