



Toxicity of diazinon and cypermethrin against the American cockroach, *Periplaneta americana* (L.)

A. S. M. Shafiqur Rahman* and M. Y. Akter

Department of Zoology, University of Rajshahi, Rajshahi 6205, Bangladesh

*Corresponding author

American cockroach, *Periplaneta americana* L. is an obnoxious and filthy domestic pest of tropical countries of the world. Cockroaches are high priority urban pests because of their aesthetically unappealing damage stored products and household good and transmit diseases (Ebeling, 1978). It is a common pest of restaurants, bakeries, grocery stores etc. It has also been observed in the cargo holds libraries and dining rooms and occurs in latrines and sewers. *P. americana* carry filth and pathogens on their legs and body and contaminate food on contact. Among pathogenic diseases transmissible by roaches to man are enteric fever, dysentery and leprosy (Eads *et al.*, 1954; Cornwell, 1968). Various control methods have been adopted to control this insect, such as chemical control with the use of selective insecticides, mechanical, biological and genetic control methods. Chemical insecticides are conventionally utilized for controlling cockroaches in most parts of the world. (Pal, 1994; Schofield, 1993).

In the case of the German cockroach, *Blattella germanica* L. high-level resistance of the pyrethroid insecticides appear to be emerging rapidly (Cockram, 1989). If this trend continuous new compounds will be required to replace the use of conventional insecticides to control cockroach. In the present study the toxic potency of two selected insecticides, *viz.* diazinon and cypermethrin against *P. americana* was evaluated under laboratory conditions. Initially the adult *P. americana* used in the bioassays were obtained from

different local flour mills under Rajshahi City Corporation. Dose mortality bioassays were undertaken according to the standard method described by McDonald *et al.* (1996) with slight modification by topical application of a 1 μ l of insecticide solution of different doses to the thoracic notum of individual adult using Hamilton microlitre syringe (Hamilton Bonaduz, Switzerland). Cockroaches were anaesthetized before dosing. Five replications of each of the five concentrations were prepared, each with 50 insects per concentration. Control insects were treated with acetone only. After treatment treated cockroaches were placed in Pyrex glass beakers containing small amount of food, and finally the insects were placed in a temperature-controlled incubator at $26^{\circ} \text{C} \pm 0.5^{\circ} \text{C}$. Dose-mortality data were corrected according to Abbott's (1925) formula and analyzed by probit (Finney, 1971)

The LD₅₀ values were found to be 303.04 and 511.56 ng/insect respectively for cypermethrin and diazinon (Table 1, Figs. 1 and 2). The experiment indicated that the relative toxicity of the pyrethroid insecticide, cypermethrin might prove to be more economic to use. Lukua & Manokora (1997) studied the toxicity of some pyrethroid insecticides against *P. americana* and reported that the cockroach died immediately after application of permethrin. The present results are similar to those reported by Ho *et al.* (1994) and Lukua & Manokore (1997).

Table 1. LD₅₀, 95% confidence limits and regression equation of insecticides applied to adult *P. americana* after 24h of treatment

Insecticides	LD ₅₀ ($\mu\text{g}/\text{insect}$)	95% confidence limits		Regression equation	χ^2 (df)
		Lower	Upper		
Diazinon	511.56	418.399	625.44	$Y = -3.4044 + 3.1026 X$	0.265 (1) ^{ns}
Cypermethrin	303.04	228.954	428.028	$Y = 0.09537 + 1.965 X$	2.149 (1) ^{ns}

df= degrees of freedom; ns= not significant

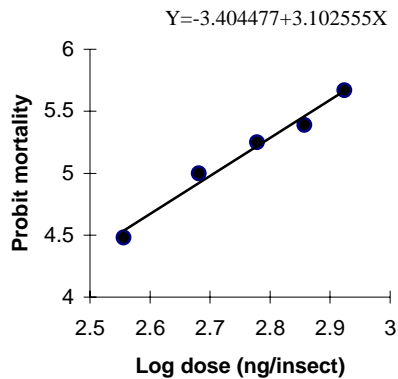


Fig. 1. Regression line of log dose of diazinon on probit mortality of *P. americana* after 24 h of exposure

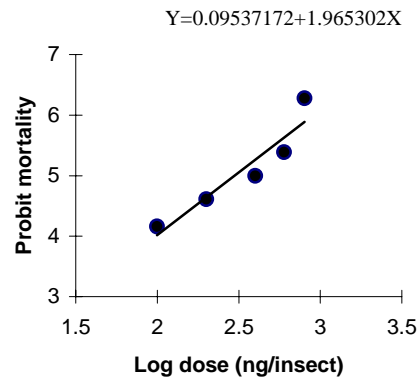


Fig. 2. Regression line of log dose of cypermethrin on probit mortality of *P. americana* after 24 h of exposure

References

- Abbott, M.S. 1925. A method of computing effectiveness of an insecticide. *J. Econ. Entomol.* **18**: 265-267.
- Cockram, D.G. 1989. Monitoring for insecticide resistance in field collected strains of the German cockroach. *J. Econ. Entomol.* **82**: 336-341.
- Cornwell, P.B. 1968. *The Cockroaches. A Laboratory Insect and an Industrial Pest.* Vol. 1. Hutchinson Co. Ltd. London. 391 pp.
- Eads, R.B., Von, F.R., Bennett, S.E. & Walker, O.L. 1954. Studies on cockroaches in a municipal sewerage system. *Am. J. Trop. Med. Hyg.* **3**: 1092-1098.
- Ebeling, W. 1978. *Urban Entomology.* *J. Univ. California.* 695 pp.
- Finney, D.J. 1971. *Probit Analysis.* 2nd edition. Cambridge University. Press. 250 pp.
- Ho, S.H., Gon, P.M. & Leong, F.C. 1994. Toxicity of some organophosphate and carbamate insecticides to *Periplaneta americana* *Int. Pest Control* **36(b)**: 153-158.
- Lukua, A.N. & Manokore, V. 1997. Biological activity of permethrin, pherothrin on *Periplaneta americana* and *Blatella germanica*. *East African J.* **74(4)**: 1007-1010.
- McDonald, D. 1996. Controlling cockroaches: The problem of resistance. *Int. Pest Control* **37(5)**: 146-147.
- Pal, R. 1994. *Program of Genetic Control of Mosquito.* 73-95 pp. Elsevier, North-Holland.
- Schofield, C.J. 1993. The policies of malaria vector control. *Bull. ent. Res.* **83**: 1-6.

Revised manuscript received on 3 April 2007.