

INSECTICIDE SUSCEPTIBILITY OF *CIMEX HEMIPTERUS*

S. L. PERTI, Y. C. WAL, P. DAMODAR and P. N. AGARWAL

Defence Research Laboratory (Materials), Kanpur

The susceptibility of the bed bug, *Cimex hemipterus* Fabricius, to certain synthetic contact insecticides, viz., DDT, lindane, dieldrin, diazinon and malathion was investigated. The fifth nymphal stage of the insect was found to be more tolerant to insecticides than other nymphal instars or the adult bed bug.

In an earlier paper, Damodar and Perti¹ have shown that the adult bed bug, *Cimex hemipterus* Fabricius, was susceptible both to chlorinated hydrocarbon insecticides and organophosphorous compounds. There is, however, no information on the susceptibility of different nymphal stages to insecticides. This forms the subject matter of the present communication.

MATERIALS AND METHODS

The insecticides used in these investigations were DDT (tech), lindane (99% γ — BHC), dieldrin (tech), diazinon (tech) and malathion (low odour, tech) obtained from the trade in India.

A susceptible strain of *C. hemipterus*, drawn from laboratory cultures, was used. The colony was raised from a single gravid female by the method described by Damodar *et al*². Nymphal instars, three to four days after emergence, and adult bed bugs, four to ten days old, were used in the tests. The insects were fed on rabbit's blood prior to exposure to insecticides.

EXPERIMENTAL PROCEDURE

The susceptibility of *C. hemipterus* to various insecticides was investigated on dry residual films on filter papers. Requisite concentrations of the insecticides were prepared in acetone. Whatman filter papers (No. 1, 11 cm) were laid flat on pin points and one ml. of the insecticidal solution in acetone was delivered on each filter paper with a hypodermic syringe. The filter papers were then allowed to dry for three hours prior to exposure of insects. A strip (5.0 \times 2.5 cm) of the treated filter paper, folded longitudinally in the form of Z, was introduced into a clean round bottom glass tube (15 \times 1.5 cm) kept vertically on a stand. Subsequently, ten nymphs or ten adult bed bugs were taken in the tube containing the treated strip. The tube was then loosely plugged with cotton wool and kept in dark. At the end of 24 hour exposure the test insects were transferred to a clean glass tube provided with a strip of untreated filter paper, folded in the form of Z as before. Observations on the mortality of insects were recorded 24 hours thereafter. There were two replicates in each assay. There was no mortality of test insects exposed on untreated filter paper or those treated with solvent alone. The temperature and relative humidity during the experiments were 25.5°C \pm 1° and 77.5 \pm 2.5 per cent respectively.

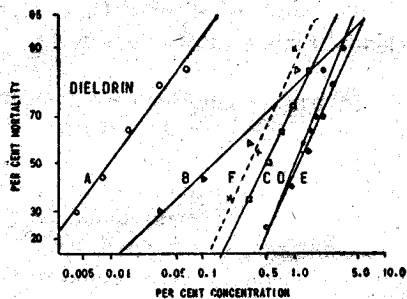
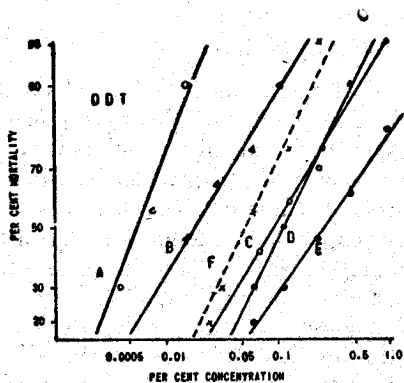
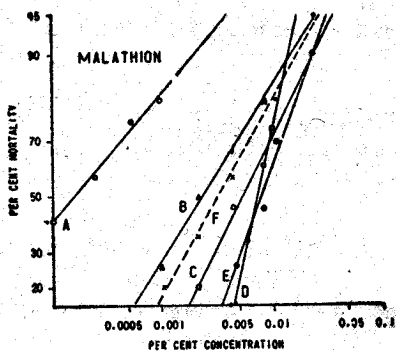
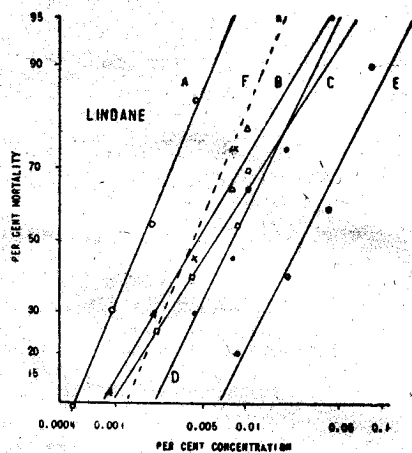
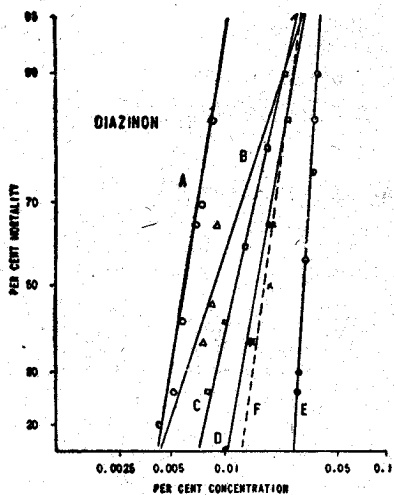


FIG. 1.—Susceptibility of *Cimex hemipterus* to insecticides.

A = First instar (o); B = Second instar (Δ); C = Third instar (\square);
 D = Fourth instar (\bullet); E = Fifth instar (\odot); F = Adult (x)

TABLE 1
RELATIVE SUSCEPTIBILITY* OF *C. HEMIPTERUS* TO INSECTICIDES

Insecticide	First Instar	Second Instar	Third Instar	Fourth Instar	Fifth Instar	Adult
DDT	1.00	1.00	1.00	1.00	1.00	1.00
LINDANE	3.34	5.22	16.75	16.76	23.17	16.99
DIELDRIN	0.22	0.05	0.33	0.175	0.60	0.20
DIAZINON	1.65	4.75	23.62	18.86	63.07	8.16
MALATHION	8.43	8.82	26.75	42.02	118.93	14.81

*Based on LC₅₀. Relative susceptibility values have been worked out by taking the susceptibility of *C. hemipterus* to DDT as unity.

RESULTS AND DISCUSSION

The results obtained in the various experiments were subjected to probit analysis³ and are graphically presented in Figure 1. The relative susceptibility of *C. hemipterus* to various insecticides was determined, based on LC₅₀, and the data are given in Table 1.

The LC₅₀ values were subjected to analysis of variance. The difference between the susceptibility of different nymphal stages and adults to any of the insecticides tested was found to be significant.

It will be noted from Figure 1 that malathion was the most toxic insecticide to nymphal instars and the adult bed bug and was followed by lindane diazinon, DDT and dieldrin. It will, however, be seen that the fifth nymphal stage of *C. hemipterus* was more tolerant to insecticides as compared to other nymphal instars or the adult bed bug. Yokowo⁴ also observed similar tolerance of the fifth instar of *C. hemipterus* and *C. lectularius* to DDT.

The results suggest that control measures directed against bed bugs should take into consideration the susceptibility to insecticides of both nymphs and adults. The fifth nymphal instar, being more tolerant to insecticides than other instars or adult bed bug, should, therefore, form the basis of recommended dosages for bed bug control,

ACKNOWLEDGEMENTS

The authors desire to thank Dr. J. N. Nanda, Director for interest in the work, and Sarvasri D. B. Chadha and B. K. Tiwari for technical assistance. Thanks are also due to Sri R. K. Tripathi for statistical analysis.

REFERENCES

1. DAMODAR, P. & PERTI, S. L., *Def. Sci. J.*, **14** (1964), 139.
2. DAMODAR, P., WAL, Y. C. & PERTI, S. L., *Indian. J. Malariol.*, **16** (1962), 227.
3. FINNEY, D. J., "Probit Analysis" (University Press, Cambridge) 1952.
4. YOKOWO, H., *Op. Cit.* No. 4, **16** (1962), 398.