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PHYSIOLOGICAL RESPONSES OF FRESHWATER PRAWN, *CARIDINA WEBERI* TO THE PESTICIDE METHYL PARATHION IN RELATION TO SIZE AND SEX

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The mature male freshwater prawns, *C. weberi* was the most sensitive among the five size groups, *viz.* juveniles, immature females, immature males, mature female and mature male exposed to methyl parathion. Among the same sexes of females, immature females are sensitive than the mature females, and in male sex, immature male was tolerent than mature male. Thus, there exist varied physiological responses to pesticide with relation to size and sex in *C. weberi* after pesticidal impact. Females are tolerent than the males, the sex dependent toxicity differences in *C. weberi* appears to set in after certain period of growth.

The size and sex have a great influence over the physiology of an organism (Prosser, 1973), Lowe *et al.* (1971) reported that juvenile blue crab, *Callinectus sapidus* are sensitive to size. Nimo *et al.* (1981) reported that juvenile mysid shrimp, *Mysidopsis blabia* is more sensitive than adults. In freshwater prawn, *Macrobrachium kistnensis* the adult females are more tolerant than the adult male when exposed to pesticides (Deshpande, 1985). Mary *et al.* (1986 a, b) reported a size and sex dependent tolerance in *M. lamerrii* to organophosphorous and organochlorine pesticides.

Thus it appears that very few size and sex tolerance studies in crustaceans have been done. In the present study caridian prawn, *Caridina weberi* in relation to size and sex tolerance to methyl parathion was undertaken.

The prawn *C. weberi* were procured from Kham river near Aurangabad, and acclimated to the laboratory conditions for three days prior to the commencement of experiment. The groups were made on the basis of size and sex *viz.* juvenile, immature male, mature male, immature female and mature female. During experimentation prawns were not fed. The pesticide methyl parathion was prepared by dissolving a known solution of this pesticide in water and known concertrations were made from the this solution. The LC_{50} values were calculated using computational precedure for critical analysis of the repression line relating probit and log dose (Busvine, 1971).

The LC_{50} values showed a size and sex dependent tolerance. The female prawns were found to be tolerant than the male prawns. The mature males were sensitive than immature prawn whereas immature females were found to be more sensitive than mature female. The toxicity values for methyl parathion are shown in Table I.

The results indicate that the toxicity is related to size of the organism. Probably the greater tolerence capacity in larger animals may be due to the decreased total cell surface area with increase in body size, which prevents relatively more diffusion (Zenthen, 1953). The large crabs are metabolically less active than small crabs (Ramanamurthi & Sainath Janan, 1973; Ambore & Venkatachari, 1978). Mary *et al.* (1986) reported that mature female are more tolerent than the immature *Macrobrachium lamerrii.*

Table I. LC_{50} of organophosphorus pesticide methyl parathion exposed in ppm for *Caridina weberi.*

Size group	Periods in hours 24	48	72	96	Safe concentration
Juvenile	0.75	0.56	0.46	0.38	0.093
Mature male	0.74	0.31	0.22	0.17	0.016
Immature male	2.18	1.77	1.54	1.25	0.0611
Mature female	3.6	2.8	2.7	2.0	0.509
Immature female	0.89	0.66	0.56	0.50	0.364

There is also a sex dependent tolerence in freshwater prawn, *Caridina weberi* to pesticide methyl parathion. The mature males are the least tolerent than the mature females. Possible explanation for this phenomenon may be that females are metabolically less active than the males so that the rate of diffusion of toxic ions into the organs may be less in the cases of females than in the males (Ramamurthi & Sainath Janan, 1973; Ambore & Venkatachari, 1978). Among the males, immature males were found to be more tolerent than the mature males. Similarly among the females, immature female was sensitive than mature females. Thus it may be concluded that sex and size dependent toxicity difference in *C. weberi* seems to set in only after some growth.

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REFERENCES

AMBORE, N.E. & VENKATACHARI, S.A.T. 1978. Respiratory metabolism in relation to body, size, sex and gill area of the freshwater crab, *Barytelphusa guerini Ind. J. Exp. Biol. 16* : 465-467.

BUSVINE, J. R. 1971. *A Critical Rreview of the Technique for Testing Insecticides.* Commonwealth Agricultural Bureau, England, pp. 267-282.

DESHPANDE, J.R. 1985. Effect of some pollutants on the reproduction in crustacea. *Ph. D. Thesis, Marathawada University, Aurangabad.*

LOWE, I.T., PARRISH, P.R. JR., WILSON, P.D. & DUKES, T.W. 1971. Effect of mires on selected estuarine organisms. Trans. 36th Amer. Wild and Nat. Res. Conference, March-7-10, 1971, Postland Oregon *1* : 71-86.

MARY SR. AVELIN, SAROJINI, R. & NAGABHUSHANAM, R. 1986a. Size and sex dependent tolerence capacity to organophosphorous pesticides in the freshwater prawns, *Macrobarchium alamerrii. Comp. Physiol. Ecol. 2* (4) : 200-202.

1986b. Size and sex related tolerence to organochlorine pesticides in the freshwater prawn, *Macrobrachium lamerrii. Ind. J. Comp. Anim. Physiol. 4* (1) : 29-34.

NIMMO, D.R., HAMAKER, T.L., MATHEWS, E. & MOORE, T.G. 1981. An overview of the acute and chronic effects of first and second generation pesticides on a eustuarine Mysid. In : *Biological Monitoring of marine pollutants* (Vernberg, F.J. Ed.). Academic Press, New York.

PROSSER, C.L. 1973. *Comparative Animal Physiology*, 3rd edn., W.B. Saunders Company, Philadelphia, pp. 165.

RAMAMURTHI, R. & SAINATH JANAN, A.T. 1973. Metabolism of freshwater crab, *Paratelphusa hydrodromous* in relation to size, sex season and diurnal rhythm. *Proc. Ind. Acad. Sci. 78* : 275-281.

ZEUTHEN, E. 1953. Oxygen uptake as related to body size in organism. *Quar. Rev. Biol. 28* : 1-12.