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Effect of Fertilizer on Glycogen Composition of Freshwater Fish *Gambusia affinis*

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ABSTRACT

The mosquito fish *Gambusia affinis* is a small stout-bellied fish. *Gambusia affinis* is native to freshwater water bodies with low salinity in the eastern and southeastern United States and the Gulf of Mexico. Mosquito fish are also now seen all over the world. The body composition of fish is very interesting. In the body of fish there are some main products are present viz, protein, water, fat, minerals and carbohydrates. A synthetic fertilizer is applied for soil or plant tissue. Compound NPK fertilizer is containing three major nutrients necessary for the healthy growth of plants. The agricultural industry relies heavily on the use of NPK fertilizers to meet the world's food supply and ensure healthy harvests. Our results showed that the freshwater fish *Gambusia affinis* had the greatest reduction in glycogen content. These results concluded that different concentrations of NPK fertilizers applied to the *Gambrusia affinis* remain in the body and their toxic effect on glycogen levels. Glycogen is used as a precursor for energy in fish under stressful conditions. Depletion of glycogen levels suggests the use of glycogen to overcome fertilizer stress. Glycogen breakdown increases due to the increased need for energy to detoxify stressful conditions.

Key words : *Gambusia affinis, Fertilizer, Larvivorous, Precursor*

Introduction

The Mosquito fish is a native freshwater fish mostly occurs in low salinity water and commonly known as, *Gambusia affinis*. It is ambiguously, they have generic name Gambusia or common name gambezi. Mosquitofish now also occur throughout the world as a result of intentional and non-intentional introductions beginning approximately 100 years ago. Biochemical studies of fish tissue are of considerable interest for their specificity in relation to the essential food value of the fish and for the evaluation of their physiological needs act deference periods of life. In the body of fish there are different components some are present i.e., protein, water, fat, minerals and carbohydrate (Wilson, 1994).

A fertilizer is any material of natural or synthetic origin that is applied to soli or to plant tissue to supply one or more plant nutrients essential to growth of plants. Many sources of fertilizer exist both natural and industrially proudest (https://en.m.wekipidia.org). This fertilizer when applied in restricted area are was and carried away by rains and fluids to larger water body like pond and river and there by alter the physiochemical properties of water this proved to be highly toxic to aquatic ecosystem in which affect the fishes and their environment such fertiliser also affects other aquatic animal. NPK fertilizer is a complex fertiliser comprised primarily of the three primary nutrients required for healthy plant growth. The agro industry relies heavily on the use of NPK fertilizer to meet global food supply and insure healthy crops (feeco.com).

Materials and Methods

The fish, *Gambusia affinis*were collected by using the fishing net from the pond of K.J.S. College Campus

Kopargaon, Ahamadnagar. The *Gambusia affinis* were acclimatized for two weeks under laboratory condition. In the present investigation almost equal sized mosquitofish *Gambusia affinis* were maintained in the laboratory. The fishes were cleaned by using 0.1% KMNO4, to avoid dermal infection and to prevent from disease outbreaks.

Experimental setup for LC_{50} value: This bio assay test was carried to calculate LC_{50} agents *Gambusia affinis*. This step was help to minimize further animal killing. The experiment was carried out in 6 sets. the lethal concentration value was analysed by Finney's probit analysis method.

Experimental Setup for effect of fertilizer on bio chemical composition of *Gambusia affinis*: After determining the LC_{50} value a batch of 10 fishes was exposed to sub lethal concentration of fertilizer. After the experimental set up the fish was taken and were given anaesthesia by using chloroform. After that the fish was dried in shade naturally.

Results and Discussion

After determining LC_{50} the batch of 10 fishes exposed to sub lethal concentration of NPK fertilizer for the analysis of glycogen content (Table 2). Another batch of fishes was maintained as control. The glycogen content is decreased when the concentration of fertilizer is increased. Control fishes show the normal glycogen value is 5.4155±0.5514. As compared to normal value, the experimental setup shows decreases in the glycogen content 3.9069±0.3763. The graph is plotted between treated and control fishes value (Fig. 2). 27.8607% was reduced which is exposed to 0.1 mg/l concentration of NPK fertilizer.

In the present study the LC_{50} value and glycogen content of freshwater fish *Gambusia affinis* which is exposed to fertilizer was calculated. The LC_{50} value of NPK fertilizer to fish was estimated by exposing six group of fishes to different concentration of fertilizer. The concentration of Fertilizer was given to fishes as 1.2, 1.4, 1.6, 1.8, 2.0 mg/l respectively (Table 1). The LC_{50} value is obtain that is 1.5 mg/lit. 50% mortality at log of concentration 0.17. After that the graph of LC_{50} value was plotted between log of concentration and probit value.The result showed that there is maximum decrease in the glycogen content of freshwater fish *Gambusia affinis*. Glycogen is used as a principle and immediate energy precursor in fish under stress condition. Depletion in the level of glycogen indicates their utilization to overcome fertilizer stress. More energy is required to cope the stressful condition. Increase in the breakdown of glycogen due to higher energy demand for to

Fig. 1. Maintenace of *Gambusia affinis*

Fig. 2. Experimental set up for LC_{50}

Table 1. Mortality of *Gambusia affinis* in different concentration of NPK fertilizer at 96 hours exposure

Sr. No.	Conc. of fertilizer in mg/l	Log of conc.	No. of fishes exposed	No. of fishes alive	No. of fishes dead	Percent mortality (%)	Probit mortality
1	1.0	0	10	10	0	0	-
2	1.2	0.079	10	7	3	30	4.48
3	1.4	0.146	10	6	4	40	4.75
4	1.6	0.204	10	4	6	60	5.25
5	1.8	0.255	10	3	7	70	5.25
6	2.0	0.301	10	1	9	90	6.28

Fig. 3. Experimental set up for 0.1mg/lit. concentration of NPK fertilizer

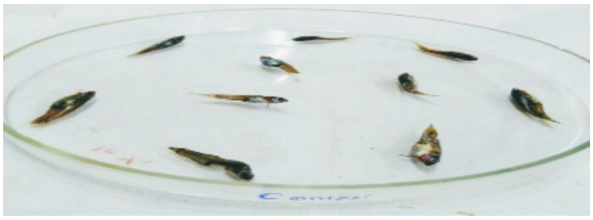


Fig. 4. Experimental set up for fish drying

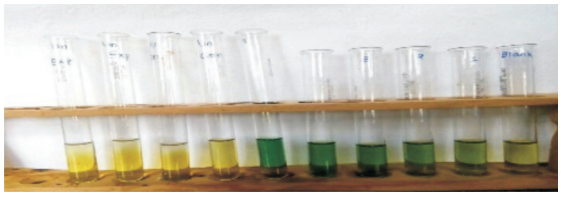
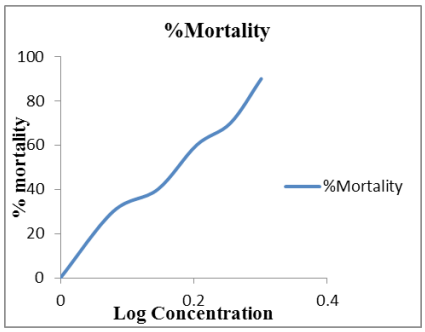
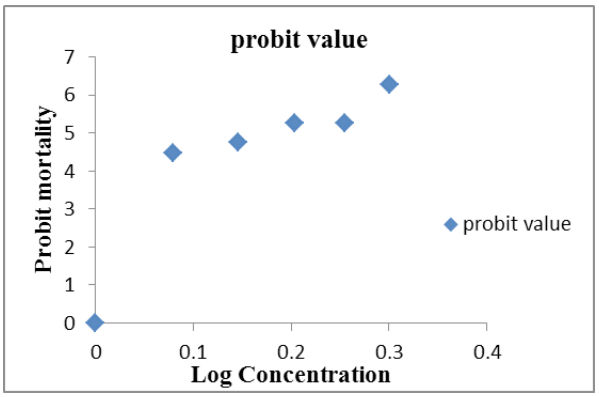


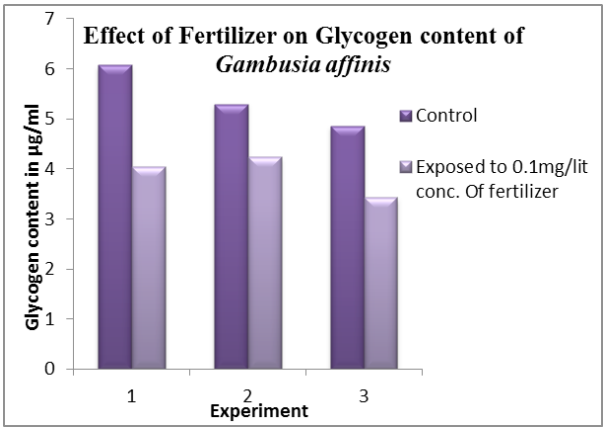
Fig. 5. Experimental set up for the Estimation of Glycogen



Graph 1. Percent mortality against log concentration



Graph 2. Probit mortality against log concentration.



Graph 3. Changes in the glycogen content over the control in whole body tissues of *Gambusia affinis* exposed to sublethal concentration of NPK fertilizer for 96 hours.

detoxify the stressful condition. These results indicate, the various concentration of NPK fertilizer applied to *Gambusia affinis* being tested remained in the body and its toxic effects on the glycogen content.

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Table 2. Effect of Fertilizer on Glycogen content of *Gambusia affinis.*

Sr. No.	Glycogen content in (µg/ml) Control	Experiment (Exposed to 0.1mg /l Conc. of N.P.K.)
1	6.0810	4.0540
2	5.2972	4.2345
3	4.8648	3.4324
Mean	5.4155± 0.5514	3.9069±0.3763

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References

Banrie, Gardner Denver, Evonik and Adisseo, 2013. *Principles of Fish Nutrition.*

Chaudhari, R.T. 2000. Impact of heavy metals on some physiological aspects of the fresg water bivalve, *Parresia cylindrica. J. Indian Poll. Con*. 18(1): 93-97.

Kulkarni, A.N., Balkhande, J.V. and Bhowate, C.S. 2015. Prevention of urea toxicity on Na+ and k+ contents of a fresh water field crab, barytelphusa guerini by using sulphur contaning amino acid methionine as an additive. *Asian Journal of Biochemical and Pharmaceutical Research*. 5 (3) : 33-37.

Krogdahl, A., Hemre, G.I. and Mommsen, T.P. 2005. Carbohydrates in fish nutrition: digestion and absorption in post larval stage. 11(2) : 103-122.

Krogdahl, A., Hemre, G.I. and Mommsen, T.P. 2005. Carbohydrate in fish nutrition : Digestion and absorption in post larval stages. *Aquaculture Nutrition*. 11 (2) : 103-122.R.

Muzaffar Ahmad, Qureshi T.A. and Singh A.B. 2011. Effect of dietery protein, lipid and carbohydrate content on the carcass composition of *Cyprinus carpio* communis fingerlings. *African Journal of Biotechnology.* 11(33): 8353-8360.

Murli Mohan, S., Siva Prasad, B.V., Srinu, A., VIjaylaxmi, D. and Harold Phillip, G. 2017. Commercial Deltametrin: Its (sublethal) impact on carbohydrate metabolism of *Labeo rohita. Indian Journal of Advances in Chemical Science*. 5 (4): 245-254.

Pawar, B.A., Shinde, P.S., Pandarkar, A.K. and Shendge, A.N. 2016. Toxicity and impact of rogorus on protein and glycogen content of fresh water fish Gambusia affinis (BAIRED & GIRARD) *J. Exp. Zool. India*. 19 : 267-271.

Sneha Verma and Anurag Rawat, 2017. Effect of chloropyrifos on protein nd carbohydrat content of *Heteropneustes fossilis* (Bloch, 1794). *International Journal of Fisheries and Aquatic Studies.* 5(1): 463-466.

Sujatha, K., Anitha Joice, A. and Senthilkumaar, P. 2013. Total protein and lipid content in edible tissues of fishes from Kasimodu fish landing center , Chennai, Tamilnadu. *Europian Journal of Experimental Biology*. 3(5): 252-257.

Saradhamani, N. and Jesi Selvarani, B. 2009. A study on the effect of herbicide metribuzin on the biochemical constituents of the fresh water fish, *Tilapia mossambica* Peters (Pisces: Cichlidae). *Current Biotica*. 3 (2): 220-231.

Wilson, R.P. 2003. Utilization of dietary carbohydrate by fish. *Apiculture*. 124 (1-4): 67-80.

Wilson, R.P. 1994. Utilization of dietary carbohydrate by fish. *Aquaculture.* 124 (4) : 67-80.