Pakistan J. Sci. Ind. Res., Vol. 13, Nos. 1–2, August 1970

STEM APPLICATION OF INSECTICIDES FOR CONTROL OF THE RED COTTON BUG, DYSDERCUS KOENIGI (FAB)

SUHEL AHMED CHOUDHURY and SYED MD. HUMAYUN KABIR

Department of Entomology, E.P. Agricultural University, Mymensingh

(Received May 10, 1969)

A green house test was conducted for determing the effectiveness of selected systemic insecticides, Azodrin (3-hydroxy-*N*-methyl-*cis*-crotonamide dimethyl phosphate), Bidrin (3-(dimethoxyphosphinyloxy)-*N*, *N*-dimethyl-*cis*-crotonamide) and Dimercon (2-chloro-2-diethylcarbamoyl-l-methylvinyl dimethyl phosphate) against the red cotton bug, *Dysdercus Koenigi* (Fab). The insecticides were applied in acetone to the stem of okra plant, *Hibiscus esculentus* Linn. at the rate of 2.5, 5.0 and 10.0 mg./plant. The 10 mg/plant dosage approximated 1.0 lb active material per acre. All the three insecticides were quite effective in controlling the bugs. The nymphs were, however, more susceptible than the adults.

The red cotton bug, *Dysdercus Koenigi* (Fab). is known to feed upon many different species of malvaceous plants. In East Pakistan the okra plant, *Hibiscus esculentus* Linn. is one of the most favourite host plant and the bug often causes serious damage to its leaves and young pods. Manickavasagar[8] studied the control of this pest in Ceylon. In a field of okra he applied emulsion sprays of DDT, dieldrin, chlordane and BHC and obtained significant mortality with the first three insecticides. Trehan *et al.*[12] evaluated toxicity of several insecticides against the red cotton bug. He found gamma-BHC, endrin, parathion and aldrin quite toxic to this insect.

Several methods of applying systemic insecticides have been reported,[4,6,9] however, application of toxicants to stem is comparatively a new approach to the pesticide research. A number of workers have demonstrated that application of systemic insecticides to the basal part of the main stem of plants is an effective method of controlling certain pests[2,5,7,10,11]. Linquist *et al.*[7] stated that stem treatment provides a much more efficient method of applying certain systemic insecticides to cotton than seed treatment or soil application. The present study was undertaken with a view to evaluate the effectiveness of azodrin, bidrin and dimecron (phosphamidon) against the red cotton bug attacking okra plants by applying the compounds to stems with dosages comparable to those of field application.

Methods and Materials

The following insecticides were tested against the red cotton bugs: Azodrin (3-hydroxy-*N*-methyl-*cis*-crotonamide dimethyl phosphate), Bidrin (3-(dimethoxyphosphinyloxy)-*N*, *N*-dimethyl-*cis*-crotonamide) and Dimecron (2-chloro-2-diethylcarbamoyl-l-methylvinyl dimethyl phosphate). The technical procedure was very much the same as outlined by Bariola *et al.*[2] The okra plants were grown singly in 12 in diameter earthen pots. When the plants attained a height of 12–15 in they were used for the experiment. For each of the insecticides dosages of 10.0, 5.0 and 2.5 mg of active material per plant were used. The 2.5 mg/plant dosage approximated 0.25 lb/acre assuming 3 plants/ft of row in a field. The testing pots were arranged at random. The insecticide in acetone was applied to the stem of each plant on a band of thin cloth 2 in wide around the main plant stem about 2 in above the soil level with the help of a pipette. Two series of tests were done. In the first series the bugs were confined in small wire cages, 1½ in diameter and 5 in long, that enclosed the apical leaves of the plants. Both sides of the cage were closed with the help of cotton so that the insects could not come out. Each cage was supported by a small bamboo stick. In the second series the bugs were confined to the entire plant in wooden-frame wire cages, 10 in diameter, in such a way that no insect could come in contact with the insecticide applied area of the stem. The two sides of the cage were covered with thin cloth so that no insect could escape. The clothes were bound firmly by threads. Ten adult insects of equal size and approximately of same age were used for each test and was replicated 10 times. Acetone-treated control was included in each test. Similar tests were also done with the third instar nymphs. Mortality counts were made 72 hr after the release of the insects to the plants. Percentage mortality was corrected by using Abbott's formula.[1] A factorial analysis of variance and Duncan's multiple range test were utilized to test for significance of the means at the 5% level.

Results and Discussion

The data have been summarized in Tables 1 and 2. The two series of tests with both the adults and nymphs showed some differences in the percentage of mortality after the indicated ex-

TABLE 1.—PERCENTAGE MORTALITY OF THE ADULTS AND THIRD INSTAR NYMPHS OF RED COTTON BUG, HELD ON THE ENTIRE PLANT, AT DIFFERENT CONCENTRATIONS OF THE INSECTICIDES AFTER 72 HR OF TREATMENT.*

Insecticide	Concentration mg/plant					
	2.5		5.0		10.0	
	Adult	Nymph	Adult	Nymph	Adult	Nymph
Azodrin	51.28 a	60.52 a	66.67 a	73.69 a	74.36 a	84.20 a
Bidrin	48.72 a	59.46 a	69.23 a	78.38 a	79.48 a	91.89 a
Dimecron	60.53 a	73.68 a	71.05 a	84.61 a	84.21 a	94.87 a

* Means followed by the same letters are not significantly different at the 5% level of Duncan's multiple range test.

TABLE 2.—PERCENTAGE MORTALITY OF THE ADULTS AND THIRD INSTAR NYMPHS OF RED COTTON BUG, HELD ON THE APICAL LEAVES, AT DIFFERENT CONCENTRATIONS OF THE INSECTICIDES AFTER 72 HR OF TREATMENT.*

Insecticide	Concentration mg/plant					
	2.5		5.0		10.0	
	Adult	Nymph	Adult	Nymph	Adult	Nymph
Azodrin	46.15 a	58.98 a	58.97 a	69.23 a	66.67 a	76.92 a
Bidrin	43.59 a	51.28 a	51.28 a	66.67 a	69.23 a	82.05 a
Dimecron	52.63 a	60.51 a	63.68 a	73.68 a	76.37 a	89.42 a

* Means followed by the same letters are not significantly different at the 5% level of Duncan's multiple range test.

posure time. All the three insecticides showed approximately similar effectiveness. However, mortality percentage was highest with the 10mg/plant dosage while 2.5 mg/plant gave lowest percentage of mortality.

The nymphs were found to be more susceptible than the adults. The results show that the toxicants became distributed within the plant body quite rapidly and effectively. Even the apical parts received enough toxicant so as to effect the insects. Several investigators working with Bidrin and Azodrin obtained effective results by stem applications against different species of insects. Corey[3] found Bidrin very effective in controlling the two spotted spider mites and mexican bean beetle larvae in the laboratory. Linquist *et al*[7] concluded that direct application of Bidrin to the stem of cotton plants was a more efficient method than soil application, seed treatment or foliar spray against the cotton aphids, *Aphis gossypii* Glover. Ridgway *et al.*[11] demonstrated that Azodrin applied to the stem of cotton effectively controlled the cotton fleahopper, *Psallus seriatus* (Reuter).

The results of the current study indicate that the stem application of all the three compounds at 1.0 lb/acre provide excellent control for both nymphs and adults of the cotton bugs. Apparently, dimecron (phosphamidon) showed more promising results. No phytotoxicity was observed with any of the applied dosages. The data further indicate that a rate between 0.5 and 1.0 lb/acre would be necessary to provide commercial control. Although normally the red cotton bugs feed on the leaves and pods of the okra plants the results show that the stem application technique would offer an effective treatment method for this pest.

Acknowledgement.—The authors extend sincere appreciations to Dr. Ashraf Ali, Head of the Department of Agricultural Statistics, East Pakistan Agricultural University, for valuable help in statistical analysis. Thanks are due to Mr. A.K.M. Mustafizur Rahman for his assistance in the laboratory.

References

1. W.S. Abbott, J. Econ. Entomol., **18,** 265 (1925).
2. L.A. Bariola, D.A. Linquist and R.L. Ridgway, J. Econ, Entomol., **60,** 257 (1967).
3. R.A. Corey, J. Econ. Entomol., **58,** 112 (1965).

4. C.B. Cowan, Jr., R.L. Ridgway, J.W. Davis, J.K. Walker, C.W. Watkins, Jr. and R.F. Dudley, J. Econ. Entomol., **59,** 958 (1966).
5. J.W. Davis, C.W. Watkins, Jr., C.B., Cowan, Jr., R.L. Ridgway and D.A. Linquist, J. Econ. Entomol., **59,** 159 (1966).
6. T.F. Leigh, J. Econ. Entomol., **56,** 326 (1963).
7. D.A. Linquist, D.A. Bull and R.L. Ridgway, J. Econ. Entomol., **58,** 200 (1965).
8. P. Manickavasagar, Trop. Agric., **111,** 28 (1955).
9. C.R. Parencia, J.W. Davis and C.W. Cowan, Jr., J. Econ. Entomol., **50,** 31 (1957).
10. B.G. Reeves and R.L. Ridgway, Cotton Trade J., Int. Ed. (1966).
11. R.L. Ridgway, B.G. Reeves, C.B. Cowan, L.H. Wilkes and D.A. Linquist, J. Econ. Entomol., **59,** 315 (1966).
12. K.N. Trehan, H.R. Pajni and K. J. S. Devi, Res. Bull. Punjab Univ. (N.S.) Sci., **12,** 57 (1961).