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RESEARCH ARTICLE

A STUDY OF INSECTICIDAL RESIDUES IN *MYSTUS SEENGHALA* FISH FROM VARIOUS WATER BODIES OF RAIPUR DISTRICT

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ABSTRACT

Contamination of insecticides of different groups were evaluated in the fish species *Mystus seenghala* in Kharun river (near Atari village Nandanvan Raipur), Chherikheri pond (rural pond) and Navagaon pond (urban pond) of Raipur district collected during the two years months of March to June 2017 and March to June 2018. Sample collection time is 6.00 am. The fish organs- gills, brain, stomach, intestine and gonads from fish were carefully dissected for determination of insecticides. The insecticidal residues were analyzed by using AAS (atomic absorption spectrophotometer). The selected fish organs of the *Mystus seenghala* insecticides are not detected.

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INTRODUCTION

Water occupies 70.7 percent of our earth's surface, only 0.052 percent of it is fresh water. Of this 4/5th occur in ice caps and glacier and bulk of the rest in relatively unpolluted regions. A physiological background makes it evident that water is an important environment factor in the life of organisms. Fresh water ecosystems are inland waters have low concentration of salts. Aquatic habitat provides the food, shelter and space essential for the survival of aquatic animals and plants. Water is universal solvent in which practically all the minerals, present in soil, may be dissolved. Most our bodies as ponds, lakes, streams, rivers, sea, oceans have become polluted due to industrial growth urbanization and other man-made problems. The healthy condition of the aquatic system depends upon its physical, chemical and biological characteristics which actually fluctuate with season and degree of pollution (Cairns and Dickson, 1971). Water is contaminated by much pollutant but one of the most dangerous is -chemical pollutant. Agriculture sector is the major uses of water, used for irrigation. At previous days Indian farmers depend upon the monsoon. Irrigation use is very inefficient. There are so many pollutants in water like- heavy metals, agrochemicals etc. During rainy season these are water mix with natural fresh water resources like- Ponds, river, Lakes etc.

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There are principal pollutant is Agrochemicals. Many pesticides, herbicides, fungicides nematicides, bactericides, weedicides etc are including in agrochemicals. Modern agriculture relies heavily on a wide range of synthetic chemicals which include different types of fertilizers and biocides. These all are use in agriculture for good productivity. No dough that after uses of pesticide farmers production is increase but it major effect to damage our aquatic ecosystems. There is a very close relationship between the metabolism of aquatic organism and hydro biological parameters in a fresh water body (Deshmukh and Ambore, 2006). Pesticides bio-accumulation on fish. Pesticides are highly toxic for aquatic insects, weeds, planktons and fishes. "Among these pesticides play an important role in damaging fresh water ecosystem" (Raman Rao et al., 1987 and Choudhuary et al., 2008). Fishes can also be used as indicators over a temporal ranges varying from minutes to decades as they exhibit diverse morphological, ecological and behavioral adaptations to their natural habits. Tenger catfish (*Mystus seenghala*) commonly found in water body of Raipur district was chosen for this study.

MATERIALS AND METHODS

Indian agriculture receives most of its water from surface sources like river, reservoir, dam, etc., (Thitame and Pondhe, 2010). In order to determine insecticidal ratio of water, its

sampling was collected in summer season month of March to June'2017 and March to June'2018. The sample were collected from river, urban and rural three different water bodies from Raipur district. Sample collection time is 6.00 am. Sample site- 1- Kharun river (Atari village near Nandanvan Raipur), site- 2 Chherikheri pond (rural pond -Dharsiva block), site-3 Navagaon pond (urban pond - Naya Raipur). Healthy and vigorous fish *Mystus seenghala* are collected from Kharun river near Atari village, Chherikheri pond (rural pond) and Navagaonn pond's (urban pond) different locations by the help of fisherman during summer season of both years. The fishes were ice-packed and transported immediately to the laboratory. After morphometric measurements, fish flesh was then washed until it was free from blood. The analytic part of fish like- gills, brain, liver, intestine, kidney and reproductive organ of male /female are removed, properly clean by sprit and put in Petri dishes to dry until reaching a constant weight. After drying, the sample was placed into digestion flask and ultra pure concentrated nitric acid and hydrogen peroxide [I V/V] [SD fine chemicals] were added. The digestion flask was heated when dried organs dissolved (Dybem, 1983). Digest was diluted with double distilled water appropriately. For insecticidal residues were analyzed using Atomic Absorption Spectrophotometer.

RESULTS AND DISCUSSION

The insecticides like cypermethrin, imidachloprid, chloropyrifos, carbofuran, malathion and dichloves are quite frequently used in Raipur district for insect and pest management, but these were not detected in edible portion of fish *Mystus seenghala* caught from various selected water bodies, may be because they were not found in the water samples of these water bodies also. Similarly less frequently used other insecticide residues were also not found in *Mystus seenghala* fish of Raipur district. Since the experimental period was in summer season, the possibility of insecticides coming through monsoon run off was least.

Due to high temperature, the process of volatization and degradation was at its peak. This may be the main reason, that insecticides were not detected in large water bodies of Kharun River near Atari village and Navagaon pond where as well as in small water bodies of Chherikheri pond also not detected , may be due to various reasons, like

- In neutral or acid aqueous solution, cypermethrin hydrolyzes slowly, with hydrolysis being more rapid at 9 pH (basic solution). Under normal environmental temperatures and pH, cypermethrin is stable to hydrolysis with a half-life of greater than 50 days and to photodegradation with a half -life of greater than 100 days (Environmental Protection Agency, 1989). In pond waters and in laboratory degradation studies, pyrethroid concentrations decrease rapidly due to adsorption of sediment, suspended particles and plants. Microbial degradation and photodegradation also occur (Muir, 1985 and Agnihotri, 1986).
- Imidacloprid is broken down in water by photolysis. Imidacloprid is stable to hydrolysis in acidic or neutral conditions and its hydrolysis increases with increasing alkaline pH and temperature (Zheng and Liu, 1999).

Table 1. Insecticidal residues in fish internal organs like- gill, brain, stomach, intestine, kidney, reproductive organs (Kharun river) during year -2017 to 2018(March –June)

S.Q	Name of Pesticides	Study Period							
		March' 17	March' 18	April' 17	April' 18	May' 17	May' 18	June' 17	June' 18
1	Cypermethrine	ND	ND	ND	ND	ND	ND	ND	ND
2	Imidacloprid	ND	ND	ND	ND	ND	ND	ND	ND
3	Chloropyrifos	ND	ND	ND	ND	ND	ND	ND	ND
4	Carbofuran	ND	ND	ND	ND	ND	ND	ND	ND
5	Malathion	ND	ND	ND	ND	ND	ND	ND	ND
6	Dichlorovs	ND	ND	ND	ND	ND	ND	ND	ND

ND- Not detected

Table 2. Insecticidal residues in fish internal organs like- gill, brain, stomach, intestine, kidney,

S.Q	Name of esticides	Study Period							
		March' 17	March' 18	April' 17	April' 18	May' 17	May' 18	June' 17	June' 18
1	Cypermethrine	ND	ND	ND	ND	ND	ND	ND	ND
2	Imidacloprid	ND	ND	ND	ND	ND	ND	ND	ND
3	Chloropyrifos	ND	ND	ND	ND	ND	ND	ND	ND
4	Carbofuran	ND	ND	ND	ND	ND	ND	ND	ND
5	Malathion	ND	ND	ND	ND	ND	ND	ND	ND
6	Dichlorovs	ND	ND	ND	ND	ND	ND	ND	ND

ND- Not detected

Table 3. Insecticidal residues in fish internal organs like- gill, brain, stomach, intestine, kidney, reproductive organs (Navagaon pond) during year -2017 to 2018(March –June)

S.Q	Name of Pesticides	Study Period							
		March' 17	March' 18	April' 17	April' 18	May' 17	May' 18	June' 17	June' 18
1	Cypermethrine	ND	ND	ND	ND	ND	ND	ND	ND
2	Imidacloprid	ND	ND	ND	ND	ND	ND	ND	ND
3	Chloropyrifos	ND	ND	ND	ND	ND	ND	ND	ND
4	Carbofuran	ND	ND	ND	ND	ND	ND	ND	ND
5	Malathion	ND	ND	ND	ND	ND	ND	ND	ND
6	Dichlorovs	ND	ND	ND	ND	ND	ND	ND	ND

ND- Not detected

- Volatilization is probably the primary route of loss of chlorpyrifos from water. Volatility & half-lives of 3.5 and 20 days have been estimated for pond water (Racke, 1992). The rate of hydrolysis is constant in acidic to neutral waters, but increases in alkaline waters. In water at pH 7.0 and 25 C, it had a half-life of 35 to 78 days (Howard, 1991).
- Carbofuran degradation in natural ponds is largely due to photodecomposition and to some extent by volatization (Erickson, 1977 & Deuel, 1979).
- Malathion although toxic to aquatic invertebrates, has got very short half life. In raw river water etc half life was found less than one week. Hence it is not expected to biocuncentrates (Howard, 1991).
- Due to rapid degradation of dichlorovos it is not adsorbed between soil and solution phases.
  Dichlorvos is rapidly degraded in water both chemically and biologically. The main degradation process is hydrolysis. Persistence in water is low (days) and depends on the pH and temperature (Jones and Stewart, 1996).
- Dimethoate is not expected to adsorb to sediments or suspended particles, nor to biaccumulate in aquatic organisms in water, as it is subjected to significant hydrolysis. Its half life in raw river water was found 8 days, with disappearance possibly due to microbial action or chemical degradation (Howard, 1989).

Conclusion

A study of insecticidal residues in fish *Mystus seenghala* of Raipur district for the period of year - 2017 and 2018 (March - June) during summer season. In the present investigation that the edible part of fish *Mystus seenghala* is safe for human intake.

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