

## INFLUENCED OF CYPERMETHRIN ON DNA, RNA AND RNA/DNA RATIO IN GILLS OF THE FRESHWATER FISH *CHANNA STRIATA*

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### ABSTRACT

In the present study the impact of sublethal concentration of cypermethrin exposed to fresh water fish. The DNA, RNA and RNA/DNA ratio were estimated in gill of freshwater fish *Channa striata*. The sublethal concentration of cypermethrin (0.00078  $\mu$ /lit) for 24, 48, 72 and 96 hours of different time intervals. The concentration of cypermethrin showed reduce level of DNA as 6.79, 15.77, 15.66, 15.36 in experimental and 15.20, 14.11, 12.16, 10.16 respectively for experimental RNA at different exposure period. Whereas the RNA/DNA ratio observed changed (2.23, 2.48, 2.27, 1.97) respectively at different exposure period as compares to control group.

**Key words:** *Channa striata*, Cypermethrin, DNA, Gill, RNA

### INTRODUCTION

Environmental problem in the developing world are clearly linked to unbalanced ecosystem. Environmental contamination by pesticides has been documented in both biotic and abiotic components. The random use of different pesticides often causes lot of damage on non-target organism. Organophosphate pesticides constitute a large proportion of the total synthetic chemicals employed for the control of pests in the field of agriculture, veterinary practices and public health. The pollution of environment due to use of pesticides has become an increasing problem over the last century with the development of industry agriculture and increase in population. The organophosphorous compounds are widely used because of their rapid biodegradability and non persistent nature. Recently studies have proved that extremely low quantities of pesticides which enter the aquatic environment can affect productivity of organisms kill eggs and larvae, influences the behavior of fish. The contamination affect all group of organisms in aquatic ecosystem like invertebrate (Castillo *et al.*, 2006) non target aquatic biota like fishes (Prashanth and Neelgund, 2008 and Singh *et al.*, 2010). The use of synthetic pyrethroid for control of various pests is regularly increasing. In fishes, the entry of pesticides into the body of fishes is largely through gills and the effect is on the rate of respiration (Clerk *et al.*, 1985; Ganpathi and Karpagganpathy 1987). The pesticides causes various problems affecting to the ecosystem and effect on growth of aquatic organism (Chinni *et al.*, 2001) and histopathological and physiological changes in fishes (Holden, 1973

and Mushgeri, 2002). Increase use of pesticides not only helped in controlling insects and pests but also created great environmental pollution especially hazardous influences in media as well as aquatic fauna (Bradbury and Coats, 1989).

The Cypermethrin are the new generation pesticides which are good substitutes for organochlorides and organophosphate (Eliot, 1980). The knock down effect of synthetic pyrethroid compounds to insect coupled with their extremely low toxicity to warm blooded animal. But they are more toxic to fish (Mauk *et al.*, 1976; Zitko *et al.*, 1977; Mulla, 1978). Tiwari 2005 reported that synthetic Pyrethroids are relatively stable for long duration. Cypermethrin has been proved as one of the most toxic pesticides to fish with very low  $Lc_{50}$  value (Schimmel *et al.*, 1983; Worthing and Walter, 1987; Tripathi, 1992).

Therefore it was considered of an interest to analyze the effect of cypermethrin on DNA, RNA, and RNA/DNA ratio in gills of a freshwater fish *Channa striata*.

### MATERIALS AND METHODS

The experimental fish *Channa striata* were collected from the Wadali Lake and Friday market around Amravati region. (Weight  $20\pm 36$  gm; length  $10\pm 18$  cm). Fishes were divided into two groups control and experimental. Each group includes five individuals. The  $Lc_{50}$  of cypermethrin is 0.0007  $\mu$ /lit for 96 hours was determined to decide its sub lethal concentration for experimentation. Control and experimental groups of fishes were sacrificed after 24 hrs 96 hrs. of treatment of up to

Cypermethrin. Gills were removed washed in saline, blotted and immediately deep frozen. A 10% homogenate was prepared in buffered saline (0.15 mol/l NaCl and 0.15 mol/l sodium citrate, pH 7.0). Homogenate was centrifuged at 8,000 rpm for 15 minute and resulting supernatant was taken for estimation of macromolecular constituents. DNA and RNA were estimated by diphenylamine and orcinol method respectively (Schneider, 1957). Absorbance was recorded at 595, 665 and 660 nm for DNA, RNA respectively.

## RESULT AND DISCUSSION

In the present study observed that when the freshwater fish *Channa striata* exposed to sub lethal concentration of cypermethrin showed significant decreased in the level of DNA, RNA (6.79, 5.67, 5.37, 5.22) and (15.20, 14.11, 12.16, 10.32), While the RNA/ DNA ratio significantly changed (2.23, 2.48, 2.27, 1.97) respectively at different exposure periods as compared to control group (Table 1).

**Table 1: Effects of sublethal concentration cypermethrin on DNA, RNA and RNA/DNA ratio of gill in the freshwater fish *Channa striata*.**

Hrs.	Control	DNA (Expt.)	Control	RNA (Expt.)	RNA/DNA (Control)	RNA/DNA ratio (Expt)
24	5.78 ± 0.019	6.79 ± 0.102	16.97 ± 0.01	15.20 ± 0.012	2.93 ± 0.022	2.23 ± 0.022
48	5.77 ± 0.015	5.67 ± 0.013	15.77 ± 0.026	14.11 ± 0.017	2.73 ± 0.026	2.48 ± 0.028
72	5.56 ± 0.023	5.34 ± 0.021	15.66 ± 0.027	12.16 ± 0.02	2.81 ± 0.016	2.27 ± 0.025
96	5.46 ± 0.036	5.22 ± 0.018	15.36 ± 0.030	10.32 ± 0.014	2.81 ± 0.016	1.97 ± 0.017

Similar observation by Bardbury *et al.*, 1986 that the low rates of fenvalerate elimination and metabolism seem to play a significant role in the physical activity. The effect of synthetic pyrethroid fenvalerate on DNA content of gill showed reduce level by Schimmel *et al.*, 1983; Worthing and Walkar, 1987; Tripathi 1992. Also Bradbury *et al.*, 1987 reported that the concentration of fenvalerate in the liver and brain in rainbow trout. In contrast to DNA, RNA content declined significantly in both the tissues and protein (Lowry and Somero 1990). Similarly Tripathi *et al.*, 2000 reported that Inhibitory effects of fenvalerate on DNA, RNA and protein content show extreme

toxicity of pyrethoidal compound on the main biochemical machinery of the fresh water catfish, *Clarias batrachus*. The effects of sub lethal concentration of cypermethrin on DNA, RNA content show extreme toxicity on the main biochemical machinery of the freshwater fish *Channa striata*.

From the above result showed that effect of sub lethal concentration affected the DNA, RNA and RNA/DNA ratio so very lower concentration may affect fishes.

Therefore, prevention must be taken to save the aquatic environment and health of fish from cypermethrin intoxicification.

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