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RELATIVE EFFICIENCY OF SOME FOLIAR INSECTICIDAL TREATMENTS FOR THE CONTROL OF *HELOPELTIS ANTONII* SIGNORET INFESTING CASHEW TREES

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The tea mosquito bug *Helopeltis antonii* Sign. (Hemiptera: Miridae) is the most serious pest of cashew in Kerala. It causes substantial losses due to blossom blight and damage to shoots, devloping nuts and apples. Abraham (1958) estimated the average damage to tender shoots to be about 25%, the damage to tender nuts being 15%. Damage due to inflorescence blight accounts for *30%* yield loss (Anon, 1966).

Damodaran and Nair (1969) assessed the relative efficiency of eleven insecticides in controlling *H. antonii* and found that two sprayings with DDT 0.2% sevin 0.1%, endrin 0.03% or dieldrin 0.05% at fifteen days interval starting soon after initiation of pest infestation, were effective in controlling the pest. Systemic insecticides were not as effective as contact insecticides. Chemical control trials carried out at Kasargod revealed that endosulfan 0.05% applied as high volume spray or 0.1% as low volume spray at the time of emergence of new flushes, panicles and fruit set was effective in controlling the tea mosquito bug (Pillai and Abraham, 1975). The present experiments were undertaken to evaluate the relative field efficiency of some of the newer contact and systemic insecticides in controlling the pest.

Materials and Methods

The field experiment was carried out at the Cashew Research Station, Vellanikkara, Trichur during the period from October to February, 1978–79, 80-81 and 81-82, adopting the randomised block design. There were nine different insecticidal treatments (Table 1) besides control, each being replicated thrice. Five year old seedling trees were selected at random for the experiment and a single tree constituted one particular treatment. Spray fluids were prepared from the EC formulations of the proprietory products except in the case of carbaryl for which 50% WP was used.

The first round of spraying was given in October at the time of emergence of new flushes and the second was given in the third week of November, synchronising with the flowering phase. The last round of spraying was given in the first week of January at the time of fruit set initiation. Five litres of the spray fluid was

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used for spraying each tree with rocker sprayer which was provided with hi-tree lance attachment.

Twenty numbers of healthy shoots were selected at random from all sectors of the canopy, immediately prior to the first spraying and the extent of shoot damage after insecticidal treatment was registered a fortnight later on a 0-4 scale as follows:

0 — no lesions
1 — one necrotic lesion
2 — two coalescing or non-coalescing lesions
3 — three coalescing or non–coalescing lesions
4 — lesions more than three and often confluent

The weighted mean scores from each treatment were analysed for each of observations. For the second and third rounds of observations twenty panicles were selected at random and the damage ratings were recorded on a 0-4 scale a fortnight after the date of spraying. The weighted mean scores for these two rounds of sprayings were analysed separately to evaluate the extent of panicle damage consequent on insecticidal application. The error mean square values for the three years were found to be heterogenous. Hence the interactions were tested by weighted analysis and found significant. Pooled analysis was done for the three years and tested by pooling the error sum of squares with the interaction sum of squares.

Results and Discussion

Shoot infestation by *H. antonii*

During 1978–79 (Table 1) the insecticides endosulfan, phosphamidon, carbaryl, quinalphos and monocrotophos were on parand more effective than control and fenitrothion treatments in reducing shoot infestation. Phosalone and fenthion treatments were on par and superior to control and fenitrothion.

During 1980-81 (Table 2) all insecticides were distinctly superior tocontrol. The insecticides endosulfan, quinalphos, fenthion, phosphamidon, carbaryl, monocrotophos and phosalone were on par and more effective than formothion and fenitrothion.

The trend in 1981-82 (Table 3) was almost similar to the previous year. Endosulfan, carbaryl. phosphamidon treatments excelled others in reducing shoot damage by *H. antonii.* The insecticides phosalone, formothion and fenitrothion were on par with control.

The results of pooled analysis for three years (Table 4) indicated the superiority of endosulfan, phosphamidon, carbaryl, quinalphos and monocrotophos over all other treatments, these being on par among themselves.

Damage to inflorescence

The inflorescence damage ratings for 1978–79 in the form of mean score values after the second round of sprayings ranged from 0.916 in treatment with endosulfan to 2.600 in control, the differences being significant (Table 1). In 1980-81 and in 1981-82 also the results were significant and the trend was almost similar (Tables 2 and 3). The results of pooled analysis for three years showed that all the insecticides (Table 4) were effective in reducing inflorescence damage due to the pest, but endosulfan, carbaryl, phosphamidon, quinalphos and monocrotophos were on par and superior to fenitrothion.

The data on the mean score values of the damage inflicted by the pest to the floral branches 15 days after fruit set initiation for the three years showed.

Table 1

Relative efficiency of foliar insecticides in controlling *Helopeltis antonii* infesting cashew trees (1978-79)

Sl. No.	Insecticides	Mean score values		
			Panicle damage	
		Shoot damage	15 days after emergence of panicles	15 days after fruit set initiation
1	Endosulfan 0.05% (Thiodan 35% EC)	0.616	0.916	1.333
2	Phosphamidon 0.03% (Dimecron 100% EC)	0.785	1.333	1.650
3	Carbaryl 0.15% (Sevin 50 % WP)	.785	1.350	1.666
4	Quinalphos 0.05 % (Ekalux 25 %EC)	0.850	1.385	1.885
5	Monocrotophos 0.05 % (Nuvacron 40 %EC)	1.000	1.450	1.916
6	Fenthion 0.05 % (Lebaycid 100 %EC)	1.350	1.616	2.200
7	Fenitrothion 0.05 % (Sumithion 50 %EC)	1.700	2.250	2.285
8	Phosalone 0.1 % (Zolone 35 EC)	1.200	1.555	2.666
9	Formothion 0.05 % (Anthio 25 % EC)	1.400	1.950	2.716
10	Control	2.166	2.600	3.366
	CD (0.05)	0.437	0.710	0.533

that all the insecticidal treatments were effective in reducing the extent of damage. The results of pooled analysis of the related data for three years showed that endosulfan, carbaryl, phosphamidon, quinalphos and monocrotophos were on par among themselves but superior to phosalone and formothion. Fenthion and fenitrothion showed intermediate efficiency in reducing damage to floral branches.

Overall considerations

In respect of control of shoot infestation, the insecticides endosulfan, phosphamidon, carbaryl, quinalphos and monocrotophos showed consistently good performance for the three years, while phosalone, fenthion, fenitrothion and formothion showed varying levels of bioefficiency lower than the efficiency spectrum of the former group of toxicants.

Table 2

Relative efficiency of foliar insecticides in controliing *Helopeltis antonii* infesting cashew trees (1980-81)

Sl. No.	Insecticides	Mean score values		
		Shoot damage	Panicle damage	
			15 days after panicle emergence	15 days after fruit set initiation
1	Endosulfan 0.05% (Thiodan 35 EC)	0.583	0.983	1.133
2	Phosphamidon 0.03% (Dimecron 100 EC)	0.833	1.075	1.225
3	Carbaryl 0.15% (Sevin 50% WP)	0.867	1.050	1.258
4	Quinalphos 0.05% (Ekalux 25 EC)	0.742	1.183	1.367
5	Monocrotophos 0.05% (Nuvacron 40 EC)	0.875	1.183	1.358
6	Fenthion 0.05% (Lebaycid 100 EC)	0.825	1.167	1.583
7	Fenitrothion 0.05% {Sumithion 50 EC)	1.225	1.583	1.900
8	Phosalone 0.1% (Zolon EC)	0.992	1.383	1.683
9	Formothion 0.05$ (Anthio 25 EC)	1.142	1.500	1.842
10	Control	1.908	2.233	2.467
	CD (0.05)	0,533	0.450	0.583

Table 3

Relative efficiency of foliar insecticides in controlling *Helopeltis antonii* infesting cashew trees (1981-82)

Sl. No.	Insecticides	Mean score values		
			Panicle damage	
		Shoot damage	15 days after emergence	15 days after fruit set initiation
1	Endosulfan *0.05%* (Thiodan 35 EC)	0.550	0.650	0.833
2	Phosphamidon 0.03% {Dimecron 100 EC)	0.683	0,883	1.067
3	Carbaryl 0.15% (Sevin 50% WP)	0.683	0.850	0.850
4	Quinalphos *0,05%* (Ekalux 25 EC)	0.817	0.833	1.100
5	Monocrotophos 0.05% (Nuvacron 40 EC)	0.733	0.908	1.133
6	Fenthion 0.05% (Lebaycid 100 EC)	1.250	1.217	1.517
7	Fenitrothion 0.05% (Sumithion 50 EC)	1.533	1.483	1.217
8	Phosalone 0.1% (Zolon EC)	1.493	1.300	1.517
9	Formothion 0.05% (Anthio 25 EC)	1.508	1.383	1.633
10	Control	1.733	2.075	2.464
	CD (0.05)	0.399	0.630	0.567

As regards the damage to floral branches after the second and third rounds of applications also, endosulfan, carbaryl, phosphamidon quinalphos and monocrotophos revealed consistency in bioefficiency. Phosalone, formothion, fenthion and fenitrothion were effeciive but not as effective as the former group of insecticides in suppressing the damage to floral branches.

The quantitative losses due to infestation by the tea mosquito bug being the cumulattve effect of shoot and inflorence damage intensities, it is very necessary to apply insecticides which can very effectively reduce the infestation levels in shoot and floral branches. It has been reported that the population of *H, antonii* show progressive increase commencing from September-October to February-March

Table 4

Relative efficiency of foliar insecticides in controlling *Helopeltis antonii* infesting cashew trees (Mean values of pooled data for 78-79, 80-81 and 81–82)

Sl. No.	Insecticides	Mean score values of pooled data		
			Panicle damage	
		Shoot damage	15 days after panicle emergence	15 days after fruit set initiation
1	Endosulfan 0.05% (Thiodan 35 EC)	0.584	0.798	1.099
2	Phosphamidon (Dimecron 100 EC)	0.767	1.098	1.314
3	Carbaryl 0.15% (Sevin 50%)	0.776	1.083	1.258
4	Quinalphos 0.05% (Ekalux 25 EC)	0.803	1.113	1.452
5	Monocrotophos 0.05% (Nuvacron 40 EC)	0.869	1.183	1.469
6	Fenthion 0.05% {Lebaycid 100 EC)	1.142	1.333	1.766
7	Fenitrothion *0,05%* (Sumithion 50 EC)	1.486	1.772	1.667
8	Phosalone 0.1% (Zolon EC)	1.228	1.413	1.955
9	Formothion *0.5%* (Anthio 25 EC)	1.350	1.611	2.063
10	Control	1.936	2.303	2.765
	CD (0.05)	0.386	0.512	0.482

(Ambika and Abraham, 1979) and scheduled applications are therefore quite necessary to prevent the build up of the pest and the consequential crop losses.

The results of the present study clearly show that endosulfan phosphamidon, carbaryl, quinalphos and monocrotophos are distinctly superior in bringing about significant reduction in pest infestation in the shoots as well as floral branches.

The above observation is not in confirmity with the trend reported by Damodoran and Nair (1969) that the systemic insecticides were not as effective as contact insecticides. It is likely that the initial contact toxicity and the subsequent systemic toxicity of phosphamidon were as effective as extended contact toxicity of other two insecticides against *H. antonii* which feeds on the plant sap. The relative

inferiority of formothion and fenitrothion in the control of the pest is consistently detected for all the three rounds of sprayings. The superiority of endosulfan *(0.05%)* in reducing inflorescence damage has already been established by Pillai and Abraham (1975) who reported that in endosulfan treated plots, the infestation of the inflorescence was 10.7% as against 32.5% in control.

Summary

The relative field efficiency of endosulfan (0.05%), phosphamidon (0.03%), carbaryl (0.15%), quinalphos *(0.05%),* monocrotophos (0.05%), fenthion (0.05%) fenitrothion *(0.05%),* phosalone (0.1%) and formothion (0.05%) against *Helopeltis antonii* Signoret (Hemiptera; Miridae) was evaluated in a field experiment conducted in the Cashew Research Station, Vellanikkara during the flushing and fruiting seasons (October–February of three years, namely, 1978–79, 1980–81 and 1981-82). Three rounds of high volume sprayings were given, synchronising with the emergence of flushes, flowering and fruit initiation stages and the intensity of damage was scored on a 0-4 scale based on observations on twenty randomly selected shoots and panicles.

Endosulfan (0.05%), carbaryl (0.15%), phosphamidon (0.03%) and quinalphos (0.05%) were found to be relatively more effective in reducing shoot and floral infestations.

സംഗ്രഹം

കശുമാവിന്റെ തളിരുകളേയും പൂങ്കുലകളേയും നശിപ്പിക്കുന്ന തേയിലക്കൊതുകുകളെ *(ഹെലോപെൽറ്റിസ് അന്റോണി)* കീടനാശിനികളം തളിച്ച് നിയന്ത്രിക്കുന്നത് സംബന്ധിച്ച് fflaaBfflifln കശുമാവ് ഗവേഷണകേന്ദ്രത്തിൽ 1978-79, 1980–81, 1981–82 എന്നീ വർഷങ്ങളിൽ നടത്തിയ പരീക്ഷണത്തിൽ എൻഡോസൾഫാൻ, ഫാസ്ഫാമിഡോൺ, കാർബറിൽ, ക്യൂനാൽഫോസ്, മോണോക്രോട്ടോഫോസ് എന്നീ കീടനാശിനികളം, ഫെന്തയോൺ, ഫെനിട്രോത്തിയോൺ, ഫൊസാലോൺ, ഫോർമോത്തിയോൺ എന്നീ കീടനാശിനികളെ അപേക്ഷിച്ച് കൂടുതൽ ഫലപ്രദമാണെന്ന് കാണുകയുണ്ടായി.

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References

Abraham, E V 1958. Pests of cashew *(Anacardiumoccidentale* L.*)* in S. India, *Indian J. agric. Sci.*, **78**:531-534.

Anonymous, 1966. Annual Progress Report of the Central Cashew Research Station Ullal, 1965–66.

Ambika, B and Abraham, C. C, 1979. Bio-ecology of *Heiopeltis antonii* Signoret (Miridae: Hemi) infesting cashew trees. *Entomon.*, 4:335-342.

Damodaran, V. K. and Nair, M. P. B.. 1969. Studies on the insecticidal control of *Heiopeltis antonii* Sign. on cashew. *Agric Res. J. Kerala* 9:28-30.

Pillai, G. B, and Abraham, V, A. 1975. Tea mosquito - a major menace to cashew. *Indian Cashew* J. 10 (1):5–7.