

TOXICITY EVALUATION OF INDUSTRIAL EFFLUENTS TO ZEBRAFISH (DANIO RERIO) EMBRYO

Patel, Dipak^a; Rana, Jigar R.^a; Patel, Manish V.^a; Khan, Nadeem^a; Vincent J. Piccirillo^b and Reddy, M. N.^c

^a Department of Toxicology, Jai Research Foundation, Valvada, India ❖ ^b VJP Consulting, Inc., Ashburn, VA USA

^c Department of Biosciences, VNSGU, Surat, Gujarat, India



Abstract Number: 364
Poster Board Number: 611

ABSTRACT

Disposal of industrial effluent is one of the major ecological challenges. The presence of toxic and persistence chemicals cause adverse effects on soil, water bodies, agriculture, flora and fauna. Therefore, environmental pollution has become a global problem and maintaining ecosystem health is a serious issue. The samples were collected from three different locations (near Sachin, Gujarat). The samples were assessed for toxicity in zebrafish embryos. Zebrafish (*Danio rerio*) embryos are widely used as an experimental model for testing of industrial effluent. The study was performed in semi-static conditions where media was renewed at 24 h intervals. Fertilized 1 hour-post-fertilization (hpf) zebrafish embryos were exposed to range of dilutions (Sample A: 0.78 - 12.5%, Sample B: 10.66 - 100% and Sample C: 0.72 - 6.0) in 24 well culture plates along with controls. Different morphological changes were observed including coagulation of embryos, non-detachment of tail, lower frequency of heartbeat, curved body, pericardial oedema and yolk sac oedema as compared to control. The acute toxicity (LC₅₀) of effluents on zebrafish embryo for 96 h were 3.44% , 50.64% and 2.60% for Sample A, B and C, respectively. Based on the result of the present study, it can be concluded that industrial effluents have shown adverse effects to zebrafish embryos even at very high dilutions. Exposure of industrial effluent to zebrafish embryo shows that it is a highly sensitive organism to the pollutants present in industrial effluent.

INTRODUCTION

Disposal of industrial effluent is one of the major ecological challenges. The presence of toxic and persistence chemicals cause adverse effects on soil, water bodies, agriculture, flora and fauna. Therefore, environmental pollution has become a global problem and maintaining ecosystem health is a serious issue. Due to present day by day increasing tremendous industrial pollution has prompted us to carry the current research.

OBJECTIVE

Present study was conducted to elucidate the effect of industrial effluents on early life stages of zebrafish (*Danio rerio*).

MATERIAL METHOD

Test Samples

Three different samples from different location near Sachin.

Positive control

3,4-dichloroaniline (97.6%), Sigma-Aldrich, Switzerland

Fish

Adult wild type zebrafish (*Danio rerio*) were used in the study. They were housed in Zebrafish Hosing System (Aquaneering, USA).

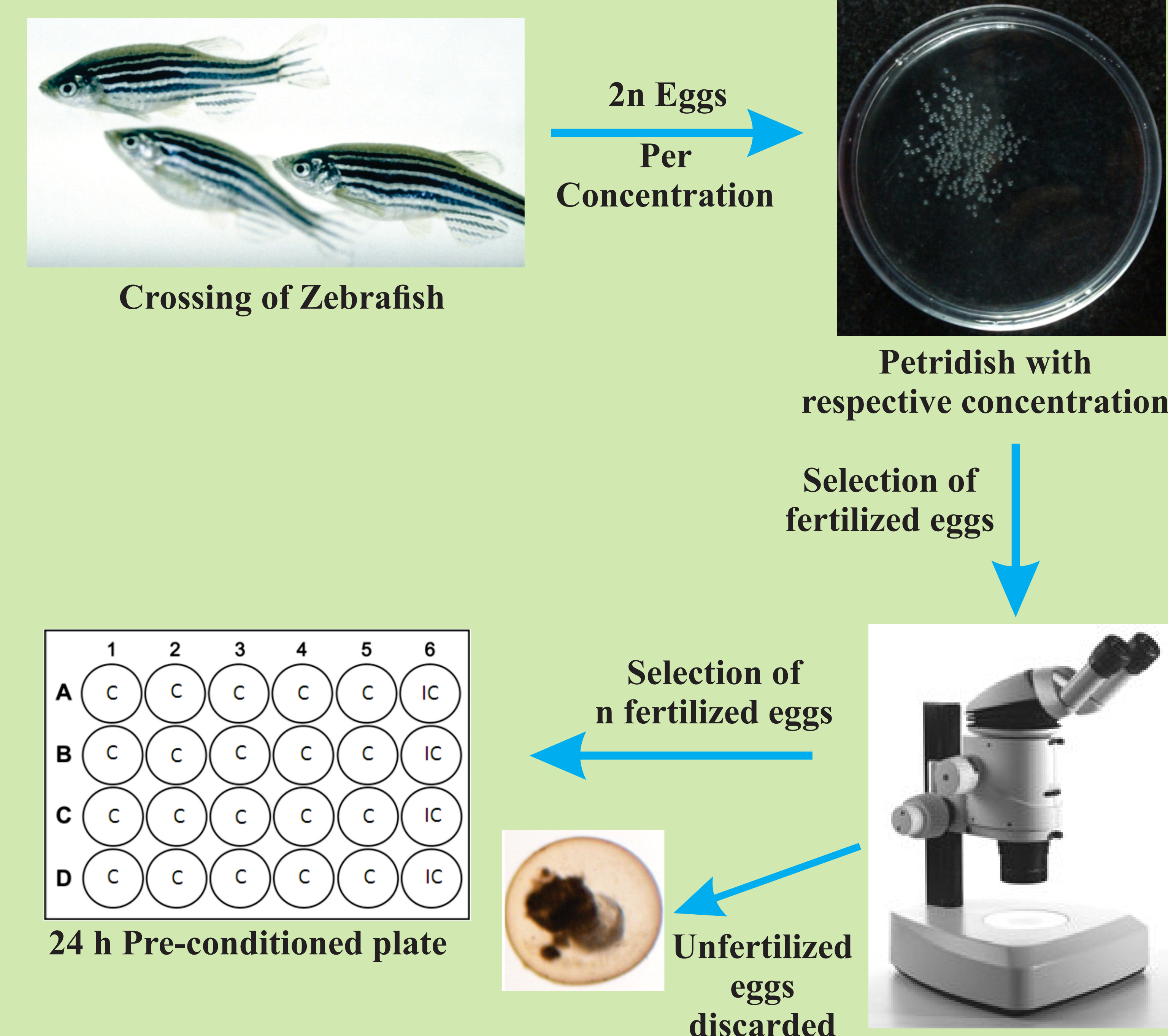
EXPERIMENTAL DESIGN

Test System	Zebrafish Embryos
Test Sample	Industrial Effluent
Test Media	E3 Medium
Test Procedure	Semi-static
Control	Test medium (E3 Medium)
Internal Control	Test medium (E3 Medium)
Positive Control	3,4-dichloroaniline at the concentration of 4 mg/L
Number of Embryos	20 embryos per concentration and 4 embryos as internal control per plate
Test Duration	96 h
Observation	Every 24 h interval
Test Concentrations	Sample A: 0.78, 1.56, 3.13, 6.25 and 12.5 % (Geometric Factor 2) Sample B: 10.66, 18.66, 32.65, 57.14 and 100.00 % (Geometric Factor 1.75) Sample C: 0.72, 1.22, 2.08, 3.53 and 6.00 % (Geometric Factor 1.7)

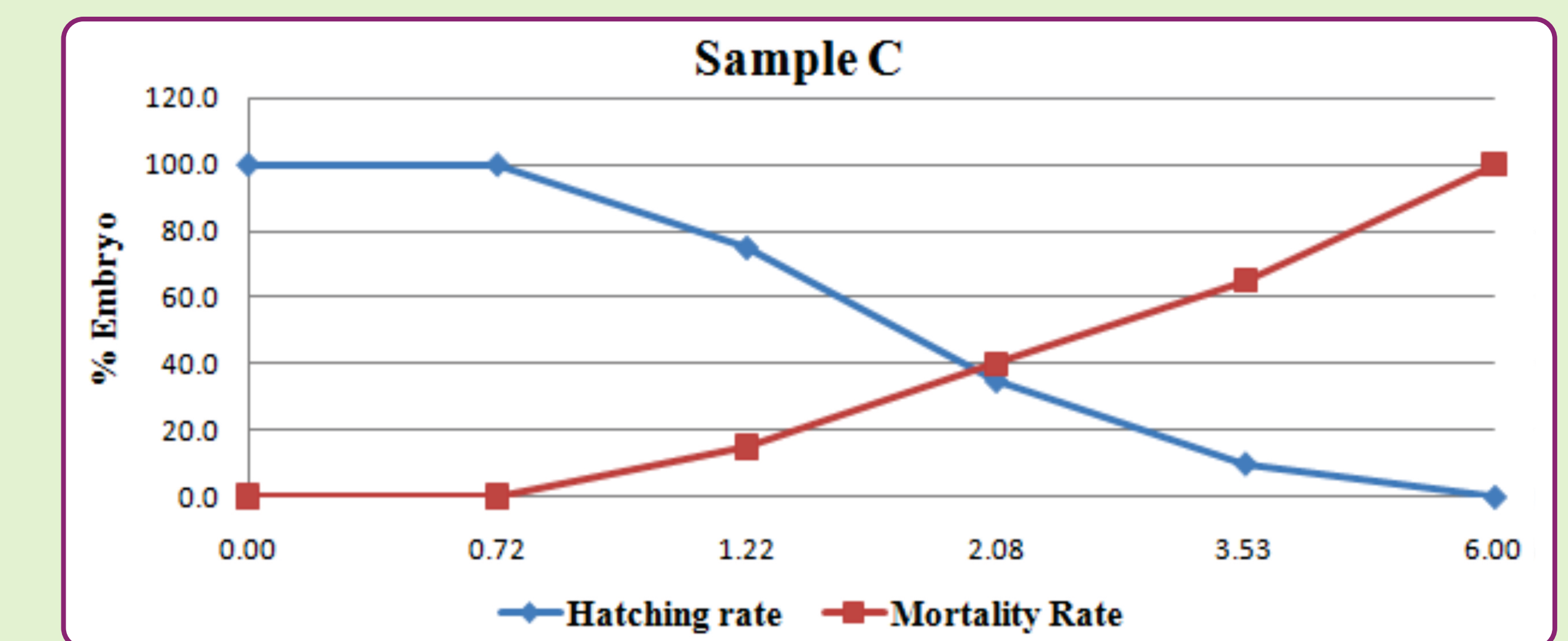
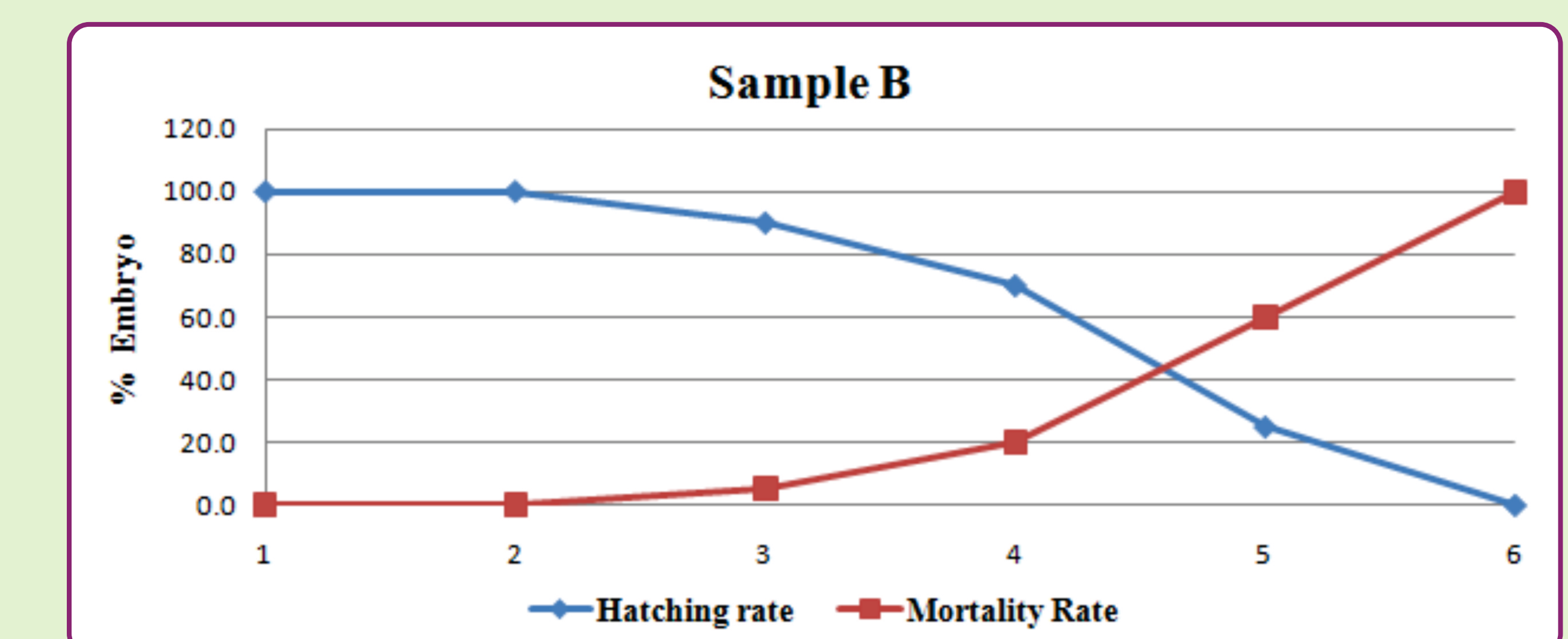
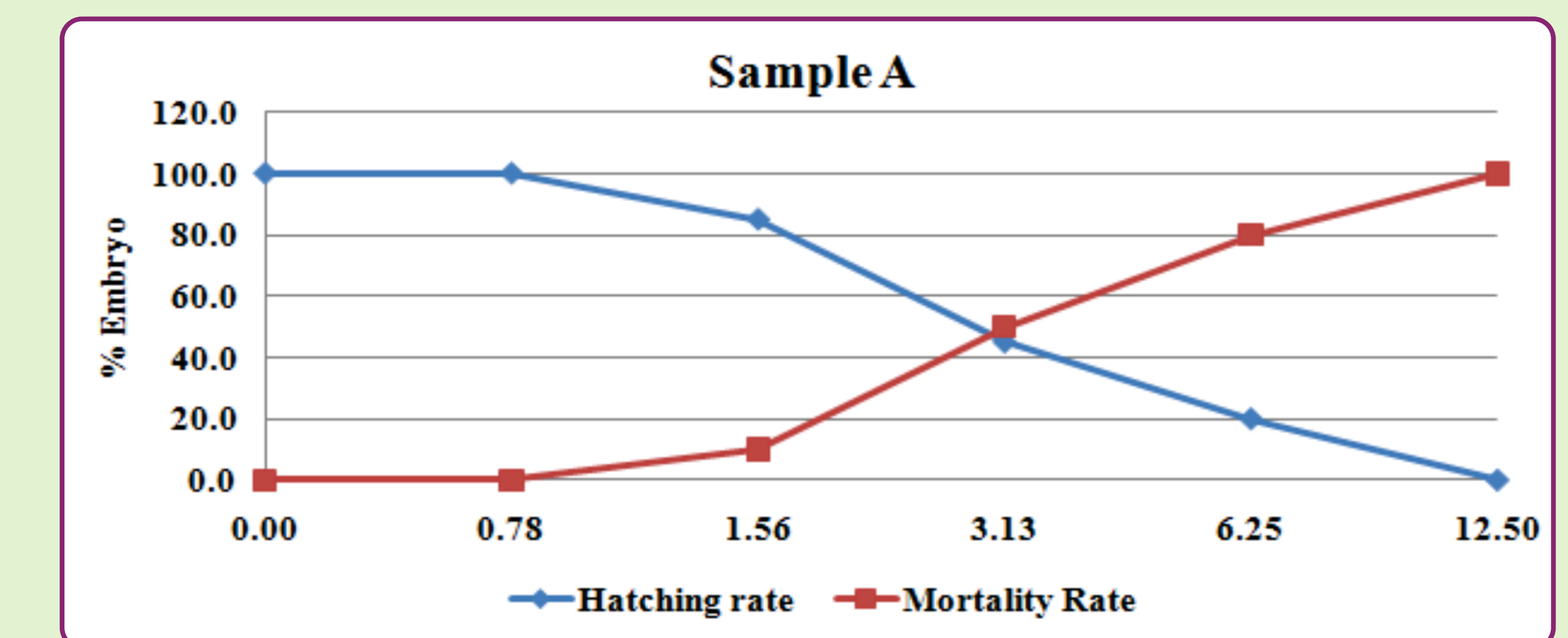
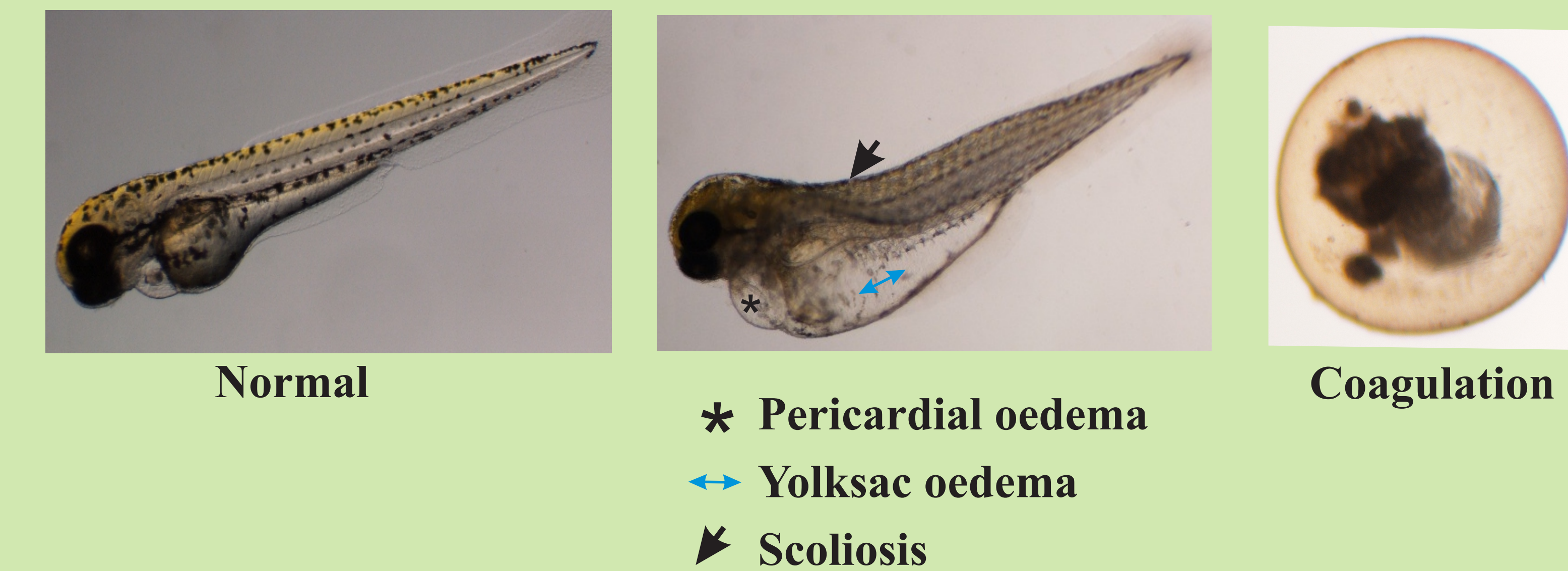
RESULT

The acute toxicity (LC50) of effluents on zebrafish embryo for 96 h were 3.44%, 50.64% and 2.60% for Sample A, B and C, respectively.

EXPERIMENTAL PROCEDURE



PHENOTYTICAL OBSERVATIONS



CONCLUSION

Based on the result of the present study, it can be concluded that industrial effluents have shown adverse effects to zebrafish embryos even at very higher dilutions. Exposure of industrial effluent to zebrafish embryo shows that it is a highly sensitive organism to the pollutants present in industrial effluent.

REFERENCES

OECD, 2013: OECD N° 236, "Fish Embryo Acute Toxicity (FET) Test", Organization for Economic Co-operation and Development (OECD) Guidelines for the Testing of Chemicals, adopted by the Council on July 26, 2013.

Finney, D. J. 1971: Probit Analysis, 3rd Edition, Cambridge, University Press, p. 333.

ACKNOWLEDGMENT

Dr. Abhay Deshpande and Dr. S. Y. Pandey of Jai Research Foundation for their scientific contribution of this work.