

CMFRI

W. K. S. S.

WORKSHOP ON

MUSSEL FARMING

25 - 27 SEPTEMBER, 1980

MADRAS



CENTRE OF ADVANCED STUDIES IN MARICULTURE

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

P. B. No. 1912, COCHIN-682 018, INDIA

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN - 682 018
CENTRE OF ADVANCED STUDIES IN MARICULTURE
WORKSHOP ON MUSSEL FARMING
MADRAS 25-27 SEPTEMBER 1980

TECHNICAL
SESSION IV

PRODUCTION AND
ECONOMICS

CMFRI-CAS/MF/80/BP - 15

MUSSEL PRODUCTION AND ECONOMICS AT RATNAGIRI

M.R. RANADE AND ANIL RANADE

Konkan Krishi Vidyapeeth
Marine Biological Research Station,
Ratnagiri

INTRODUCTION

Mussels as a world food resource have been indicated by Davies (1970), because of their great potential for culture and world wide distribution. In countries like India with high population and protein malnutrition anything that could be produced in large quantities at a cheaper cost giving animal protein is welcomed. In this respect mussels could be an answer meeting all the requirements. The culture potential for mussels yielding about one million tons at a rate of one ton per acre have been shown possible for India (Davies 1970). Experiments carried out in 1971-72 at Vizhinjam by Central Marine Fisheries Research Institute have shown that production of 60-70 m. tons per hectare (Qasim and Achari 1972). Recently it has been stated that open sea farming of mussels yield a production rate of

....2.

150 tons for brown mussel and 235 tons for green mussel per hectare (C.M.F.R.I. 1978) but highest production with an annual production of 480 tons of mussels per hectare has been computed by Qasim et al (1977). The results of these experiments given above clearly indicate that the forecast of Davies (1970) of potential production of one million tons at the rate of 2.5 tons per hectare per year is far too low when compared to 480 tons per hectare per year. However, they certainly indicate the tremendous potential mussels have and mariculture of mussels will go a long way in future in substantially increasing the marine food production.

The family Mytilidae is represented in Indian waters by two species viz. Perna viridis the green mussel and Perna indica the brown mussel. The detailed distribution of these two species in India is given by Jones and Alagarswami (1973). The green mussel has a wider distribution whereas the brown mussel is restricted to the southern most part of the Indian peninsula.

Occurrence of the green mussel Perna viridis in Ratnagiri which evinced interest in the animal led to study their growth in nature and a field trial in culture. The growth in culture was found to be faster (Ranade et al; 1973). A project entitled, "Raft culture of the green mussel Perna (Mytilus) viridis" was therefore, formulated and submitted to I.C.A.R. for financial assistance. The project was cleared by I.C.A.R. in June 1977 and funds amounting to Rs.44,300 were made available for a period of three years. The work was started in October 1977 and the results obtained so far have been reported in this paper. The authors wish

to express their sincere thanks to I.C.A.R. for financial assistance and for the permission to publish the results of the investigations.

MATERIAL, METHODS AND DISCUSSION

A survey of seed of the green mussel along the coast of Ratnagiri did not reveal any dense spat fall useful for culture operation. It was, therefore, decided to collect seed mussels from Velsao, Goa where density of spat of 11000/m² has been reported (Qasim et al; 1977). The seed collected from this place was transported in plastic pools on board the Research Vessel "Varsha". The deck washing pump of R.V. "Varsha" was used to keep the sea water in continuous circulation in the plastic pools enroute to Ratnagiri. This method was found to be quite satisfactory for transportation of seed from Goa to Ratnagiri. The mortality during transport was hardly 2-3%, possibly because of injury to mussel seed during collection.

A square wooden raft fabricated at the research station was taken to the shore and toed to the mooring site in Bhagawati Bay by R.V. Varsha. The details of the raft are given below:

- 1) Shape : Square
- 2) Overall dimensions: 5 x 5 m.
- 3) Space available for culture ; 4 x 4 m.
- 4) Length of wooden poles : 7.0 m.
- 5) Length of bamboos : 5.0 m.
- 6) Height of drums : 1.25 m.
- 7) Girth of drums : 0.7 m.
- 8) Weight of anchors : 45 kgs each

- 9) Length of nylon rope used for anchorage: 20 m.
- 10) Number of wooden poles required : 9
- 11) Number of bamboos required : 11
- 12) Number of drums required : 4
- 13) Number of anchors required : 2
- 14) Quantity of coir rope required : 20 kgs.
- 15) Quantity of nylon rope required : 36 kgs.
- 16) Quantity of anti-corrosive paint required: 20 kgs.
- 17) Number of man hours required for fabrication : 15 hrs.

The method of attachment of mussel seed to the hanging ropes was similar to that described by Qasim et al; (1977). From the raft of specifications given above 75 ropes could be suspended.

The details of rope cultivation of mussels are given below:

- 1) Time taken for commercial production .. 6 months
- 2) Average marketable size .. 60-62 mm
- 3) Average weight of the marketable size .. 20 gms.
- 4) Cultivable area of the raft .. 16 m²
- 5) Number of 3 m. long ropes per raft .. 75
- 6) Average annual production per rope in 6 months .. 7.0 kgs.
- 7) Average annual production per rope (2 harvests) .. 14.0 kgs.
- 8) Average annual production per raft(16m²) 1050 kgs.
- 9) Annual production per m square .. 65.62 kgs.
- 10) Value of mussels per raft per year @ Rs. 4/- kg. .. Rs. 4200

Based on the above production rates the economics of raft culture of mussels at Ratnagiri by a fisherman family is worked out and given below:

Economics of a 25 m² raft :

I) Capital expenditure:

| | | |
|--|--------|---------|
| 1) Cost of drums (4 Nos.) | .. Rs. | 400.00 |
| 2) Cost of wooden poles (9 Nos.) | .. Rs. | 99.00 |
| 3) Cost of bamboos (15 Nos.) | .. Rs. | 75.00 |
| 4) Cost of anchors (2 Nos.) | .. Rs. | 360.00 |
| 5) Cost of Nylon ropes (36 kgs.) | .. Rs. | 1080.00 |
| 6) Cost of coir ropes (20 kgs.) | .. Rs. | 80.00 |
| 7) Cost of anticorrosive paint (20 kgs.) | .. Rs. | 50.00 |
| 8) Cost of labour for fabrication | .. Rs. | 56.00 |
| 9) Cost of transport and mooring of raft | .. Rs. | 200.00 |
| 10) Cost of one tony | .. Rs. | 1200.00 |
| | | ----- |
| Total . | Rs. | 3600.00 |
| | | ----- |

II) Recurring expenditure:

| | | |
|--|--------|---------|
| 1) Servicing and upkeep of the raft | .. Rs. | 200.00 |
| 2) Cost of seed 150 kg @ Rs. 2/- kg. | .. Rs. | 300.00 |
| 3) Cost of transport and hanging | .. Rs. | 400.00 |
| 4) Depreciation of raft @ 33% | .. Rs. | 710.00 |
| 5) Depreciation of tony @ 5% | .. Rs. | 60.00 |
| 6) Loan repayment in 5 years | .. Rs. | 720.00 |
| 7) Interest on diminishing balance @ 11% | .. Rs. | 240.00 |
| 8) Miscellaneous | .. Rs. | 70.00 |
| | | ----- |
| Total | Rs. | 2700.00 |
| | | ----- |

III) Profit and Loss:

| | | |
|--|-----------|------------|
| 1) Sale of 1050 kgs of mussels @ Rs.4/-kg. | .. | Rs.4200.00 |
| 2) Interest on depreciation fund @ 10% | .. | Rs. 77.00 |
| | | ----- |
| | Total Rs. | 4277.00 |
| 3) Less recurring expenditure | Rs. | 2700.00 |
| | | ----- |
| 4) Net profit | Rs. | 1577.00 |
| | | ----- |
| 5) Rate of return on investment | | 144% |

Although the rate of return on the investment is good the net profit of Rs. 1577/- from operating one raft is not enough to maintain the family of six for a fishermen. It is, therefore, necessary that each unit of fishermen family operates four rafts at a time. Economics of operation of four rafts by unit of fishermen family is given below:

I) Capital expenditure:

| | | |
|--------------------------------------|-------|-------------|
| 1) Cost of tony | ... | Rs. 1200.00 |
| 2) Cost of fabrication of four rafts | ... | Rs. 8800.00 |
| 3) Cost of transport and mooring | ... | Rs. 800.00 |
| | | ----- |
| | Total | Rs.10800.00 |
| | | ----- |

II) Recurring expenditure:

| | | |
|--------------------------------------|-----|-------------|
| 1) Servicing and upkeep of the rafts | ... | Rs. 800.00 |
| 2) Cost of seed 600 kg @ Rs. 2/kg. | ... | Rs. 1200.00 |
| 3) Cost of transport and hanging | ... | Rs. 1600.00 |
| 4) Depreciation of rafts @ 33% | ... | Rs. 2940.00 |

.....7.

| | | |
|---|-------|-------------|
| 5) Depreciation of tony @ 5% | ... | Rs. 60.00 |
| 6) Loan repayment in 5 years | ... | Rs. 2200.00 |
| 7) Interest on diminishing balance @ 11% | ... | Rs. 730.00 |
| 8) Miscellaneous | ... | Rs. 170.00 |
| | | ----- |
| | Total | Rs. 9700.00 |
| | | ----- |

III) Profit and Loss:

| | | |
|---|-------|--------------|
| 1) Sale of 4200 kgs of mussels @ Rs. 4/kg. | ... | Rs. 16800.00 |
| 2) Interest on depreciation fund @ 10% | ... | Rs. 300.00 |
| | | ----- |
| | Total | Rs. 17100.00 |
| | | ----- |
| 3) Less recurring expenditure | ... | Rs. 9700.00 |
| | | ----- |
| 4) Net profit | ... | Rs. 7400.00 |
| | | ----- |
| 5) Rate of return on the investment | ... | 168% |
| | | ----- |

The economics of operating four rafts by a unit of fisherman family given above clearly indicates that it is more profitable to operate your rafts than one and earning a decent per capita income which is much above the poverty line.

The main constraint for mussel culture in Ratnagiri district is the non-availability of seed mussels in large quantities which increases the cost of culture operation by 29.2% because the seed is to be brought from Goa. This is compensated by the high price of mussels at Ratnagiri

(Rs. 4/- per kg.) which is considered a delicacy next to oysters and because of scarce availability. It is estimated that in the district only 1.4 m.tons of mussels are caught (Jones and Alagarswami 1973). With culture operations and large quantities available for sale the price is likely to fall down to Rs.3/- per kg. and subsequent reduction in the net profit to Rs.3200/-. To offset this reduction in earnings, the raftmen will have to increase the production per unit space and time by increasing size of the raft and by utilizing open sea for mariculture of mussels where better production is achieved.

The various production rates of mussels culture on ropes at various places on the west and east coast of India need to be compared on some common grounds. For this it is necessary to standardise a size of raft, pattern of fabrication, quantity of seed to be attached, species to be used etc. This will give a correct comparison of production rates and economics at various places which will help in the future on deciding the policy for development of culture of mussels in the country.

REFERENCES

- C.M.F.R.I. : Mariculture Research and development activities. CMFRI special publication No.2 (1978)
- DAVIES G. : Mussels as a world food resource in Symposium on Mollusca Part III, Marine Biological Association of India, (1970)
- JONES, S. and ALAGARSWAMI, K. : Mussel fishery resources of India in Proceedings of the symposium on living resources of the seas around India, CMFRI Publication (1973)
- QASIM S.Z. and ACHARI G.P.K. : Seminar on Mariculture and Mechanized Fisheries (Dept. of Fisheries, Govt. of Tamil Nadu) Abstract 13 (1972)

QASIM S.Z.,
PARULEKAR A.H.,
HARKANTRA S.N.,
ANSARI Z.A. and
AYYAPPAN NAIR

: Aquaculture of green Mussel Mytilus
viridis L: Cultivation on ropes from
floating Rafts. India J.Mar.Sci.
6(1977), 15

RANADE M.R.,
RAJE P.C. and
RANADE A.M.

: A note on the growth of the green
mussel Mytilus viridis (Linn) in
Ratnagiri waters. Curr.Sci. 42
(1973), 584.

....