

SUMMARY AND CONCLUSION

CHAPTER V

Environmental quality is going to degrade day by day because of industrial development. Water pollution is a major problem in today's life and is mostly related to industrial development. Discharge of industrial wastewater in to natural water bodies creates water pollution due to which aquatic animals get affected. The purpose of water quality monitoring is to determine the physical and chemical properties of natural waters. Properties of water can change natural and human related processes. These properties can be used to determine the effects of surface water on aquatic ecosystem can sometimes be used to identify sources of pollution in water. Changes in these parameters may be detrimental to the organisms in and around the water source. Many factors can affect the quality of the water in an ecosystem including discharges of industrial wastes. Tannery industry is one of the most water polluting industry and wastewater from it contains high amount of solids, chlorides, turbidity, chemical oxygen demand and acidic pH etc. Very few tannery industries treat waste waters before discharged into the water bodies. It is discharged directly in to water bodies which get contaminated. Therefore, efforts have been taken to evaluate the effect of tannery wastewater on aquatic animals.

The fresh water bivalve, *Lamellidens marginalis* shows some changes in physiological processes on exposure with the different concentrations of tannery wastewater for different exposure periods. The present study on toxicological impact of tannery wastewater includes different parameters like characteristics of tannery wastewater, biochemical and enzyme activities accumulation of chromium in animal and histopathological changes in animals exposed to tannery wastewater. These results are beneficial for the use in monitoring of water quality

and its effect on aquatic biota. Following are some conclusion of the study conducted.

1. Tannery wastewater is acidic in nature because of the use of different chemicals at the time of manufacturing processes. Such acidic wastewater from tanneries discharged in to fresh water bodies in excess amount will adversely affect the aquatic biota.
2. Tannery wastewater is highly turbid due to presence of excess amount of total suspended and total dissolved solids as lime is used for loosening of hairs from skin. Turbidity and presence of solids in water results in to low penetration of light in water bodies and affect dissolved oxygen of water which is very essential for aquatic biota.
3. Chemical oxygen demand in tannery wastewater is also high due to use of chemicals in it and results in reduction of dissolved oxygen contents of water. Aquatic organisms can not survive in such water bodies contaminated with chemicals through tannery wastewater and having poor dissolved oxygen demand.
4. Oil and grease present in excess amount forms a layer on water surface which affects oxygen transport and light penetration. Likewise the chloride contents are also more in tannery wastewater as lime is used for the process of pickling of hides. Therefore, wherever this wastewater is released may results in loss of biotic components.
5. The wastewater studied in present investigation is from vegetable tanning industry where the chromium is not used for the process of tanning hides. Therefore, the chromium level found is within the limit. Some amount of chromium found in tannery wastewater may come from another chemicals used in the processing of tanning hides.

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6. Acute toxicity of tannery wastewater studied in bivalve, *Lamelidens marginalis* for 96-hrs exposure period. Animals showed LC₀ and LC₅₀ values as 5% and 20% concentration of tannery wastewater respectively.
 7. In the subacute toxicity dose concentration used is 1/10th of LC₀ and LC₅₀ values i.e. 0.5% and 2% respectively.
 8. The chromium was not detected in the control animals but found in animals exposed to tannery wastewater. Chromium accumulation is dose and exposure period dependent.
 9. The of biochemical parameter, protein shows significant reduction in all tissues of bivalve suggests increased proteolysis and decreased protein synthesis, due to stress an animals.
 10. A glycogen content decreases significantly in all tissues and is directly proportional to dose and exposure period. Decrease in glycogen contents indicates decrease in glucose stores and increase in rate of glucose utilization under stress conditions.
 11. Lactic acid accumulated insignificantly suggesting decrease in glycogen with increase in lactate level indicates hyperlactemic condition which is due to stress conditions, and increased energy supply.
 12. The cholesterol content in the bivalves, *Lamellidens marginalis* exposed to tannery wastewater decreased significantly in all tissues suggesting its role in supply of fuel to meet the metabolic demands.
 13. Acid phosphatase and alkaline phosphatase activity shows significant increase in the tissues. The decrease in protein contents and increase in acid and alkaline phosphatases results in to changes in histology and cellular damage.
 14. Glutamate oxaloacetate transaminase and glutamate pyruvate transaminase shows significant increase. It can be said that tannery wastewater has

- stimulated the breakdown of proteins resulting to amino acids leading to its accumulation and thereby elevation in transaminase levels.
15. The adenosine triphosphatase activity showed inhibited activity in all tissues. Any impairment of ATPase activity results in less availability of cellular energy in the form of ATP.
 16. Lactate dehydrogenase activity shows inhibited activity and more significantly change in 20 days exposure period. Lactate dehydrogenase variations related to histological changes in the animal.
 17. The light microscopic structure of gills shows disintegration and vacuolations in connective tissues, basal filament, and epithelial cells with accumulation of dark material. Condition is due to extreme stress on organisms.
 18. The light microscopic structure of hepatopancreas shows vacuolations and disintegration in connective tissue and cytoplasm as well as reduced lumen cavity. This may adversely affect the metabolism of the organism.

Therefore, it can be said that the tannery wastewater is harmful to aquatic biota as it changes their physiology and histopathology. So it becomes necessary that tannery waste should be treated properly before discharge in to water sources. There should be proper management of disposal of tannery wastewater. Toxicity studies help to assess the response of aquatic animals to the various toxicants in water sources found due to disposal of industrial wastewater. The physiology of aquatic organisms that come in contact with such polluted water bodies show changes in physiology as well as anatomy. This type of work helps to monitor metabolic activities in aquatic organisms during the stress conditions.