


SPRINGER BRIEFS IN ENVIRONMENTAL SCIENCE

Pramod Baburao Rokade

Impacts of
Tannery
Operations on
Guppy, *Poecilia
reticulata*

 Springer

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Preface

The relationship between man and environment is symbiotic, and the equilibrium must be maintained at any cost. Ever since the first human being appeared on earth, he has been dependent upon natural resources and their various elements. Due to expanding expectations and activities, the symbiotic relationship has drastically been culminating towards a dangerous end.

The increasing needs of humans have not left any biosphere untouched. Dangers can be seen when shifting millions of tons of solid waste materials from one place to another, and converting the waste into a degradable by-product is harmful to living beings. Increasing demands for limited natural resources by an increasing population is a problem with no current solution. As natural resources deplete, alternatives are needed if demand is not reduced. This is especially the case in developing countries, where the quality of air and water continuously deteriorates and efforts to control pollution have been failing.

Industrial development has contributed significantly to improving living standards, but it has also enhanced the dangers of pollution. During analyses of waste, it is reported in many cases that the toxicant level after treatment of toxic chemicals is considerably high, containing trace quantities of metals such as Cu, Cr, Zn, Mn, Pb, and Ni. This may be due to minimal efforts and imperfect technologies. Despite this, most of us are not willing to give up industrial commodities that are responsible for generating pollution.

Pollution can have short and long term effects on ecosystems. For instance, an accidental toxic spill can kill many animals in a short time. This gives us insight into the effects of toxicity on the environment, and raises the issue to the public. Continuous exposure of aquatic animals to pollutants might not be lethal, but it may affect the whole aquatic ecosystem in the long term by disrupting vital physiological and endocrinological functions. Pollutants enter in the food chain through many ways such as absorption by and accumulation in vegetation, phytoplanktons, and zooplanktons. Normally, many vertebrates and invertebrates feed upon micro and macro-aquatic biota and become vulnerable to the bioaccumulation of pollutants.

Tannery releases more toxic effluent than most industries, which indirectly exerts stress on aquatic ecosystems. The heavy metal Cr (VI), one of the nondegradable pollutants found in tannery effluent, not only damages the tissue like gills and

gonads but also disrupts reproductive functioning in animals. Due to this, tannery effluent has been selected to be studied for its possible effects on target tissue (the gonads and pituitary gland), on reproduction, and on the rate of parturition in the fish *Poecilia reticulata*.

Guppy is a voracious feeder on mosquito larvae and keeps a check on their population. Therefore, it lives in the places where mosquitos lay their eggs and continue their life cycle. Individual guppies eat about 150–200 larvae within 5 minutes. Selection of the guppy for the present investigation is due to its easy availability throughout the year. It also gets acclimatized very easily to laboratory conditions with little effort, and is very sensitive to environmental changes.

Systematic position of *Poecilia reticulata* in the animal kingdom

Kingdom: Animalia

Phylum: Chordata

Subphylum: Vertebrata

Class: Osteichthyes

Subclass: Actinopterygii

Order: Atheriniformes

Suborder: Cyprinodontoidei

Family: Poeciliidae

Genus: *Poecilia*

Species: *reticulata*

Taxonomic order 1675

Synonym: *Poecilia reticulata* (Peters) 1859; 412, type locality, Caracas, Venezuela, Rosen and Bailey 1933; 56.01

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