Hexapoda (*Insecta indica*)

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Field efficacy confirmation of best blend ratio option for Lures used for fruitfly trapping in Cucurbit crops Ecosystems of Sri Lanka

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ABSTRACT: Tephritid fruit flies are an important constraint to marketable fruit yields in cucurbit and tree fruit crops globally and trapping them with aggregation pheromonelures is recommended for their effective management-both by monitoring and/or by mass trapping. The present field study was taken up in Sri Lanka, on the relative efficacy of blending Cue-lure, (CL) being the recommended fruit fly attractant for melon fruit flies for synergy benefit with another attractant- Methyl Eugenal (ME), as potential synergist in cucurbit ecosystem. The replicated field study in cucurbit crops ecosystem among three locations in SriLanka during May-June 2019 showed that overall numbers of *B.cucurbitae* in trap catch were consistently higher (more than double) when CL was blended with ME(CL+ME) compared to CL alone, so confirming the synergy effect of blending CL. In addition, blending of CL with ME(3:1 ratio) in same lure source caused six-fold increase in trap catch of *B.dorsalis* species complex, which is a cost- free bonus effect with habitat- sanitation advantage. There is immense scope for collaborative R&D to gain further insight into chemical ecology of para-pheromone-based trapping systems for maximising the economic impact in trapping of the fruit flies which are economically important in cucurbit ecosystem in Srilanka and in South Asia region**.**

Key words: Parapheromones, Fruit flies, Blending, Cuelure, Methyl Eugenal, cucurbit ecosystem

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Introduction

Sri Lankan agri-horticulture cropping systems are keen to adopt market-focus and consumer-safe technologies as means of enhancing the profitability of farming through compliant practices. This focus also constitutes a major plank in adopting Integrated Pest Management (IPM) towards more sustainable farming. Tephritid fruit flies are important constraint to the marketable yields in major cucurbit vegetable crops. Trapping systems with para-pheromone dispensers are an important management tool for trapping of fruit flies.

Methyl-eugenal is recommended for both monitoring and mass trapping of the *Bactrocera dorsalis* complex in tree fruit crops like mango, guava and citrus. On the other hand, Cue-lure based attractant traps have potential for monitoring and mass trapping of the melon fly males in most cucurbit crops (Vargas *et al*., 2010).

The relative role of trap design attributes in attracting and/or retaining the attracted males in these trapping systems has been well documented by Sithanantham (2011). Jaiswal *et al.,* (1997) reported that majority of cucurbit farmers adopted the use of attractant traps with cue-lure and obtained effective control of the pest .The alternative dispenser options include plywood discs of different sizes, besides vial with cotton wick, whose relative efficacy tends to be influenced also by the trap design in which they are deployed.

The present studies were directed at local field evaluation of lure dispenser options formelon fruit flies with Cue-lure in cucurbit crop ecosystem, Sri Lankan conditions and the results are discussed.

Materials & Methods

The experiment was carried out in three farmers field locations of cucurbit crops near Peradeniya during 2019 season. The commercial trap Cylindrical jar trap with plywood discs (pheromone dispensers)of 4x1x1cm dimension which were charged with either Cue lure-methyl eugenal (CL+ME) blend or with Cue-lure alone(CL) were also included as main treatments for comparison.The traps and dispensers were secured from Sun Agro Biotech Research Centre, Chennai, India, as collaborating R&D institution. The treatments were kept at an inter-distance of 20m and their positions within the replication interchanged randomly after each count. There were four consecutive weekly observations on trap catches. The data on trap catches of the fruitflies was pooled over the locations and analysed as per procedures suggested by Gomez and Gomez (1983).

Results

Overall the numbers of melon flies were consistently more when Cue lure was blended with methyl eugenal (CL+ME) than with Cue-lure alone (CL), confirming the synergy effect of blending CL with ME. This trend was evident in all three locations (Table.1).

Addition of ME to CL in same lure source was found to trap non-cucurbit FF species in the cucurbit crop/farm, which is a no-cost bonus and multi-species trapping advantage.

Table 1: Mean number of melon fruit flies trapped for Cue-Lure (CL) alone versus Cue-Lure-Methyl Eugenol (CL :ME) blend in three locations, May –June 2019

Location	No. of Weeks	CL			CL:ME		
		B.cu	*B.tau*	FF	*B.cu*	*B.tau*	FF
Gampola	1 st	07	01	-	21	01	46
	2nd	09	-	-	13	-	26
	3rd	17	01	02	40	07	26
	4th	14	02	-	35	03	24
Total		47	04	02	109	11	122
Yata watta	1 st	08	-	-	118	-	-
	2nd	13	-	02	68	06	92
	3rd	08	-	-	96	57	41
	4th	06	-	-	156	43	37
Total		35	-	02	438	106	170
Rambukkana	1 st	01	-	-	-	-	10
	2nd	01	-	-	-	-	4
	3rd	05	01	01	18	01	05
	4th	05	02	03	28	04	06
Total		17	03	04	46	05	25

Progress/Findings:

Number of MFF attract to CL: ME traps were significantly higher. Chi-Square value for *B.cucurbitae*

(B.cu) (χ^2 84.2;P<.0001,)

B.tau ($\chi^2$43. 1;P<.0001)

B.dorsalis, B.kandiensis and *B.correcta)*-($\chi^2$148.1 ;P<.0001)

Discussion

The results on relative economic benefit of blending CL with ME (in 3:1 ratio) was well quantified in the present multi location studies undertaken in Srilanka.: The present results clarified that choice of blend ratio for the recommended cue lure with methyl eugenal for fruit fly trapping is highly scopeful in cucurbit ecosystem in SriLanka. While plywood disc dispensers are useful for fruitlies for methyl eugenal in both cucrbit and mango ecosystems in earlier studies in India with cylindrical vertical jar type traps (Sithanantham, 2011), the present findings are specific to their relative performance as blend ratios for such dispensers in the Steiner type trap design. Evidently, the blend ratio as a component in attracting and trapping cucurbit fruitlies among trap design-lure attributes, manifest their own influence on the relative trap catch performance, by differential release pattern of the attractant blends and /

or their retention potential to attract all species of relevant fruit flies in cucurbit crop habitats. While this aspect may be worth further research with longer duration of trap catch observations, the present findings are adequate to reliably recommend the promising blend ratio to be dispensed in large plywood disc as superior to the other options in cucurbit ecosystem in Sri Lanka using promising Steiner type trap. The scope for future collaborative R&D on the maximisation of impact of blend ratios for trapping systems in cucurbit crops across Sri lanka is indicated.

Conclusion

The present study has confirmed the benefical effect of blending the two attractants-ME and CL and laosdemonstrated and the scope for improving the relative catches of both the melon fly and oriental fruitfly species complex which co-occur in cucurbit ecosystems as in SriLanka. The present finding could be recommended for enhancing the impact potential of the Steiner type trap being commonly recommended for use in SriLanka, and is well applicable to the large plywood discs for improving fruitfly catches in improved trapping system for cucurbit ecosystem fruit flies in Sri Lanka.

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