

# INSECTICIDAL TRIALS AGAINST *RHYNCHOPHORUS FERRUGINEUS* FABR. (CURCULIONIDAE: COLEOPTERA), THE RED WEEVIL OF COCONUT

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Nirula (1956) reviewed the earlier methods of control of *Rhynchophorus ferrugineus* Fabr., studied the comparative toxicity of DDT, BHC, toxaphane, chlordane and pyrethrinspiperonyl butoxide combinations (Pyrocon) on the pest, and recommended injection of 1 per cent Pyrocon-E 2/20 at 1,000-1,500 ml per infested coconut palm as a curative measure. Since then, the method was widely practised with success in Kerala for treating the palms attacked by this tissue-borer. Mathen and Kurian (1959) reported the reaction of the grubs and adults of the weevil in the laboratory to dieldrin, endrin, diazinon, parathion and pedix-bade emulsion. Trials were continued at the Central Coconut Research Station, Kayangulam, with different insecticides against the pest and the present paper sums up the results with three of them tried in the laboratory and field since 1959.

## MATERIAL AND METHODS

The insecticides tried were carbaryl (sevin), isobenzan (telodrin) and dimethoate (rogor), all commercial formulations (obtained through courtesy of Messers Union Carbide India Ltd, Burmah-Shell and Tata-Fison, respectively, as free samples) of 85 per cent carbaryl wettable dust (1-naphthyl N-methyl carbamate), 15 per cent w/v isobenzan emulsion concentrate (1, 3, 4, 5, 6, 7, 8, 8-octachloro-3a, 4, 4, 7a-tetrahydro-4, 7-methanophthalan), and 40 per cent dimethoate emulsion concentrate, containing as its active ingredient the chemical 0, 0-dimethyl S(N-methyl carboxamidomethyl) phosphorothiolothionate. The test grubs were of uniform growth and size and were selected from fresh lots brought to the laboratory at the time of the tests collected from infested palms in the field. The method was designed to provide, in the laboratory, conditions approximating those in the field during treatment by injection. Coconut leaf stalks were cut into pieces, each 30 cm long and bored by means of an auger to a depth of 15 cm. The larvae were introduced one into each and allowed 24 hours to establish themselves. Into each hole 15 ml of the insecticide suspension in water was poured on the second day. There were five replications for each dose of 0.025, 0.05, 0.1, 0.2, 0.5 and 1.0 per cent concentrations of the three chemicals employed, with five grubs per replication. Observations on normalcy (feeding), paralysis (not feeding, but capable of movement) and death were recorded at 24-hour intervals till all the paralysed grubs died.

## RESULTS AND DISCUSSION

In the laboratory 1 per cent concentration of carbaryl and dimethoate left no grub normal and brought about 44 per cent mortality on the first day and 84 per cent

on the third day. The paralysed grubs did not regain normalcy. Isobenzan gave 64 per cent mortality (+36 per cent paralysis) and 83 per cent kill (+17 per cent paralysis), respectively, on the first and third days at 0.2 per cent concentration and 84 per cent and 96 per cent mortality, respectively, on the first and third days at 0.5 per cent strength. Statistical analysis of the data is given in Table I.

TABLE I. STATISTICAL ANALYSIS FOR ASSESSING THE RELATIVE TOXICITY OF INSECTICIDIES

No.	Insecticide	Day	Heterogeneity	Regression equation	LC <sub>50</sub>	Fiducial limits	LC <sub>90</sub>	Fiducial limits
1.	Carbaryl	1	$\chi^2_{(4)}=8.773$	$Y=2.75+1.25X$	0.631	0.356& 1.118		
		3	$\chi^2_{(4)}=1.129$	$Y=4.60+0.70X$	0.0373	0.0136& 0.1025	2.5119	0.4069& 15.5060
2.	Dimethoate	1	$\chi^2_{(4)}=0.534$	$Y=3.40+0.75X$	1.359	0.373& 4.957		
		3	$\chi^2_{(4)}=2.085$	$Y=4.70+0.65X$	0.0289	0.0& 0.1011	2.6965	0.3514& 20.6920
3.	Isobenzan	1	$\chi^2_{(4)}=2.874$	$Y=2.85+1.80X$	0.156	0.115& 0.213		
		3	$\chi^2_{(4)}=1.710$	$Y=4.40+1.20X$	0.0316	0.0164& 0.0610	0.3687	0.1797& 0.7567

X=log (conc.  $\times$  100); Y=Prodit kill.

All the three insecticides exhibited considerable variation in toxicity between 1 and 3 days after treatment. Based on the values of LC<sub>50</sub> calculated for three days after treatment, they did not show much variation. The insecticides in their order of relative toxicity are isobenzan, carbaryl and dimethoate as judged from LC<sub>50</sub> after 25 hours and LC<sub>90</sub> after 72 hours.

In the field, 1 per cent carbaryl and dimethoate and 0.5 per cent isobenzan were each administered on 15 naturally infested palms. One palm in each case was observed killed after three months; others survived completely up to nine months or more, thus giving 93 per cent success. Two months after treatment, 5 out of the 45 palms treated were found to be reinfested. They required a second injection. None of the chemicals tested produced any phytotoxic symptoms on the host plant. The cost of treatment with carbaryl 50 per cent at Rs 11 per kg, isobenzan 15 per cent at Rs 14.75 per litre, and dimethoate 30 per cent at Rs 11 per 250 ml net, works out to Rs. 0.22, Rs 0.49 and Rs 1.46, respectively, per tree per injection (1000 ml) in comparison to treatment with Pyrocon (Rs 55 per litre) at Rs 0.55.

#### SUMMARY AND CONCLUSIONS

In laboratory trials with carbaryl, isobenzan and dimethoate against grubs of red weevil of coconut, *Rhynchophorus ferrugineus* Fabr., carbaryl and dimethoate at 1 per

cent and isobenzan at 0.5 per cent concentration effected 100 per cent knock down + mortality on the first day, and 84 per cent death with carbaryl and dimethoate and 96 per cent with isobenzan on the third day (the rest were paralysed and attained death subsequently). In the field, all of them gave 93 per cent cure of infested palms. Carbaryl and isobenzan compete in efficacy and cost with Pyrocon-E 2/20. Because of its low cost and low mammalian toxicity, carbaryl is superior to isobenzan and dimethoate.

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