

EFFICACY OF METHYL EUGENOL AS A MALE ATTRACTANT FOR DACUS ZONATUS (SAUNDERS) DIPTERA: TEPHRITIDAE*

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Abstract. *Dacus zonatus* (Saunders) is a serious pest of guava in Pakistan which is responsible for 25–50% loss of fruit. The efficacy of methyl eugenol as an attractant alone and in different combinations with toxicant, protein hydrolysate, and sugar was explored for the males of this species. A solution of 85% methyl eugenol + 5% naled + 10% sugar (v/v/v) was found to be the best combination for attracting and killing the flies for a longer period.

In Pakistan *Dacus zonatus* (Saunders) is an important pest of fruits like guava, mango, papaya and citrus. The fly causes damage to the extent of 25–50%, and in places where no control measures are applied almost all the guava fruit become infested by the fly especially during summer.¹

Attractiveness of methyl eugenol for the males of Oriental fruitfly, *Dacus dorsalis* Hendel has been reported and the lure was utilized in testing the male annihilation concept of insect control against this species.^{2,3} Steiner *et al.*^{4,5} used the male annihilation technique successfully in the Mariana islands to eradicate the Oriental fruitfly, *D. dorsalis* through the aerial distribution of $2\frac{1}{4} \times 2\frac{1}{4} \times \frac{3}{8}$ in fibre board blocks soaked in a solution of the male lure, methyl eugenol, plus naled.

In order to evaluate the effectiveness of methyl eugenol as well as its economical use against *Dacus zonatus* it is imperative that its efficacy of attractiveness is known under our conditions. In the present studies, therefore, the efficacy of methyl eugenol as an attractant for the males of *Dacus zonatus* Saunders alone and in combinations with toxicant (naled), protein hydrolysate and sugar was explored.

Materials and Methods

The experiment was conducted in a 50-acre guava garden near Tandojam and the following combinations were tried:

100% methyl eugenol
95% methyl eugenol + 5% naled
90% methyl eugenol + 5% naled + 5% protein hydrolysate
85% methyl eugenol + 5% naled + 10% protein hydrolysate
90% methyl eugenol + 5% naled + 5% sugar
85% methyl eugenol + 5% naled + 10% sugar
85% methyl eugenol + 5% naled + 5% protein hydrolysate + 5% sugar
80% methyl eugenol + 5% naled + 5% protein hydrolysate + 10% sugar
75% methyl eugenol + 5% naled + 10% protein hydrolysate + 10% sugar

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Four ml solution from each of the combinations were injected separately in cotton wicks measuring 5.4 cm long and 1.5 cm dia of the individual one gallon plastic trap. The traps were hung on the guava trees at the height of 4–6 ft above the ground and the experiment was replicated twice.

The record on the number of male flies trapped in each trap was maintained. The data was subjected to analysis of variance, and Duncan's multiple range test was used for testing the significance of the differences between the means.

Results and Discussion

The traps having combinations (ii), (iii), (v) and (vi) captured significantly higher number of male flies than the rest of the combinations under trial (Table 1). In combination (ii) mean male fly catch per trap per fortnight was 9624 while in combinations (iii), (v) and (vi), the male fly catch was 7172, 7610, and 8173 respectively; combination (i) recorded the lowest fly count (3339 flies). This is due to the fact that the flies might have consumed all the lure as there was no poison to kill them.

In order to screen out the best treatment from combinations (ii), (iii) (v) and (vi) another experiment was conducted in the same garden. All the above-mentioned combinations including 100% methyl eugenol [combination (i)] were replicated 10

TABLE 1. EFFICACY OF METHYL EUGENOL AS AN ATTRACTANT FOR MALES OF *D. zonatus* WHEN USED ALONE AND IN DIFFERENT COMBINATIONS WITH INSECTICIDE (NALED) SUGAR AND PROTEIN HYDROLYSATE DURING AUGUST 4–OCTOBER 20, 1973.

Combinations	Average no. of male flies captured/trap/fortnight						Mean
	1st	2nd	3rd	4th	5th	6th	
(i)	5733	3965	6415	2049	1749	123	3339
(ii)	7891	6932	19695	11435	6302	5485	9634*
(iii)	8250	5967	15263	7532	3829	2188	7172*
(iv)	5923	4895	15704	6356	2813	1379	6178
(v)	7084	6048	15755	8224	4015	4535	7610*
(vi)	6276	8606	12967	15758	3336	2097	8173*
(vii)	6254	6631	15212	6270	2143	762	6212
(viii)	1155	7784	17595	7930	2773	3126	6727
(ix)	8235	6371	15507	3576	1676	4248	6602

*Combinations (ii), (iii), (v) and (vi) are significant ($P \geq 0.01$).

TABLE 2. EFFICACY OF METHYL EUGENOL AS AN ATTRACTANT FOR THE MALES OF *D. zonatus* (SAUNDERS) WHEN USED ALONE AND IN DIFFERENT COMBINATIONS WITH INSECTICIDE (NALED) SUGAR AND PROTEIN HYDROLYSATE DURING MARCH 18-JUNE 3, 1974.

Combinations	Average no. of flies captured/trap/ fortnight					Mean
	1st	2nd	3rd	4th	5th	
(i)	124	546	454	198	12	226.8e
(ii)	254	1360	2216	1729	215	1154.6c
(iii)	385	1357	2247	1911	257	1231.4b
(v)	173	974	1365	1528	612	931.00d
(vi)	229	1192	2398	3608	1839	1853.2a

Treatment means followed by different alphabets are significantly differ from each other at 1% level.

times. The data (Table 2) show that in order of effectiveness the highest average number (1853) of male flies per trap per fortnight was trapped in combination (vi), followed by combinations (iii), (ii) and (v) where the mean fly catch was 1231, 1155 and 931 respectively. Combination (i) again recorded lowest fly count (267 flies). This experiment was again repeated in an identical manner for a 3-months period (July-September, 1974). The results confirmed the higher efficiency of attractiveness of the combination (vi). Based on these results it is concluded that a solution of 85% methyl eugenol + 5% naled + 10%

sugar injected in cotton wicks of dry plastic traps could effectively be used to annihilate the male fly population of *D. zonatus*.

Further studies are planned to find out a suitable thixotrope for distributing the poisoned male lure. Several different thixotropes have been reported in the literature, which could be used as an extender, e.g. Myverol (distilled monoglycerides of lard, i.e. monoesters of glycerol),⁶ Cab-o-Sil (an amorphous pyrogenic silica)⁷ and Thixcin E (nontoxic chemically inert organic powder).⁸

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