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Research Journal of Agricultural Sciences
An International Journal

P- ISSN: 0976-1675

E- ISSN: 2249-4538

Volume: 12

Issue: 04

Res Jr of Agril Sci (2021) 12: 1267–1268

Impact of Bioneem on the Lipid Content in the Intestine of Freshwater Fish *Garra mullya* (Sykes)

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Received: 26 Apr 2021 | Revised accepted: 27 Jun 2021 | Published online: 26 July 2021
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Key words: Bioneem, Biopesticide, *Garra mullya*, Intestine, Lipid

Direct application of pesticides in the form of spray drift and aerial spraying are the major causes of aquatic pollution. Lipoproteins are the important cellular constituents of cell membranes and cellular organelles. Neem (*Azadirachta indica*) is a plant with medicinal property and containing azadirachtin as a chemically active substance. Bhat [1] studied comparative aspect of toxicity of a synthetic pesticide, dichlorvos and a neem based pesticide, neem-on to *Labeo rohita* (Hamilton). An aquatic organism including fishes plays an important role of bio indicator for environmental pollution. They are highly sensitive to various xenobiotics. Acute exposures of fish to pesticides result in some biochemical changes, causing some interference in the metabolic processes. Pesticidal stress alters biochemical composition of compounds in different organs / tissues of fish and have been reported by number of workers [2-7].

Lipids play a vital role in the architecture of cell membranes. It helps to transport substances across the cell membrane. The change in mechanism of lipid synthesis can be associated with the stress condition of an organism as lipids have high caloric value and it contributes to energy production [8]. Very little work has been done on the toxic effects of pesticides on biochemical contents in the tissues of *Garra mullya*. Present work was aimed with the study of effect of lethal concentration of plant based biopesticide Bioneem on lipid content of intestine in *Garra mullya*, which is consumed as a food by tribals of Nandurbar district.

Toxicant used

Technical grade Bioneem containing 2% azadirachtin was 100% water soluble. 0.2ml bioneem was dissolved in 1000ml water to prepare 10ppm solution.

Test animal

Garra mullya (Sykes). It is fresh water cyprinid fish and commonly found in the Indian subcontinent specially throughout the Western Ghats of India in highly oxygenated water. It is commonly preferred as a food fish in the local market. Tribal community of the Nandurbar district used to call it as 'Molga'.

Laboratory procedure

The active acclimatized medium sized healthy fishes were exposed for 24, 48, 72 and 96 hours. The concentration for experiment used as LC₅₀/2 of 96 hours for Bioneem was 83.7278 ppm. After 24, 48, 72 and 96 hours treatment the control and experimental fishes were sacrificed to analyze the biochemical composition. Fishes were then dissected and their intestines were separated for lipid analysis by Vanillin Method.

The changes in biochemical composition of intestine of fresh water fish *Garra mullya* (Sykes) exposed to acute Bioneem was studied along with control animals with respect to percentage of lipid in wet tissues. The lipid content of the intestine decreased after acute exposure Bioneem from 6.65% to 6.15% and given in (Table 1).

A healthy food is marked by all essential constituent viz; carbohydrates, proteins, fats, minerals and vitamins in an appropriate proportion. They are fundamental biomolecules in all aspects of cell structure and function. Pesticidal pollution cause stress to organism and change its metabolic activity. The observed biochemical changes may be due to response of pesticidal intoxication representing adaptive or regulatory mechanism or may be due to pathological effect. Ecofriendly and safe nature of neem-based insecticides at the same time their hazardous effect on several non-target aquatic organisms [9]. They further suggested assessment of eco-toxicological effects of the neem or botanical insecticides.

Lipids play a vital role in the architecture of cell membranes. It helps to transport substances across the cell membrane. The change in mechanism of lipid synthesis can be associated with stress condition of an organism as lipids have high caloric value and it contribute to energy production [8]. Decrease in the lipid content of liver and

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intestine of *Ophiocephalus punctatus* exposed to cypermethrin suggesting channelization of lipids for energy production during stress condition [10]. The caloric value of lipids reported to be twice than that of the equivalent weight of protein and carbohydrates.

Decline in total lipid content was reported by Leela

[11] in liver, muscle, and gill of *Tilapia mossambica* under the stress of phosalone and by Revathi [12] in fish *Gambusia affinis* when exposed to tannery effluents. In present study similar results were obtained i.e., total lipid content of intestine of *Garra mullya* was found to be decreased after acute exposure of Bioneem.

Table 1 Lipid content (mg/g wet weight of tissue) in *Garra mullya* (Sykes) exposed to lethal concentrations of Bioneem

Tissue	Control	24 hrs range Mean ± S.D	48 hrs range Mean ± S.D	72 hrs range Mean ± S.D	96 hrs range Mean ± S.D
Intestine	6.65 ± 0.39	6.54 ± NS	6.40 ± NS 0.06 3.81%	6.22 ± NS	6.15 ± NS
		0.45		0.59	0.23
		1.71%		6.47%	7.49%

1. Each value is a mean of three observations ± S.D
2. (+) or (-) indicate present variations over control
3. Values are significant at N. S. = Not Significant
- * = P < 0.05; ** = P < 0.01; *** = P < 0.001

SUMMARY

Present work was carried out to find out any adverse effect of bioneem on lipid content in the intestine of freshwater fish *Garra mullya*. The lipid content of the intestine was found to be decreased after acute exposure of bioneem from 6.65% to 6.15%. The total lipid content in the intestine of fish *Garra mullya* (Sykes) was found to be decreased in acute treatment of pesticide bioneem. Biochemical changes induced by pesticide lead to metabolic disturbances, changes in behaviour and physiology. It is

concluded that the pesticides promote utilization of lipid from intestine in order to meet the increased energy requirement of enhanced metabolic activity due to pesticidal stress. Present investigation indicates that the fish *G. mullya* treated with the neem or botanical insecticides (Bioneem) which is although considered to be eco-friendly have shown decreasing lipid content with increase in the exposure period even at the sub lethal concentrations thus experimental fish is not able to maintain a normal physiological balance compared to the control. These pesticides can also be one of the threats to fish and aquatic environment.

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