INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
© VISHWASHANTI MULTIPURPOSE SOCIETY (Global Peace Multipurpose Society) R. No. MH-659/13(N)
www.vmsindia.org

IMPACT OF ENDOSULFAN ON PROTEIN CONTENT IN THE GONADS OF FRESHWATER CRAB, *PARATELPHUSAJACQUEMONTII* DURING DIFFERENT SEASON

R. A. Gulhane
S.S.S.K.R. Innani Mahavidyalaya,Karanja (Lad) Dist. Washim (M.S.)India

Abstract:-
In the present study increased in protein level was observed in the crab, *paratelphusajacquemontii* after lethal exposure to endosulfan in ovaries and testes. However decline in protein content in the same tissue was observed during sub-lethal exposure as compared to control group in different season, may be due to anaerobic metabolism which can be increased under stressful condition can also cause change in protein content and this low metabolism due to decline in glycogen, as glycogen play an important role in the production of protein molecules and they store protein for building and repairing of body tissue. The increased in the protein content in the crab is due to the increase in protein synthesis. The decrease in protein content of sub-lethal level of exposure of endosulfan is due to the possible utilization of protein for metabolic purpose and the enhanced of proteolysis to meat the high energy demand under pesticide stress condition. It may be due to activation of protein synthesis process: The decrease in protein elimination of endosulfan.
Keywords:-Endosulfan, protein content, paratelphusajacquemontii.

Introduction:-

The pollutants acts as one kind of stress to an organism and organisms responds to it by developing necessary potential to counter out that stress. The biochemical changes occurring in the body given first indication of stress. During stress an organism needs sufficient energy which is supplied from reserve material i.e. protein, glycogen and lipids. When stress is mild then only stored glycogens are used as a source of energy but when stress is strong, then the energy stored in lipid and proteins may be used.

The organochlorine pollutants cause metabolic dearrangement in the living system on contact.Endosulfan due to their potential toxicity produce biochemical changes in organs of animals. The endosulfan cause metabolicdearrangement in the living system on contact. Organochlorine pesticides due to their potential toxicity produce biochemical changes in organs of animals. There is good deal of information on alternation in metabolic in the blood and various tissue of animal exposed to pesticide stress (Kaundinya,et.at. 1979), Salinity stress (Patilet.al. 1996); induced changes total plasma protein are important inorganic substances which play an important role in tissue building the amino acids are important in the toxic balance in cellular media where an enzymes was studied by many workers. Nagabhushnan (1977) observed the protein, glycogen, and fat content of Donaxcunicatus. Farooki and Nagabhushanan (1983) and Rao et.at. (1988) noted biochemical variation during testes maturation in the marine crab, Scylla serrota. Reddy et.al. (1995) has studied time course alteration in protein metabolism of fresh water crab, 'Barytelphusaguerini during endosulfantoxicosis.

Effect of malathion on biochemical changes in clariusbatrachus reported by Mukhopadyasy and Dehadrai (1980). Studies on biochemical composition in fresh water teleost, Heteropneustesfossilis (Bloch). Pujakumarietal (2014)

Material and Method:

The freshwater crab, *paratalphusa jacquemontii* were collected from river around Amravati regions. They were brought to the laboratory and maintained in plastic troughs with two liter of campus well water. The crabs were to acclimatized to laboratory condition for 10 days, according to APHA/AWWA/WPCE (1985) the water of the trough was change every day. The healthy adults crabs of approximately the same size and weight were selected for the experiments. To study the effect of endosulfan on the biochemical composition of the crabs, *ParatelphusaJacquemontii* were exposed to lethal concentration for acute treatment and sub lethal concentration for chronic treatment.

Lethal Treatment :- The acclimatized crabs were treated with lethal concentration of Endosulfan and exposed for 24h, 48h, 72h and 96hrs. Endosulfan concentration 1.6872, 1.0960, 0.800 and 0.7042 ppm for 24h, 48h, 72h and 96hr during summer 2.0211, 1.7256, 1.0055 and 0.8021 ppm for 24h, 48h, 72h and 96hr during monsoon. 2.5947, 1.9460, 1.1443 and 0.8735ppm for 24h,48h,72h and 96h for winter. Simultaneously, the control crabs were kept in water which was daily changed. The crabs were sacrificed for the analysis of the tissue biochemical composition. The crabs were

dissected, gonads are dried in oven completely and powder was prepared. The protein contents in tests and ovary were estimated by calorimetric methods.

Sub-lethal treatments :-

Three batches of acclimatized crabs were treated with sub-lethal concentration of endosulfan and exposed, to 1/3 of 96h Lc_{50}Konar (1969) for summer, monsoon and winter for a period of 7 days, 15 days and 30 days. The control as well as treated crabs were dissected and processed in the same way as those of the auto treated animals.

Protein estimation :-

The calorimetric protein estimation of ovary and testes of freshwater crab *paratelphusajacquemontii* was done according to Lowry's Methods (Lowry etal 1951) – 5 mg of dry powder was homogenized in 10mlof 10% TCA, The homogenate was centrifuged for 15 minutes at 3000 rpm. The supernatant was discarded, the precipitate was dissolved in 10ml of 0.1 N, NaOHsolution.

0.1ml of this solution was mixed with 4ml of Lowry's C (Freshly Prepared) and 0.4 ml folin phenol. The OD was read at 530nm. filter in the calorimeter after half and hour. Blank was prepared by adding 0.1ml NaOH (1N) to 4 ml Lowry's C and 0.4ml folinphenol. The amount of protein was calculated by referring to the standard graph value protein mg / gm dry weight of tissue. The bovine serum albumin was used as a standard.

Discussion :-

The fresh watercrab, *paratelphusajacquemontii* exposed to endosulfan for lethal and sub-lethal concentration of toxicants.Results show the variation in the level of organic constituent of tissue.

Proteins are the most characteristic organic compound found in the living cell, protoplasm of cell is composed of proteins. So protein have a major role in the process of interaction of cellular medium.Pesticides induced direct or indirect changes in protein metabolism, protein have a duel importance for the organism as building material and asa source of energy.

Protein metabolism function in such a way that protein may be used as alternative source of energy under condition of stress (Jaiswal et.al. 1986.) Nagabhushanamet.al. (1981) in M. Kistensis by pesticidal impact and Wang & stickle (1988) in the crab, callinectessapidus by crude oils.

Bhygylakshmi (1984) reported increased in protein level in the tissue of the crab, oziotelphusa, senexsenex after sumithion exposure.Kabeer (1978) and Shivprasad Rao et.al. (1981) reported increased protein level may be due to the increased level of protease and elevated synthetic potentiality of protein in various tissues under pesticidal poisoning.

Table 1. Changes in gonads Protein content of the fresh water crab, P.jacquemontii exposed to endosulfan during summer at different hours of exposure periods (mg/gm dry wt) ± S.D.

Condition	Organ	
	Ovary	Testes
Control	4.195 ± 0.095	4.931 ± 0.056
24hrs	2.240 ± 0.598 P<0.01* - 46.58%	3.231 ± 0.168 P<0.001*** -34.45 %
48hrs	5.058 ± 0.814 P<0.05 -20.55 %	3.544 ± 0.481 P< 0.05 -28.117
72hrs	4.054 ± 0.823 P<0.05 -14.25%	4.266 ± 0.630 P<0.05 -13.477
96hrs	3.566 ± 0.257 P<0.05* -12.96%	2.965 ± 0.294 P<0.01** -39.86 %

Each value is mean of five readings (+) or (-) indicate variation over control values are significant at , P<0.05*, P<0.01**, P<0.001*** and NS = Not significant.

Table2. Changes in gonads Protein content of the fresh water crab, P.jacquemontii exposed to endosulfan during Monsoon at different hours of exposure periods (mg/gm dry wt) ± S.D.

Condition	Organ	
	Ovary	Testes
Control	4.428 ± 0.0.415	5.202 ± 0.357
24hrs	4.972 ± 0.057 P<0.001 12.27%	3.613 ± 0.324 P<0.01** -30.54 %
48hrs	1.732 ± 0.144 P<0.01 -60.86 %	4.104 ± 0.067 P< 0.05 -21.10 %
72hrs	2.044 ± 0.390 P<0.05 -53.81%	4.136 ± 0.061 P<0.05 -20.48%
96hrs	2.316 ± 0.292 P<0.001*** -47.68%	3.341 ± 0.057 P<0.05 -35.67 %

Each value is mean of five readings (+) or (-) indicate variation over control values are significant at , P<0.05*, P<0.01**, P<0.001*** and NS = Not significant.

Table3. Changes in gonads Protein content of the fresh water crab, P. jacquemontii exposed to endosslfan during Winter at different hours of exposure periods (mg/gm dry wt) ± S.D.

Condition	Organ	
	Ovary	Testes
Control	5.516 ± 0.358	3.572 ± 0.358
24hrs	3.926 ± 0.297 P<0.05 * -28.81%	4.700 ± 0.357 P<0.05 32.57 %
48hrs	3.030 ± 0.057 P<0.001*** -40.16%	3.612 ± 0.414 P<0.05 1.11%
72hrs	4.698 ± 0.359 P<0.05 -14.82 %	5.202 ± 0.358 P<0.05 45.61 %
96hrs	3.070 ± 0.357 P<0.01** -44.33%	3.300 ± 0.057 P<0.05 -7.617 %

Each value is mean of five readings (+) or (-) indicate variation over control values are significant at , P<0.05*, P<0.01**, P<0.001*** and NS = Not significant.

Table 4. Changes in gonads protein content of the fresh water crab, P. jacquemontii exposed to endosulfan during Summer at different days of exposure periods (mg/gm dry wt) ± S.D.

Condition	Organ	
	Ovary	Testes
Control	3.885 ± 0.327	4.741 ± 0.381
7 days	3.509 ± 0.510 P<0.05* -9.67 %	4.392 ± 0.477 P<0.05 - 7.35 %
15 days	3.300 ± 0.057 P<0.05* -15.05 %	4.276 ± 0.619 P<0.05 -9.80%
30 days	3.184 ± 0.448 P<0.05 -18.03 %	4.067 ± 0.621 P<0.05 -14.21 %

Each value is mean of five readings (+) or (-) indicate variation over control values are significant at , P<0.05*, P<0.01**, P<0.001*** and NS = Not significant.

Table 5. Changes in gonads protein content of the fresh water crab, P. jacquemontii exposed to endosulfan during Monsoon at different days of exposure periods (mg/gm dry wt) ± S.D.

Condition	Organ	
	Ovary	Testes
Control	3.885 ± 0.358	5.285 ± 0.952
7 days	3.111 ± 0.383 p<0.05 -19.91 %	4.387 ± 0.358 P<0.05 -16.98 %
15 days	2.044 ± 0.389 P<0.001*** -47.37 %	3.886 ± 0.264 P<0.05 -26.46 %
30 days	1.732 ± 0.144 P<0.01*** -55.40 %	2.316 ± 0.272 P<0.01** -56.16 %

Each value is mean of five readings (+) or (-) indicate variation over control values are significant at , P<0.05*, P<0.01**, P<0.001*** and NS = Not significant.

Table 6. Changes in gonads protein content of the fresh water crab, P. jacquemontii exposed to endosulfan during Winter at different days of exposure periods (mg/gm dry wt) ± S.D.

Condition	Organ	
	Ovary	Testes
Control	4.700 ± 0.357	3.070 ± 0.359
7 days	3.900 ± 0.122 P<0.01** -17.01 %	3.613 ± 0.326 P<0.05 -17.68 %
15 days	3.757 ± 0.284 P<0.001*** -20.05 %	3.038 ± 0.739 P<0.05 -1.04 %
30 days	3.400 ± 0.615 P<0.01** -27.65 %	2.392 ± 0.247 P<0.05 22.01 %

Each value is mean of five readings (+) or (-) indicate variation over control values are significant at , P<0.05*, P<0.01**, P<0.001*** and NS = Not significant.

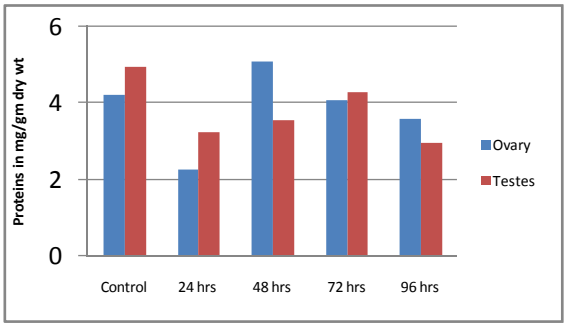

Figure 1.

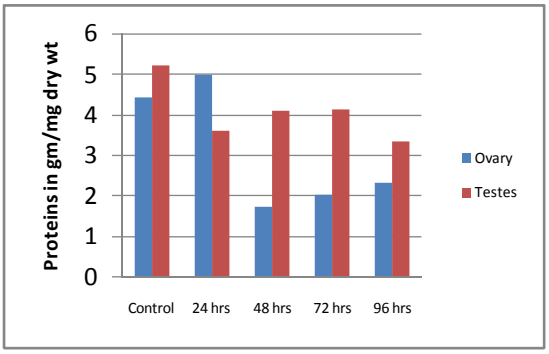

Figure . 2.

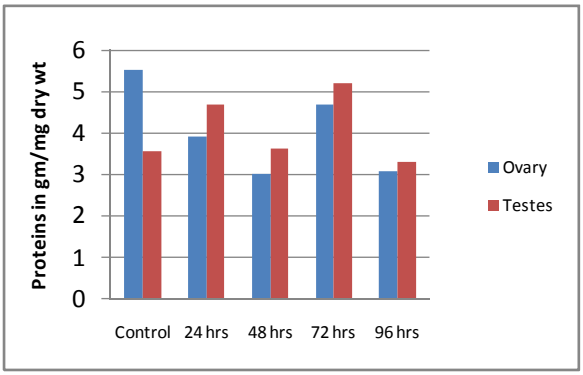

Figure 3.

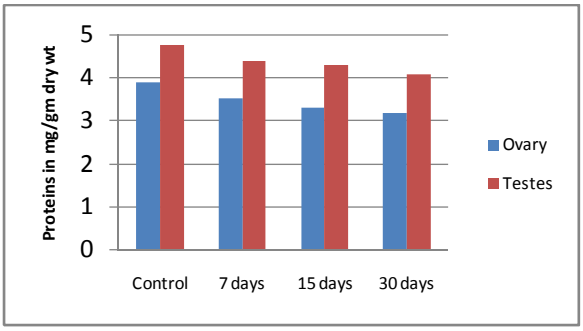

Figure 4.

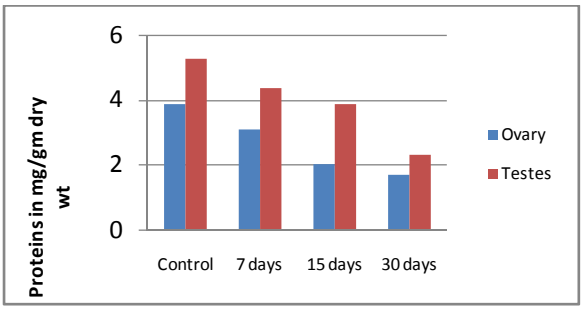

Figure 5.

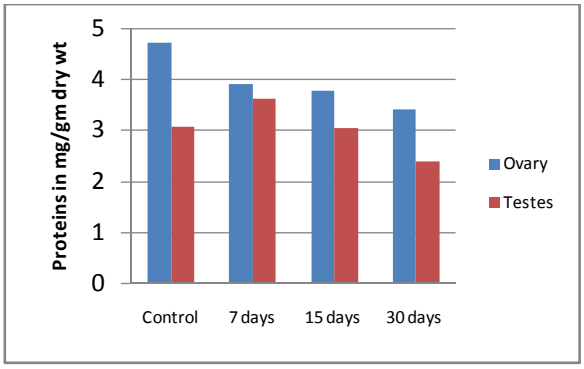

Figure 6.

Conclusion:-

The decrease in protein content of sub-lethal level of exposure of endosulfan to the crab, *paratelphusa jacquemontii* suggests the possible utilization of protein for metabolic purposes. It may be due to activation of protein synthesis processes. The decrease in protein level indicate sever stress experienced in protein of elimination of endosulfan. It has been shown by many investigator's that increased proteolytic activity occur with decrease in protein.

References:-

APHA/AWWA/WDCE (1985) :– Methods for examination of water and waste water. 16th end. Am Publ. H Lth ASSD – Washington.

Bhagyalakshmi A. Sreenivasula Reddy P. and K. Ramamurthi (1984) : Sub-lethal induced by sumithion on certain biochemical parameters in oziotelphusasenexsenex, the fresh water rice field crab. Toxicol. Lett. 21 : 127-134

Farooki, U. H. and Nagabhushanam R. (1983) : Biochemical variations during testes maturation in the marine crab, Scylla serrata (forshal) Rev. Brazil Biol. 43 (30) : 257-260.

Jaiswal, K. B. (1986) : Physiological response of the fresh water prawn, macrobrachiumKistensis to hydrocarbon napthalen. Ph.D. Thesis Marathwada Uni. Aurangabad. M.S. India.

Kabeer Ahmed, I (1978): Effect of malathion on free amino acids, total proteins, glycogen and some enzymes of pelecypod, Lamellidesmarginalis (Lam). Proc. Indian. Acad. Sci. B. 87 (12) : 377-380.

Konar, S. K. (1969): Laboratory studies on two organophosphorus insecticide DDVP and phosphomidon, as selective toxicants, Trans. Am. Fish – Soc. 98, 430-437.

Koundinga, P. R. and R. Ramamurthi, (1979): Effect of organophsphate pesticide sumithion (Ferithrothion) on same aspects of carbohydrate metabolism in a fresh water fish. Sartherodon (Tilapia Mossambica) Peters Experientia, 35, 1632.

Lowry, Q. H. Rosebrough N.J. Farr A.L. and Randall (1951) : Protein measurements with folin reagent. J. Biochem 193 : 166-275.

Mukhopadhya, P. K. and Dehadrai (1980): Biochemical changes in the air breating catfish, clariusbatraches exposed to matathion. Environ. Pollute, 22-149.

Nagabhushanam, R. (1977): Seasonal variation in protein fat and glycogen of the wedge clam, Donaxcuneatus. Ind. J. Mar. Sci 6 (1): 85-87.

Nagabhushanam, R. and G. K. Kulkarni (1981) : Freshwater plaemonid prawn, macrobrachiumKistensis (Tiwari) Effect of heavy metal pollutants, proc. India. Nat. Sci. Aead 4713. 380-386.

Patil, B. N., E. M. Wath and Prakash Bakre (1996) :Effect of solinity stress on enzyme succinic dehydrogenate in fresh water crab, paratalphusajacquemontii pro. Acad. Eviron. Biol. 5 (1) : 29-32

Pujakumari and Acharya Shankar (2014): Studies on Harmonal regulation of biochemical composition in freshwater Teleost HETEROPNEOSTES FOSSILIS (Bloch). Proc. Zoo. Soc. India. 13 (2) : 23-25.

Reddy, A. N. Venugopan N. B. R. K. and S.L.N. Reddy (1995) : Effect of Endosulfan 35 EC on some biochemical changes in the tissue and haemolymph of freshwater field crab, Barytelphusaguerinui. Bull. Environ. ContamToxicol. 116-121.

Rao K.S. Khan, A. K. Alam, S. M. and R. Nagabhushanam (1988) : Effect of benzene on the biochemical constituents of the Marine crab, Scylla servata. Environ and Ecology. 6 : 335-339

Shivprasad Rao, Kabeer Ahmed, I, and K. V. Ramana Rao (1981): Effect of methyl parathion on tissue proteins and a secretary product of the snail. Pila globasa. Nat. Acad. Sci. Letters, 4 (8) : 387-392.

Wang S. Y. and W.B. stickle (1988) :Biochemical composition of the blue crab, callinectesspapidas exposed to water soluble fraction of crude oil. Mar. Biol. 98 : 23-30.