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PRELIMINARY STUDIES ON THE USE OF PETROLEUM SPIRIT EXTRACT OF CLOVES AS TRAPPING AGENTS OF CUCURBIT FRUIT FLY *Bactocera sp.*

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INTRODUCTION

The attack of maggot (larvae) of fruit fly on Cucurbits is very severe in the Eastern region of Sri Lanka. However there is no direct control on maggots as they live within the developing fruits. The adult flies can be controlled by using traps and poison baits.

A preliminary study was conducted to evaluate the efficacy of Trapinol and Petroleum spirit extract of cloves as trapping agents of Cucurbit fruit flies.

MATERIALS AND METHODS

Bitter gourd *Mormordica charantia* was selected for this study. Nine Trellises were provided for this crop. Among these Trellises, three were used for each treatment, namely Trapinol, Clove extraction and Control. The number of fruit flies caught in traps was counted weekly.

Trapinol (Methyl eugenol)

The commercial name of Methyl eugenol is Trapinol. It was bought from Anglo-Chem Limited. Chemically it can be described as 4-allyl-1,2-dimethoxybenzene or 3,3 dimethoxy (1)2-propenyl benzene. Three drops (0.1 ml) of Trapinol is recommended for control of fruit flies.

Essential oil of Clove

This s the extracted substance of Clove. By transferring the pulverized Clove into Soxhelet Extract Unit, it can be produced. Three drops (0.1 ml) of Clove extract was used to trap the fruit flies. This essential oil contains,

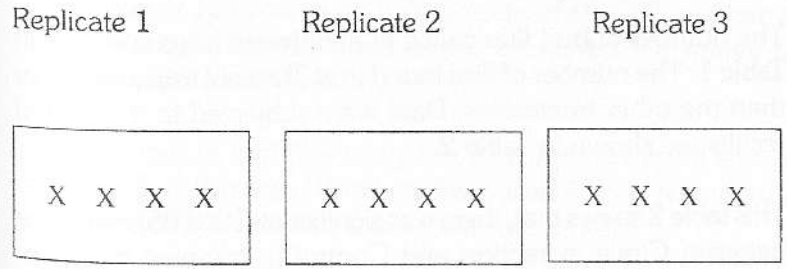
- Monoterpenes 2%
- Sesquitepenes 8%
- Oxygenaed Compounds (Eugenol, etc.) 90%

Measurements

Flowering commenced in plants at one month after planting. At the initial stage of flowering the traps were constructed to each Trellis and after one week the fruit flies in each trap were collected. Moreover, identification and separation of fruit flies was done based on the morphological features of the species collected from the traps. Data collection was done at weekly interval for one month.

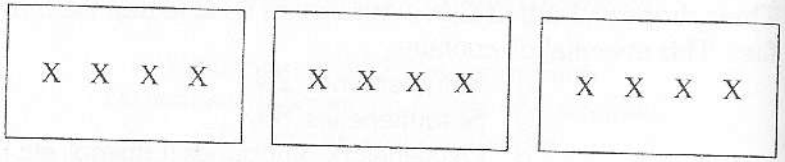
Field Layout

Bittergourd (Constructed with Trapinol trap)



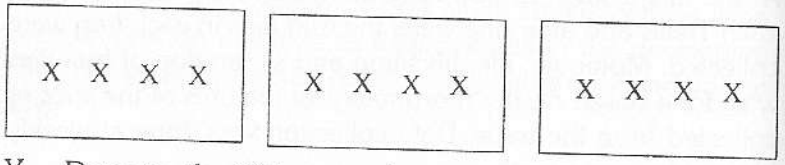
Bitter gourd (Constructed with Clove extraction trap)

Replicate 1 Replicate 2 Replicate 3



Bitter gourd (Control)

Replicate 1 Replicate 2 Replicate 3



X – Denotes the Bitter gourd crop

RESULTS AND DISCUSSIONS

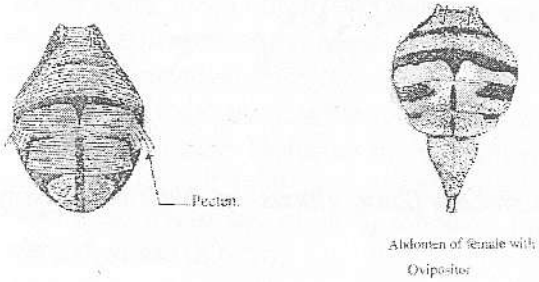
Variability in efficacy of treatments

The number of fruit flies called in at different traps is shown in Table 1. The number of flies found in at Trapinol trap was higher than the other treatments. Data were subjected to 't' test and results are shown in Table 2.

This table 2 shows that, there was significant ($P<0.05$) difference between Clove extraction and Control in trapping fruit flies. Also it was evident that, Trapinol had higher efficiency to trap fruit flies than Clove extraction and Control.

Identification of different species in fruit flies

Almost all the flies that were caught in traps were found to be males. It showed that, Methyl eugenol act as a Sex pheromone for male than female fruit flies. Male flies were identified from female flies with the help of morphological features. male flies have blunted abdomen and pecten and females have elongated abdo9men due to the presence of ovipositor.



Male with blunts abdomen

Many workers reported similar results. Abraham-Verghese and Verghese (1998) reported that, Methyl eugenol significantly attracted the male Tephritids, and also attracted a small number of females of *Bactrocera dorsalis*. liquido *et al* (1998)also found that, Methyl eugenol aced as an attractant for males of *Bactrocera dorsalis* (Hendel).

The number of fruit flies caught in Pheromone trap, is shown in Table 3, in this area Based on the morphological features the presence of two different species was observed.

i) Bactrocera (Zeugodacus) sp. Near tau (Taxon L)
ii) Bactrocera (Zeugodacus) gavisa

i) *Bactrocera (Zeugodacus) sp. Near tau* (Taxon L)
It has lateral and medial yellow stripes on scutum. In wing, costal band is extending into apical spot, but there is no any marking on dm-cu vein. (Plate 1)

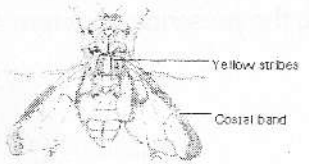


Plate 1: *Bactrocera (Zeugodacus) sp. Near tau* (Taxon L)

ii) *Bactrocera (Zeugodacus) gavisa*
Lateral and medial stripes on scutum are common feature for this species. However, in this species, the costal band of wing is not extending into apical spot, and it has facial spots (Plate 2)

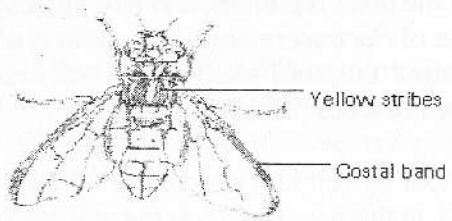


Plate 2: *Bactrocera (Zeugodacus) gavisa*

In Indonesia, the attractiveness of Methyl eugenol to the fruit fly *Bactrocera carambolae* was stated by Iwahashi *et al.*(1996). However findings from this study Methyl eugenol was capable

of capturing fruit flies of other species. *Bactrocera (Zeugodacus) gavisa, Bactrocera (Zeugodacus) sp. near tau* and *Bactrocera (Zeugodacus) cucurbitae.* This may be due to the eographic and climatic patterns prevailing in Indonesia and Sri Lanka.

It was reported that the species of *Bactrocera (Zeugodacus) cucurbitae* is predominant in Asia include Sri Lanka (Dennis, 1983). When infected samples of Bitter gourd by fruit fly were kept in Laboratory, more number of *Bactrocera (Zeugodacus) cucurbitae* wee emerged. But none of the flies from this species *Bactrocera (Zeugodacus) cucurbitae* were caught in the trap. This shows that the traps are not effective in attracting *Bactrocera (Zeugodacus) cucurbitae.* However the present study showed that, more number of fruit flies caught were *Bactrocera (Zeugodacus) sp. Near tau* (97.4%) followed by *Bactrocera (Zeugodacus) gavisa* (2.6 %).

The results were subjected to Chi-square test and it was found that, there was significant ($P<0.05$) difference in between the number of *Bactrocera gavis* and *Bactrocera sp.near tau.* This study showed that, the distribution of the species *Bactrocera sp. near tau* is higher than the species, B*actrocera gavisa* in Yala season. However, earlier studies using traps with Trapinol in Maha, it was found that, the distribution of the both species *Bactrocera (Zeugodacus) sp. near tau and Bacrocera (Zeugodacus) gavisa* were in equal proportion in this Eastern region (Niranjana and Raveendranath, 2000).

Tsuruta *et al.*, (1999) showed that, *Bactrocera (Zeugodacus) gavisa* and *Bactrocera (Zeugodacus)sp. near tau* were effectively attracted by Cue-lure. However this study showed that, *Bactrocera (Zeugodacus) gavisa* and *Bactrocera (Zeugodacus) sp. near tau* were also attracted by Methyl eugenol.

CONCLUSIONS

The study in the Agricultural farm of Eastern University showed that Trapinol for trapping the fruit flies in Cucurbits was more effective than Clove extraction. Clove extraction is also having an effectiveness to trap fruit flies to a certain extent. Further studies may be conducted to improve the effectiveness of Clove extraction as a trapping agent. Although it has been believed that *Bactrocera (Zeugodacus) cucurbitae* is the predominant species in this area, it is important to note that, the presence of these two species, *Bactrocera (Zeugodacus) gavisa* and *Bactrocera (Zeugodacus) sp. near tau,* in this area is reported for the first time.

The clove extraction consists 90% of eugenol but in Trapinol, 98% of eugenol is present. Therefore, it may be suggested purification of clove extraction and increasing the dosage rate of Clove extraction may enhance the effectiveness to trap fruit flies.

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Table 1: Number of fruit flies in different treatments

Week	Bitter gourd		
	Trapinol trap	Clove extraction trap	Control
1	4113	40	0
2	3801	25	0
3	4506	37	0
4	4107	28	0

Table 2: Comparing the overall mean ± SE number of fruit flies arrived to different trap

Factor	Treatment	mean ± SE number of fruit flies	't' value			Probability
			TT Vs CET	TT Vs Control	CET Vs Control	
Bitter gourd	Trapinol trap (TT)	4179.25 ± 152.54	27.185 *			P<0.05
	Clove extraction trap (CET)	32.5 ± 3.0618		27.39*		P<0.05
	Control	0 ± 0			10.6146*	P<0.05

Table 3: Number of different species caught in trap in Yala (2001)

Week	*Bactrocera (Zeugodacus) gavisa*		*Bactrocera (Zeugodacus) sp. near tau*	
	Trapinol trap	Clove extraction trap	Trapinol trap	Clove extraction trap
1	101	05	4012	35
2	89	08	3792	17
3	121	10	4485	27
4	96	07	4021	21