Feasibility and growth of hatchery produced green mussel (*Perna viridis*) spat in Bhimili Estuary, Visakhapatnam, Andhra Pradesh

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The Bhimili Estuary situated in Visakhapatnam District of Andhra Pradesh is a fairly large but shallow estuary and supports the livelihood of over 5000 fishers. Nearly 3000 clam/oyster pickers exploit the bivalve resources of this estuary. The Gostani River joins the sea at Bhimilipatnam carrying freshwater from Anantagiri hills, Padmanabhan, Boni, Pandrangi, Taditorru, Gudivada, Chittivalasa, Jutmill, Mulakuddu and Nagamayyapalem.

Green mussel (*Perna viridis*) spat was produced in the bivalve hatchery of Visakhapatnam Regional Centre of Central Marine Fisheries Research Institute. Hatchery produced spat of *P. viridis* were transferred to Bhimili Estuary to study the suitability of the site for mussel farming, for monitoring growth performance of the mussel and also for mussel culture demonstration. The hatchery produced spat of 17.7 mm APM (antero-posterior measurement) and 0.6 g weight, were stocked in velon mesh bags and placed in netlon cages and suspended from a rack erected in the Bhimili Estuary at a depth of 2 m in the month of February. After two months, when the spat attained over 25 mm size, they were removed from the velon mesh bags and stocked in netlon cages. The growth was monitored from the 47th day onwards. The shell length, shell width, shell thickness, total weight and meat weight were recorded. The growth rate per day and specific growth rate % (SGR %) were calculated. The SGR was calculated using the formula:

$$SGR\% = [(\ln L_2 - \ln L_1) / (T_2 - T_1)] * 100$$

where, L_1 and L_2 are mean shell length/mean shell width/mean shell thickness/mean total wet weight at times T_1 and T_2 in days.

The green mussel recorded good growth in the Bhimili Estuary. They attained a final mean size of 36.45 mm APM, 20.15 mm DVM (dorsoventral measurement), 12.18 mm thickness and total weight of 5.75 g in 195 days of rearing (Fig. 1). The growth

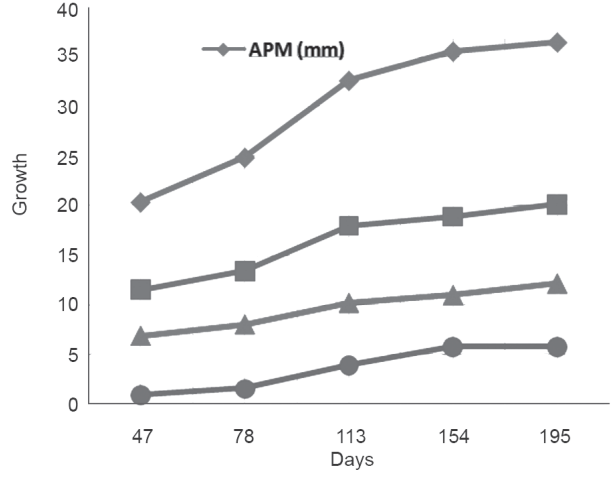

Fig. 1. Growth of *Perna viridis* in Bhimili Estuary

rate per day was 0.11 mm APM, 0.06 mm DVM, 0.04 mm thickness and 0.03 g total weight. The specific growth rate % (SGR %) in terms of APM was 0.39, DVM 0.38, shell thickness 0.39 and in terms of total wet weight 1.24. The mean meat content was 21%. Nearly 20 kg of mussels were harvested at the end of the culture period.

The salinity in the estuary ranged from 30-32‰ during the culture period, however, it was very low during September recording 11‰. The mean dissolved oxygen recorded was 3.78 ml l^{-1} with the highest value of 5.52 ml l^{-1} recorded in April and lowest value of 1.28 ml l^{-1} observed in May. The mean biological oxygen demand (BOD) recorded was 1.29 ml l^{-1}. The mean gross primary productivity (GPP) was 0.31 mg C l^{-1} h^{-1} and mean net primary productivity (NPP) was 0.21 mg C l^{-1} h^{-1}. The mean chlorophyll *a* value was 0.33 mg m^{-3} recording the highest value of 0.72 mg m^{-3} in September; the mean chlorophyll *b* value was 0.41 mg m^{-3} recording a high of 1.02 mg m^{-3} in September; and the mean chlorophyll *c* value was 0.52 mg m^{-3} recording a high of 1.3 mg m^{-3} in September. Mean values of ammonia, phosphate , nitrite and nitrate recorded at the culture site during the experimental period were 0.10 µg l^{-1}, 0.13 µg l^{-1}, 1.14 µg l^{-1} and 1.96 µg l^{-1} respectively.

The farming trial established that Bhimili Estuary is a good site for mussel farming. The hydrological conditions were conducive for good growth and meat content was also fairly high. However, during February – March, there was significant mortality due to predation by crabs. Therefore, if the farming activity is commenced after March, the culture will be more viable and sustainable. Significant resource of edible oyster and clams exists in Bhimili Estuary and this offers scope for integrated farming. Therefore Bhimili Estuary can be considered as a suitable site for small scale integrated farming of mussels and oysters. However, since local people are not aware of the edibility of mussels and do not consume mussels, it is necessary to create awareness regarding the high protein value as well as market demand of green mussels. There is need to convince the local people that mussel farming is an alternative livelihood option which is simple, ecofriendly, economically viable and sustainable.