

Effect of Imidacloprid Insecticide on Glycogen Content in the Gill Tissues of Fresh Water Fish *Rasbora daniconius* (HAMILTON, 1822)

¹Gaikwad.S.B, ¹Kharat Pravin.S , ³Tanaji Kashid, ¹Barve M. B.

¹Research Scholar, ² Assistant Professor, ³ Assistant Professor

¹Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.), India.

³PDEA's Anantrao Pawar College, Pirangut, Taluka-Mulshi, District-Pune Maharashtra, India.

Abstract-The indigenous freshwater fish *Rasbora daniconius* was used for the present experiment to validate the toxic effect of Imidacloprid insecticide. When subjected to increasing concentration of imidacloprid (Nicotine insecticide) acute exposure to different doses of lethal concentrations respectively i.e. 24 hrs, 48 hrs, 72 hrs and 96 hrs with imidacloprid at 5.6 mg, 4.5 mg, 2.9 mg and 1.8 mg respectively. A decrease in the glycogen level was observed in gill tissue of test fish, it shows the possible effect of insecticidal toxicity. As the fish, *Rasbora daniconius* is largely consumed by people, it is necessary to know the toxic effect of imidacloprid on biochemical changes in gill tissue.

Keywords- *Rasbora daniconius*, imidacloprid, glycogen, toxicity.

I-INTRODUCTION

In the present study effect of Insecticide Imidacloprid on content of glycogen level in gill tissue of *Rasbora* fish was observed as *Rasbora daniconius* is easily available in rivers, streams and ponds and is very much popular in the poor section of people for its taste and availability at affordable price, hence it is essential to have a comprehensive knowledge of food value and chemical composition to know how far the fish consumed by the people can actually fulfill their energy requirement. Stress is the first indicator to know that biochemical changes occurring in the body of a fish and during the stress animal requires sufficient energy. Stored Glycogen is being used as a source of energy during mild stress. Energy supplies from reserve materials i.e. Glycogen, Protein and Lipid[1]. In the present study a little attention was paid to study the changes glycogen level in gill of freshwater fish *Rasbora daniconius*, as it is an economically important fish.

Increasing use of pesticides for the control of pests in agriculture including commercial and household production of vegetables causes potential health hazards to live stock, especially to fish, frogs, birds, and mammals [2].

The purpose behind present study is to estimate the alteration in glycogen content in gill of *Rasbora daniconius* by the influence of Imidacloprid. Increased use of pesticide may be having toxic effects on a wide range of non-target organism. Fish and many other aquatic species is the victim of agricultural pesticides.

II-MATERIAL AND METHOD

Healthy adult freshwater fish *Rasbora Daniconius* collected from "Jatwada" Dam near 5 km. from Aurangabad city, and brought to the laboratory, and acclimatized to laboratory condition and aerated for 48 hours exposed to next three days conditioning at room temperature. Fishes were fed with commercial feed diet daily during this period, Feeding were stopped 24 hours before toxicity tests, dechlorinated water is necessary to maintain fish as it helps to stabilize its composition and to eliminate residual chlorine which is otherwise considered highly toxic to fishes. Artificial aeration and feeding stopped during toxicity tests. physico chemical parameters were regularly reported and listed in the table no.1

Table .1.The physio-chemical parameters of the acclimatized water (average values).

Temperature	28 ⁰ c (27 ⁰ c - 28 ⁰ c)
Dissolved oxygen	6.2 mg/L (5.8 - 6.5 mg/ L)
Total hardness	72 ppm (70 - 90 ppm)
PH	7.4 (7.1 - 7.5)

Healthy fishes of similar size and weight (8.02 ± 0.4)cm. and weight (0.790 ± 0.7) taken and then moved into the same sized glass aquarium containing dechloronated tap water with 20 liter water, 10 fishes transferred to each aquaria. Fishes were exposed for 24 hrs, 48 hrs, 72 hrs and 96 hrs with stock solution of imidacloprid 5.6 mg, 4.5 mg, 2.9 mg and 1.8 mg respectively.

Water was changed every day to avoid the accumulation of metabolic waste, and it helps to maintain the concentration constant. After exposure period fishes were dissected carefully and gill tissues were taken out. For the estimation of glycogen content 10 mg gills dissected out from both control and treated fishes separately and added 5 ml of KOH solution and for further estimations was carried out accordingly to the Anthrone reagent method [3].

III. RESULT AND DISCUSSION

Imidacloprid exposed gill tissues of *Rasbora daniconius* show glycogen content of mg/gm wet weight for gill tissues.

Table 2: Glycogen content in the gill tissues of fish *Rasbora daniconius* when exposed to Imidacloprid for a period of 24 hrs, 48 hrs, 72 hrs and 96 hrs.

	Exposure period in hrs.			
	24 hrs.	48 hrs.	72 hrs.	96 hrs.
Control	5.12 ± 0.020	5.12 ± 0.020	5.12 ± 0.020	5.12 ± 0.020
Exposure Mean	4.42 ± 0.020 (13.67)	3.82 ± 0.028 (25.39)	3.42 ± 0.020 (33.20)	3.06 ± 0.024 (40.23)
SD	0.0724	0.0634	0.0557	0.0492

SD=Standard deviation, Values are expressed in mg/100mg of wet tissue weight (Mean ± SD);

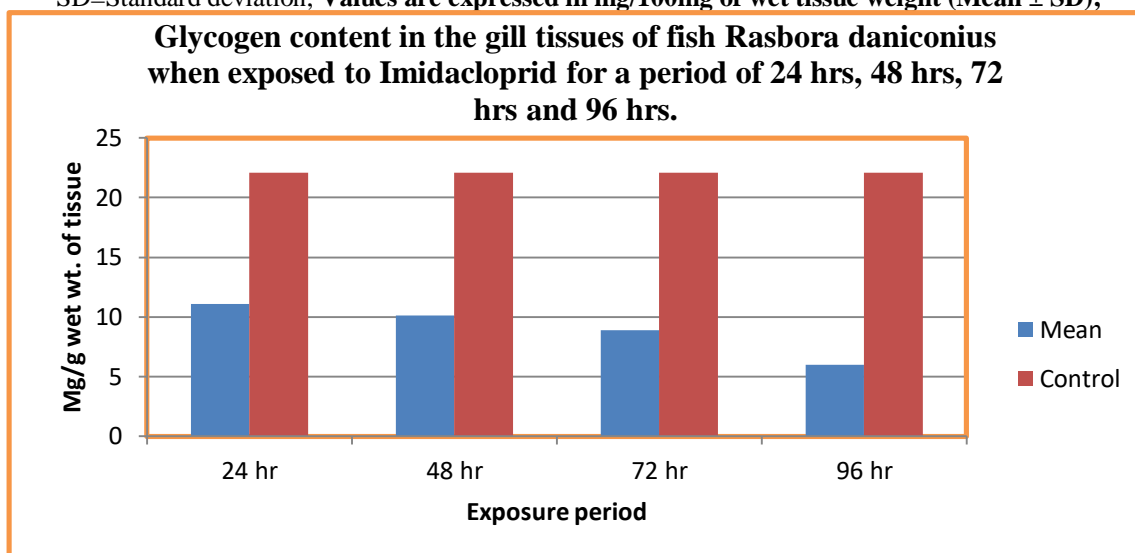


Fig.1. Glycogen content in the gill tissues of fish *Rasbora daniconius* when exposed to Imidacloprid for a period of 24 hrs, 48 hrs, 72 hrs and 96 hrs.

Table no.2 shows glycogen content decreased in the gill tissue after exposure if Imidacloprid. Glycogen is the major principle and immediate source of energy during the stress [4] observed that decrease level of glycogen in the fresh fish *Tilapia mossambica* treated with sodium fluoride[5]. Suggested that the increased glycogenolysis decreases glycogen content in the liver of *Clarius batrachus* exposed to Malathion[6] noticed that decrease in the glycogen level in *Tilapia mossambica* chronically exposed to Thiodon, due to extreme increase in energy requirement[7] observed depletion in glycogen content after exposure fresh water fish *Channa gachua* to quinalphos. [8] Observed decrease in the glycogen level of the muscle of the fish *Colisa fasciata* & *Cyprinus carpio*. [9] observed decrease in muscle tissue glycogen level and related it to the hypoxia condition under which stored glycogen may be utilized by the fish *Tilapia mossambica* exposed to Thiodon. [10] observed that the decrease in the glycogen level can be due to rapid breakdown to circulate glucose in to the circulatory system to attain the requirement energy. Similar observations have been noticed by other researchers. [11] They observed decreased level in the glycogen content of the muscle due to the enhanced oxidation through HMP-pathway. [12] observed in stress condition carbohydrate reserve depleted to meet energy demand. The decrease level in the glycogen and glucose suggested the possibility of active glycogenolysis as reported.

IV. CONCLUSION

In the present studies the decrease of glycogen level in the gill tissue observed in *Rasbora daniconius* treated with imidacloprid, can be due to glycogenolysis in order to meet energy demand under the insecticide stress as per the view expressed by other researchers.

ACKNOWLEDGEMENT

The authors are thankful to head, Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University (M.S) Indian for providing laboratory facilities.

REFERENCES

- [1] Jagarkar .J.V. 2005. Interactive effects of heavy metals on the toxicity and physiology of the freshwater fish: *Rasbora daniconius*. Ph.D. Thesis submitted to Dr. B.A.M. University, Aurangabad.
- [2] K. Suneetha. 2010. Changes in protein subunits induced by endosulfan and fenvalerate in fresh water fish *Labeo rohita* through SDS-PAGE. Journal of Environmental Biology September 2010, 31(5) 759-763 (2010).
- [3] Seifers S, Dayto Naic B. 1950. The estimation of glycogen with Anthrone reagent. Arch. Biochem. Biophys 1950;25:191
- [4] M. B. Bagale. 2015. Sodium fluoride induced histochemical changes in the Liver of freshwater fish, *tilapia mossambica* (*Oreochromis mossambicus*). The Bioscan.9(3): 1089-1092, 2015
- [5] Mukhopadhyaya and Dehadrai.1980. Studies in air breathing cat-fish *Clarius batrachus* under sub lethal Malathion exposure. Indian journal of experimental biology. 1980; 18:348-382.

- [6] Gaikwad.S.A. 1981. Toxicity studies with Thiodon 35 EC & Phenylmercuric Acetate on *Tilapia mossambica*. Ph.d.thesis submitted to university of Mumbai, 1981
- [7] N.B.Pakhare et al. 2016. Acute toxicity of quinalphos (25% EC) on glycogen content in different tissues of the freshwater fish, *Channa gachua*(HAMILTON, 1822). The Ecoscan, vol.IX:783-787:2016.
- [8] Soman. 1987. Toxicity of Fenthion, Thiodon, DDT, malathion & Nuvan to the fish *colisa fasciata*. Enviromental biology & Toxicology, Rastogi & company, meerut,India, 1987, 09-15.
- [9] Swaminathan et.al.1990. Indian agriculture next phase, pesticide. 1990; xxiv(1):17-21.
- [10] Dange et.al. 1984. Effect of Naphthalene exposure on activity of some enzyme in Chichlid fish *Tilapia mossambica* (Peters). Indian journal of exp. Biology. 1984; 2:16-24.
- [11] Reddy, Yellumma S. 1991. Toxicity of Cypermethrin in *Tilapia mossambica*. J Environ. Biol. 1991; 5(2):25-30.
- [12] Sastry et.al. 1984. Some haematological, biochemical & enzymological parameters of a fresh water teleost fish *Channa punctatus* exposed to sub lethal concentration of Quinalphos pesticide. Biochem. Physiol. 1984; 22:8-13.

