Golden Research Thoughts
ISSN 2231-5063
Volume-2, Issue-5, Nov-2012 Available online at www.lbp.world

EFFECT OF PESTICIDES POISIONING ON TISSUE METABOLITE LEVE OF FRESH WATER, FISH HETEROPNEUSTES FOSSILIS (BLOCH)

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ABSTRACT :

Total tissue glycogen, tissue protein and tissue lipid in liver. Muscles, Testis and Ovary were estimated in control and pesticides (dimethoate and carbayl) treated fish. Heteropneustes fossilis (Bloch) for 30 days. The tissue glycogen was found to decrease on exposure of pesticides while total tissue protien and total lipid found to depleted in both pesticides exposures.

KEY WORDS : pesticides dimethoate, carboryl, protein, glycogen, lipid.

INTRODUCTION :

Today water quantity management faces greater problem than at any time in its history. In addition to natural pollutants, varied contaminants exist in surface water including multiple chemical compounds and different products of industrial and agriculture revolution. The insecticide constitute one group of thease pollutants, both synthetic and natural. Which contribute to the environmental problems. At present, it seems that the problem is more conspicuous in developing countries, where lately there has been an increase in the use of insecticides as means of increasing agricultural productivity, without much concern to the consequences of indiscriminate application. There are many pathway by which insecticides leave their sites of application and distribute throughout the environment and enter the aquatic ecosystem.

Most insecticides ultimately find their way into rivers, lakes and ponds. (Tarahi Tabrizi 2001; Honarapajouh, 2003, Bagheri 2007. Shayeghi et.al. 2007; Vryzas et.al. 2009 Werimo et.al. 2009; Arjmandi et.al. 2010) and have been highly toxic to non target organisms that inhabit natural environments close to agricultural field. In the past few years, the increase of mortility among the fish in various streams, lakes and ponds of around the world has drawn scholars attention to the proplems caused by insecticides and pesticides runoff associated with intense agricultural practices Numerous studies have found them to be toxic to aquatic organism espicially fish species (Talebi, 1998: Uner et.al. 2006; Banaee et.al. 2008). Fishes are praticalarly sensitive to the environment contamination of water. Hence, pollutants such as insecticides may significantly damage certain physiological biochemial processes when they inter into organ of fishes (John, 2007; Banaee, et.al. 2011).

MATERIALS AND METHODS :

Heteropneustes fossilis (Bloach) were collected from a local pond. Healthy fish having average weight of 40-50gm each were stored out for experiment.

All fish were allowed to acclimatization in the laboratory aquaria for fifteen days before the initiation of experiment.

After the maintenance and acclimatization for fifteen days, the fish were exposed to test concentration of 2 ppm of diamethoate and carbaryl for a period of 30 days respectivily. During the period of experiment water polluted with diamethoate and carbaryl were renewd afresh every third day.

The control fishes of the same weight and size were mantained seperately.

The water temperature during the period of experiments (August-September) remained at 29.0 ± 57^0C.

STATIC ACUTE BIOASSAY :

Bioassay were conducted for the determination of L_{50} values (concentration letnal at 50% of the test fish.) of dimethoate and carbaryl for 24, 48, 72 and 96 hours following the method of APHA, AWWA and WPCP (1985).

For each acute bioassay there were 20 test concentration and 10 fishes per concentration in addition to the control. The number of aquaria in each set were thus 11 (one control + 10 experimental).

The fish were held in dilute water for at least one day before the start of the test. The diamethoate and carbaryl concentration were in loarithmic series.

A stock solution of dimethoate and carbaryl were prepared by simple dilution technique as described by Duodoroff et.al. (1951). The fish were exposed to different concentration of dimethoate and carbaryl at different time intervals. (24, 48, 72 and 96 hrs.) were recorded as a measured acute toxicity. The LC_{50} values 96 hours the aforesaid time intervals were determined by regression equation (Dowine and Health. 1970)

At the end of exposure period (day 30) the fish were anaesthesized with 1: 4000 MS 222 (tricane methane – sulfonate, sandoz) for two minutes. The liver, testis and ovary were quickly dissected out. Weighed and proceesed for the quantitative estimation of glycogen, total protein and total lipid.

The glycogen content of liver, muscle testis and ovary was estimated following the method of carroll et.al. (1956).

Estimation of protein in liver, muscle and gonads were followed by Folin- lowry Method (lowry et.al. 1951).

The total lipid was extracted as per the method of folch et.al. (1957).

OBSERVATION AND RESULT :

(A) Glycogen in liver, muscle testis and ovary *:* The level of glycogen in liver, muscles, testis and ovary were observed decreased. Maximum decrease was found in testis i.e. 32% followed by ovary 24%, liver 21% and muscle 12% under dirnetoate exposure i.e. testis> ovary> liver> muscle while under carbaryl exposure the decline nature was reported as maximum depletion in testis i.e. 41% followed by muscle 40%. liver 37% and ovary 33%. The decline nature was

testis> muscle> liver> ovary. In both the exposure the decline nature was different due to various factor. (Table-I).

(B) Total protein in Liver, Muscle, Testis and ovary *:* Total protein was depleted in all the tissues but the maximum depletion was recorded in liver 25% followed by ovary 24%. Muscle 17% and testis 12% under dimethoate exposure. While under carbaryl exposure the maximum depletion was recorded in liver 50% followed by ovary 41% muscle 39% and testis 25%. In both pyrethroids exposure depletion was highly significant (P<0.001) in all the tissues i.e. liver, muscle, testis and ovary. (Table-II)

(C) Total lipids in Liver, Muscles, Testis and Ovary *:* Under dimethoate exposure maximum deptetion was recorded in muscle i.e. 32% followed by liver 16%, testis 13% and ovary 10% while in carbaryl exposure the maximum depletion was recorded in liver i.e. 46% followed by ovary 28% testis 25% and muscles 10%. All the tissues under both the exposure of dimethoate and carbaryl showed non- significant i.e. (P<0.05). The decline nature under carbaryl was liver>ovary> testis> muscle while under dimethoate it was recorded as muscle> liver> testis> ovary (Table-III).

Table-I
Total tissue glycogen (mg/L) in H.fossilis exposed to dimethoate and carbaryl for 30 days at 2ppm.

Parameters	Control	Dimethoate 2ppm	carbaryl 2ppm
Liver	24.3±2.44	18.6±0.59	15±0.05
Muscle	20.2±0.838	14.27±0.834	11.5±0.05
Testis	17.42±0.12	11.59±0.26	9.5±0.05
Ovary	20.79±0.17	15.55±0.47	13.5±0.05

Values indicate percent increase (+) or decrease (–) over control values significannt at P<0.05, P <0.001.

Table-II
Total tissue protien (mg/L) in H.fossilis exposed to dimethoate and carbaryl for 30 days at 2ppm.

Parameters	Control	Dimethoate 2ppm	carbaryl 2ppm
Liver	101.61±1.87	75.06±2.57	49.5±2.02
Muscle	72.426±0.1	61.472±2.532	44.5±0.05
Testis	79.9±1.47	69.5±1.26	59.5±0.05
Ovary	119.53±1.95	90.43±1.90	69.5±0.05

Values indicate percent increase (+) or decrease (–) over control values significannt at P<0.05, P <0.001.

Table-III
Total tissue Lipid (mg/L) in H.fossilis exposed to dimethoate and carbaryl for 30 days at 2ppm.

Parameters	Control	Dimethoate 2ppm	carbaryl 2ppm
Liver	27.4±1.64	20.84±0.68	14.84±0.68
Muscle	20.12±1.23	18.93±0.89	17.93±0.89
Testis	16.21±0.80	13.98±0.83	11.98±0.83
Ovary	20.61±1.03	18.49±0.72	15.49±0.72

Values indicate percent increase (+) or decrease (–) over control values significannt at P<0.05, P <0.001.

DISCUSSION :

During the present work tissue glycogen profiles of H. fossilis and 2ppm concentration of dimethoate & carbaryl for 30 days, a signficant decrease in glycogen in liver, muscle, testis and ovary was recorded. The decrease in tissue glycogen may have accepted due to cellular disorganization of the internal tissue system affecting the storage metabolism as suggested by Ghosh (1990). Hathway (1989) due to physical excertion for movement & high respiration rate.
The total protein content of liver, muscle, testis and ovary exhibited significant decrease might have reduced the synthesis of serum protein due to direct toxic effects of dimethoate & carbaryl.

Decreasing tendency of lipid correlated with the increased activity of lipase the enzyme responsible for the breakdown of lipids into free fatty acids and glycerol.

CONCLUSION :

The present investigation has been conducted on the sub-lethal effects of dimethoate and carbaryl on tissue methabolite levels.

Decrease tissue glycogen, tissue protein and tissue lipid shows that the tissues of H. fossilis is more susceptible to dimethoate and carbaryl exposure.

REFERENCES :

1. Arjmandi, R. Tavokol, M.2 Shayeghi M.(2010) Determination of organopharous insecticide residues in rice peddies. International Journal Environment, Science Technology, 7(1): 175-182.
2. Agrahari, S Pandey, K.C & Gopal K (2007) Biochemical alteration induced by monochrotophos in the blood plasma of fish, Channa punctatus (Bloch), pesticide Biochemistry and physiology 88, 268-272.
3. Bagheri, F. (2007) Study of pesticides residues (Diazinon Azinphosmetryl) in the rivers of Golestan province (Gorganroud and Gharehsai, M.Sc. Thesis Tehran University of Medical Science, Tehran. Iran. 1-25.
4. Banaee, M. Mirvagetei, A.R. Rafei. G.R. Majazi Amiri. B (2008). Effect of sub-lethal Diazinon concentration on blood plasma biochemistry Int. J. Environ. Res. 2(2): 189-198.

5. Banaee, M. Mirragnefi, Ahmadi, K.& Banaee, S. (2008) Determination of LC50 and investigation of acute toxicity effects of diazinon an hermatology and serology indices of common crab (cyprinus carpio). J. of Marine science and Technology Research 3(2):1-10.
6. Banaee. M. Mirvaghefi. A.R. – Ahmadi, K. (2011) Effect of diazinon on biochemical parameters & of blood in rainbow trout (concorhynchus mykiss). Pesticide Biochemistry and physiology, 99:1-6.
7. Doudoroff P, Anderson B.G.; Burdick, G.E., Gaitsoft P.S., Hart. W.B. Patrick, R. Strong E.K., surber E.W. and Vonhorn W.M. (1951). Bio assay method for evaluation of acute toxicity of industrial wastes to fish. Sewagemd wastes, 23(11): 1380-1397.
8. Downie, N.M. and Heath R.W. – (1970): Basic statistical Methods. Harper International Edition New York. Evanston and London, pp. 129-131.
9. Folch, J.Lees, M. Slone stanely. G.M. (1957): A simple method for isolation and purification of total lipid and framarinal tissues. J. Biol. chem. 226.497-507.
10. Ghosh, T.K. and Chatterjee, S.K. (1988) : Toxic influence of fenvalerate on the Biological parameters of the fish Anabas testudineus, Environ. Ecol. 6 (1) : 107–110.
11. Hathway, D.E. (1980) : Molecular aspects of Toxicology, U.K. RSC Publications.
12. Honarpajouh. K. (2003). Study and identification of OP pesticides residues (Azinphosmethyl and Diazinon) in the Manabad and Siminerood Rivers. M.Sc. Thesis. Tehran University of Medical Science, Tehran, Iran, pp. 95.
13. Jhon, P.J. (2007). Alteration of certain blood parameters of freshwater teleost mystus Vittatus after chronic exposure to metasystok and sevin, fish physiology. Biochemistry, 33:15-20.
14. Lowry, O.H.,Rosenbrough, W.G. Farr, A.L. and Rohndall, R.G. (1951): Protein measurements with folen phenol reagent, J. Biol. Chem. 193, 265-275.
15. Shayeghi, M. Darabi. H. Sadeghi. M. Pakboz F. and Golestaneh, S.R. (2007) Assessment of persistence and residue of diazion and malation in three rivers (Mohd. Shahpour and Dalaky) of Bushehr province in 2004-2005 years. Iranian South Medical Journal 10(1) 54-60.
16. Talebi, K. (1998): Diazinon Residues in the Besin of Anzali Lagoon Iran. Bulletin Environmental contamination Toxicology61: 477-483
17. Uner, N. Uruc. E.O. Sevgiler. Y. Sahin, N. Durmaziz, H.2 Usta D. (2006): Effects of diazinon on acetylcholine sterase activity and lipid peroxidation in the brain of oreochromis niloticus. Environ. Toxixology and pharmacology, 21:241-245.
18. Vryzas. Z. Vassiliou. G. Alexudias C. & Papadopaoulou Mourkidou. E. (2009): Septial and temporal distribution of pesticide residues in surface water in northeastern greece water research, 43:1-10.
19. Werimo, K. Bergwerff: A.A. & Seineh W. (2009): Resideu levels of organochlorines and organophosphates in water. Fish and sediments from lack victoria kenyan portion, Aquatic Ecosystem Health and Management 12. 337-341.