

PREFACE

The estuaries of Kerala provide water front for several major and small scale industries, amongst coir industry ranks first. Retting of coconut husk is basically a biological process involving the release of a variety of biochemical compounds. The conventional coconut husk retting causes extreme pollution due to the production of organic wastes and the liberation of hydrogen sulfide, which is a potent inhibitor of aerobic respiration. Fish kills have been reported from several coconut husk retting areas in Kerala state. This study was conducted to assess the physio-biochemical changes with special reference to lipid peroxidation, and histopathological changes in fishes collected from the hydrogen sulphide contaminated waters.

The present study is divided into two parts. First part include the studies on the pollution stress effects of coir retting on fishes in the Kadinamkulam estuary located in Thiruvananthapuram district, Kerala, south- west coast of India. A detailed survey was conducted to identify the fish species found in retting and non-coconut husk retting areas of the estuary. *Oreochromis mossambicus* Peters was identified as the most abundant species in the estuary. Fish (*Oreochromis mossambicus*), water and sediment samples were collected from the selected stations in the retting areas and non-retting areas of Kadinamkulam estuary during pre-monsoon, monsoon and post monsoon seasons from March 2004 to February 2005.

The physico-chemical characteristics of the water and sediment samples were determined, and the results showed significantly high concentration of H₂S and low values for dissolved oxygen in the retting areas of the estuary. The condition factor of fishes in retting areas was less than that of the fishes in non-retting areas. The lipid peroxidative changes have been studied by determining the changes in malondialdehyde (MDA) concentration, glutathione content and activities of enzymes like superoxide dismutase (SOD), glutathione-S-transferase (GST), glutathione peroxidase (GPx), catalase (CAT) in the liver, kidney, gills and

brain of fishes. The malondialdehyde in the liver, brain, gills, and kidney were found to be high in the fishes of retting areas. The assay of enzyme activities in different tissues showed that liver, brain, and gills of fishes in retting (H₂S polluted) areas were more subjected to oxidative stress induced changes. The changes were also observed in the haemoglobin content, erythrocyte counts, leucocyte counts and haematocrit values in the blood samples of fishes studied. The histopathological changes were observed in liver, kidney and gill tissues of fishes collected from the retting and non retting areas of Kadinamkulam estuary. In the second part, an aquarium study was conducted to assess the lipid peroxidative changes, alterations in haematological parameters and histopathological changes in *Oreochromis mossambicus* (Peters) experimentally exposed to two different concentrations of hydrogen sulphide (4.9mg/L and 6.6mg/L), under controlled conditions with respect to control fishes which were not subjected to H₂S exposure.

Both the field and experimental studies point out that hydrogen sulphide pollution stress in fishes causes increase in tissue lipid peroxidation and changes in the activities of related enzymes. The studies also revealed haematological and histopathological changes in *Oreochromis mossambicus* exposed to hydrogen sulphide pollution even though it is a tolerant species. The results of these investigations are discussed in detail in the thesis, and conclusions are given. Some management measures for the protection of Kadinamkulam estuary and its biota are also suggested.