

## Development of fouling organisms on pearl oyster *Pinctada fucata* during a period of 2 months

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*Pinctada fucata* is heavily fouled in Tuticorin waters. A two months experimental study showed that common fouling organisms were diatoms, coelenterates, bryozoans, crustaceans, tunicates, and polychaetes. The fouling pattern from the primary layer has been studied in detail and is discussed.

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### INTRODUCTION

Marine fouling is a term used to describe the assemblages of plants and animals capable of colonising submerged surfaces in the marine environment. Seen from the interests of human beings, the effects of fouling organisms may range from harmless to harmful, *i.e.*, capable of destruction of materials. Thus the problem of marine fouling and its prevention is a subject of very great economical importance to all maritime nations of the world.

Tropical waters favours the settlement, reproduction, and growth of biofoulers and thus it is essential to know the intensity, seasonal occurrence, growth rate and reproductive cycle of these organisms. The first event in the sequence of fouling is formation of primary film, which mainly comprises bacteria and diatoms.

A primary film is important for development of a fouling community and serves as food for other organisms, which may grow to a thickness of 1 cm. The larger fouling organisms prefer settlement on a surface where a primary film is already growing. Thus microbial films constitute the early development of invertebrate macrofouling communities. The pioneering bacterial community is preceded by the sorption of a

conditioning film of polymers from the sea (Nagabushanam & Thompson 1997).

### MATERIALS AND METHODS

The present study was carried out from 21 June to 21 August 2000 in shallow coastal water (3.5 m) near the harbour of Tuticorin (Lat. 8°45'N, Long. 78°10'E).

Formation of the primary film and secondary foulers were studied on pearl oysters suspended from rafts, which were placed at a distance of 500 m from the sandy shore of Tuticorin. Fouling organisms present on 60 pearl oysters were removed by scrubbing. Next the oysters were carefully swabbed with spirit and reintroduced into net frames suspended at a depth of 2.5 m. Samples were collected at 5 days intervals and brought to the laboratory in sterile polyethylene bags.

Sterilized cotton was used to swab the oysters, and the cotton was put into 9 ml sterile sea water. Serial dilutions of  $10^{-2}$ ,  $10^{-3}$ ,  $10^{-4}$ , and  $10^{-5}$  were made using 9 ml of sea water blanks. One ml aliquot appropriate dilutions were pipetted onto 4 Petri plates. Pour-plate technique was employed using Zobell's 2216c marine agar medium to enumerate the total viable aerobic heterotrophic bacterial forms. The isolates were purified by streaking and

stored in Zobell agar slants. The method of Simudu & Aiso (1962) was followed to identify bacterial isolates. Diatom film was scraped from the surface of oysters and preserved in 5% neutral formalin for subsequent identification.

## RESULTS

The bacteria *Pseudomonas* sp. and *Micrococcus* sp. were observed on day 5. Many genera of diatoms were observed on day 10: *Thalassiothrix* sp., *Coscinodiscus* sp., *Navicula* sp., and *Rhizosolenia* sp. On day 15, the cirriped *Balanus amphitrite* and the compound ascidian *Diplosoma swamiensis* were noted. Bryozoans *Membranipora annae* and the sea anemone *Paranemonia* sp. were present on day 20. On day 25 the amphipod *Elasmopus peckni* and the sea anemone *Bunodactis* sp. were observed. The isopod *Sphaeroma* sp. and the polychaete *Hydroides* sp. were recorded on day 30. The simple ascidian *Asuclia depressiuscula* and the polychaete *Polydora* sp., were observed on day 35. From day 40 and onwards, the seaweed *Hypnea musciformis* and crabs were observed. Barnacle numbers increased from 30 to 100 per oyster valve during the study period of 2 months. A linear increase in number of fouling organisms was observed from day 50 to 60.

The salinity during the study period ranged from 35-38 ‰. The temperature between 27 and 30 °C, and pH from 7.5-8.

## DISCUSSION

As expected, fouling was intense throughout the study period of 2 months with bacteria and diatoms as the important primary foulers. In the Ago Bay, which is the most important area of pearl culture in Japan, the dominant fouling organisms were tubicolous polychaetes, bryozoans, barnacles, ascidians, edible oysters and other bivalves (Yamamura *et al.* 1969). In our study the barnacle *Balanus amphitrite* was the most serious pest followed by ascidians, bryozoans, polychaetes, amphipods and isopods. Occurrence of small barnacles throughout the study period indicated their continuous breeding. Successive settlement of

the compound ascidian *Diplosoma swamiensis* formed a red layer on the pearl oysters. The boring polychaete *Polydora* sp. was widespread in pearl oysters of the present study. *Polydora* has been responsible for the great damages to the edible oyster populations in many parts of the world. (Korringa 1951, 1952; Yonge 1960).

Fouling organisms were also found on the net cages preventing the free flow of water inside the cages, affecting the pearl oyster. Turbid water in the shallow area probably afforded ideal conditions for settlement and growth of the numerous fouling organisms. The intensive fouling noticed in the pearl culture farming necessitated frequent cleaning operations.

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