TOXIC IMPACT OF FENVALERATE ON THE PROTEIN METABOLISM IN THE BRANCHIAL TISSUE OF A FISH, *CYPRINUS CARPIO*

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THE present study was prompted by the increasing evidence of pesticide-protein interaction and its relevance to the mode of action of insecticides[1].

Cyprinus carpio (a freshwater fish) weighing 8 ± 2 g were collected from the local fish farm and adapted to laboratory conditions for a week. Technical grade sample of fenvalerate (90%) was obtained from Gujarat Insecticides Limited, and the stock solution was prepared in acetone. The LC_{50} value of fenvalerate to *Cyprinus carpio* was found to be 0.030 ppm for 48 h. The fish were exposed to sublethal concentration (0.010 ppm) of fenvalerate for 6,12,24 and 48 h. After each exposure the gill tissue was isolated and chilled in ice box and used for the estimation of total, structural and soluble proteins[2], free amino acids and protease activity[3], aspartate and alanine aminotransferases[4], ammonia[5], urea[6] and glutamine[7]. It is evident from the table that the total, structural and soluble proteins were significantly decreased whereas the neutral protease activity levels significantly raised with a concomitant increment in the amino acid pool. Aspartate and alanine aminotransferases activity level also showed significant elevation in all the exposure periods. Ammonia content decreased but the urea and the glutamine levels increased.

The protein content showed a decreasing trend at all the exposure periods suggesting the functioning of high protein hydrolytic activity and possible utilization of the products for metabolic purposes. The increased free amino acid levels of gill tissue confirm that proteolysis was stepped up. The

Table 1 *Levels of total, structural and soluble proteins, free amino acids (mg/g wet wt) protease activity (mg of a.a./mg protein/h), aspartate and alanine aminotransferases activity levels (μmol of pyruvate formed/mg protein/h), ammonia (μmol of ammonia/g wet wt.), urea (μmol of urea/g wet wt) and glutamine (μmol of glutamine/g wet wt.) in control and fenvalerate exposed fish*

Parameter	Control	Exposure periods (h)			
		6	12	24	48
Total proteins	111.76 ± 5.94	$100.69^{c} \pm 0.25$ (−9.90)	$93.74^{a} \pm 5.01$ (−16.12)	$80.32^{a} \pm 3.50$ (−28.13)	$67.22^{a} \pm 4.65$ (−39.85)
Structural proteins	61.79 ± 7.47	$56.31^{d} \pm 4.58$ (−8.87)	$53.75^{d} \pm 6.68$ (−13.01)	$45.98^{b} \pm 3.13$ (−25.59)	$40.94^{a} \pm 2.75$ (−33.74)
Soluble proteins	49.81 ± 2.71	$43.91^{b} \pm 2.59$ (−11.84)	$39.49^{a} \pm 3.05$ (−20.72)	$34.99^{a} \pm 3.29$ (−29.75)	$26.45^{a} \pm 2.03$ (−46.89)
Free amino acids	4.96 ± 0.12	$5.43^{c} \pm 0.43$ (9.54)	$6.65^{a} \pm 0.39$ (30.04)	$8.14^{a} \pm 0.34$ (64.03)	$9.21^{a} \pm 0.36$ (85.70)
Protease activity	0.261 ± 0.016	$0.290^{b} \pm 0.006$ (11.11)	$0.317^{a} \pm 0.017$ (21.45)	$0.366^{a} \pm 0.015$ (40.23)	$0.410^{a} \pm 0.009$ (57.09)
Aspartate aminotransferase	1.13 ± 0.04	$1.40^{a} \pm 0.04$ (23.89)	$1.61^{a} \pm 0.08$ (42.48)	$1.86^{a} \pm 0.09$ (64.60)	$2.04^{a} \pm 0.12$ (80.53)
Alanine aminotransferase	1.73 ± 0.07	$2.06^{a} \pm 0.09$ (19.07)	$2.83^{a} \pm 0.16$ (63.58)	$3.57^{a} \pm 0.23$ (106.06)	$5.39^{a} \pm 0.30$ (211.56)
Ammonia	3.92 ± 0.17	$3.44^{a} \pm 0.13$ (−12.24)	$3.09^{a} \pm 0.09$ (−21.17)	$2.60^{a} \pm 0.14$ (−33.67)	$2.22^{a} \pm 0.12$ (−43.37)
Urea	0.247 ± 0.016	$0.277^{b} \pm 0.006$ (12.14)	$0.319^{a} \pm 0.007$ (29.15)	$0.356^{a} \pm 0.020$ (44.13)	$0.395^{a} \pm 0.013$ (59.92)
Glutamine	10.01 ± 0.29	$11.23^{a} \pm 0.31$ (12.90)	$12.85^{a} \pm 0.37$ (28.37)	$15.09^{a} \pm 0.051$ (50.75)	$17.90^{a} \pm 0.61$ (78.82)

Each value is mean ± S. D. of six individual estimations; Values in parentheses are per cent change over control; values are significant at 5% level; $^{a}P<0.001$; $^{b}P<0.01$; $^{c}P<0.05$; ^{d}Not significant.

elevation in free amino acids has a functional relevance to meet the energy demands[8] and is also involved in the osmotic balance[9]. AAT and A1AT aminotransferase activities of gill tissue increased significantly indicating the occurrence of greater energy demands under toxic stress. The decrease in the ammonia content in the gill suggests the excretion of ammonia from this tissue by way of diffusion or its possible utilization for amino acid synthesis via glutamine as evident from increased levels of glutamine. The decreased levels of ammonia with increased urea content suggest the stepped-up conversion of toxic ammonia to less toxic urea. Hypoproteinemia and other indicators of toxic stress revealed in this study have been earlier reported with other pesticides[10,11].

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IMPACT OF THE PRESENCE OF PARASITES ON THE POPULATION OF RESIDENT ENDOSYMBIOTES IN BROWN PLANTHOPPER, *NILAPARVATA LUGENS* STAL. (DELPHACIDAE: HOMOPTERA)

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BROWN planthopper (BPH), *Nilaparvata lugens* (Stal.) was found to be parasitized by several parasites at various stages of its development. Some of the parasites frequently observed were an egg parasitoid, *Anagrus optabilis*, Perkins (Mymaridae)[1], a Dryinid, *Haplogonatopus? orientalis*[2] and a mite belonging to the family Trombidiidae occurring on nymphs and adults[3] and finally an unclassified Elenchid (unpublished observation by the authors) occurring as an internal parasite in BPH.

Generally the presence of a parasite would make the host weak, disrupt the normal functioning of the reproductive system and death in extreme cases. In BPH the presence of yeast-like symbiote at adequate number is an important aspect in fulfilling the nutritional requirements of the host insect as seen in the cases of other rice planthoppers[4].

This paper attempts to study the effect of such presence of parasites on the population of symbiote in BPH.

The parasitized eggs, nymphs and adults of BPH were collected from the insectary and rice fields. In eggs parasitized by *A. optabilis*, the number of symbiote was counted in the individual egg. Comparison was made with healthy eggs of BPH following the method described earlier[5]. The different stages of the mymarid were recognized based on available descriptions[6].

In the nymphs and adults parasitized by the dryinid, mite and elenchid the symbiote number was counted after separating the parasite from the host. As the availability of parasitized host was inadequate, the method described by Noda[7] for counting symbiote was slightly modified. Individual insects were squashed in 1 ml of 0.8% saline without preweighing and counts made in all the 9 large squares of the improved Neubauer double ruling haemocytometer chamber of 9 mm^2 area for increasing the accuracy. Comparison of this method with Noda's procedure suggested a negligible difference in symbiote number.

In the case of BPH eggs parasitized by the mymarid, the number of symbiote decreased with