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TOXICITY OF SOME INSECTICIDES TO THE RED COTTON BUG, DYSDERCUS KOENIGI (FAB)

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The LD_{50} values and relative toxicity of five organophosphorus insecticides, Azodrin, Bidrin, Birlane, and Dimecron were determined by topical application to third instar nymph and adult of red cotton bug, *Dysdercus koenigi* (Fab.). Azodrin and bidrin were found to be most toxic to the nymphs and adults, respectively. The nymphs were comparatively more susceptible to the insecticides tested.

Comparatively very little toxicological work has been done on the red cotton bug, *Dysdercus koenigi* (Fab.). Insecticidal control of this pest, however, has been reported by several workers.[1,8,11] Trehan *et al.*[12] determined the LD_{50} values of several selected insecticides and concluded that gamma-BHC, endrin, parathion and aldrin were more toxic than DDT. Lal[7] mentioned that alpha-naphthyl acetic acid (NAA)—a plant growth regulator, increased the toxicity of malathion to red cotton bug.

Considerable research has been reported on the toxicities of chemicals on different species of cotton insects.[3,6,10] However, it is not safe to assume that chemicals effective in controlling other insects will also control red cotton bug. The work reported herein, though based on laboratory evaluation will help field researchers to select a suitable insecticide for control of the red cotton bug.

Methods and Materials

The red cotton bug was first collected from the field and then was transferred in the laboratory to rear on the leaves of okra, *Hibiscus esculentus* Linn. Only the adults and third instar nymphs were used in the test. Five organophosphorus insecticides, azodrin, bidrin, birlane, diazinon and dimecron were used. Desired working concentrations were prepared by adding requisite quantity of acetone. Four dosage levels were used for each insecticide. One hundred each of the third instar nymphs and adults were selected at random, weighed collectively, and mean weight per individual calculated. This weight was used as a basis for calculation of insecticide dosages. One μl of the insecticide-acetone solution was applied on the tip of the abdomen of each insect with the help of a micro-syringe. Following treatment the insects were transferred to glass jars containing fresh okra leaves. Ten insects were used in each treatment and the treatments were replicated at least four times. An acetone-treated control was maintained in each test. All the experiments were done under the same conditions of temperature and humidity (29 ± 1°C and 75 ± 5% R.H.). Mortality counts were made 24 hr after the treatment. The moribund insects were also counted as dead. The data were subjected to probit analysis.[5] The median lethal dose (LD_{50}) was determined from the Ld-P line and feducial limits were set at the 95% level of probability.

Results and Discussion

The results for the contact toxicity of the insecticides tested against the nymphs and adults of the cotton bug are summarized in Tables 1 and 2, respectively. For a comparison of the toxicities, the LD_{50} values and regression equations for each of the insecticides were determined.

It appears that the relative toxicities of the compounds against the nymphs and adults varied considerably. In case of the nymph, the toxicity was in the order: azodrin > bidrin > diazinon > dimecron > birlane after 24 hr of treatment, while in the adult it was bidrin > diazinon > azodrin > dimecron > birlane. The values of relative toxicity of the different insecticides have been calculated by taking dimecron as unity. In all cases the probit analyses of the percentage mortality gave χ^2 values which are not indicative of significant heterogeneity.

The results show that the insect was susceptible to all the test insecticides. Birlane, however, showed least toxicity to both the nymph and the adult. Of the two life stages, the nymph was significantly more susceptible than the adult. Furr and Calhoon[4] found several insecticides more toxic to third instar than the fourth instar larvae of fall armyworm. McPherson *et al.*[9] applied DDT, BHC–DDT–sulphur mixture and endrin

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TABLE 1.—TOXICITY OF FIVE INSECTICIDES TO THE THIRD INSTAR NYMPHS OF *D. Koenigi.*

Insecticide	Heterogeneity	Regression equation	LD_{50} mg/g	Fiducial limits of LD_{50}	Relative toxicity
Azodrin	$\chi^2=3.7835$	$Y=2.78+2.02X$	0.126	0.186–0.085	1.992
Bidrin	$\chi^2=0.2283$	$Y=0.99+3.44X$	0.141	0.151–0.132	1.780
Diazinon	$\chi^2=0.9556$	$Y=3.04+1.53X$	0.195	0.214–0.178	1.287
Dimecron	$\chi^2=2.3329$	$Y=3.53+1.06X$	0.251	0.398–0.159	1.000
Birlane	$\chi^2=0.7336$	$Y=0.35+3.05X$	0.562	0.891–0.355	0.446

Y=Probit kill; X=Log (concentration × 10^3)

TABLE 2.—TOXICITY OF FIVE INSECTICIDES TO THE ADULTS OF *D. Koenigi.*

Insecticide	Heterogeneity	Regression equation	LD_{50} mg/g	Fiducial limits of LD_{50}	Relative toxicity
Bidrin	$\chi^2=0.0719$	$Y=1.92+2.58X$	0.151	0.186–0.123	2.761
Diazinon	$\chi^2=0.4346$	$Y=2.87+1.46X$	0.281	0.417–0.191	1.484
Azodrin	$\chi^2=1.3598$	$Y=2.45+1.65X$	0.380	0.598–0.256	1.097
Dimecron	$\chi^2=2.1731$	$Y=2.56+1.52X$	0.417	0.724–0.240	1.000
Birlane	$\chi^2=0.1285$	$Y=2.69+1.35X$	2.750	4.740–0.186	0.151

Y=Probit kill; X=Log (concentration × 10^3).

topically to larvae of *Heliothes zea* (Boddie) and *H. virescens* (Fab.) and concluded that percent control of the larvae decreased as the larvae increased in weight and age. A similar result was also recorded by Eldefrawi *et al.*[2] with the larvae of Egyptian cotton leafworm, *Prodenia litura* Fab.

It is of interest to note that the order of toxicity of the insecticides differed in the two series of tests. Azodrin was most toxic to the nymphs followed by bidrin and diazinon. In adults, the heighest mortality was recorded with bidrin followed by diazinon and azodrin. The reason of such differential susceptibility is not quite clear. This phenomenon, however, has also been reported in other insects.[2]

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