



Field evaluation of different trap designs and dispenser options for improved management of cucurbit fruit flies

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ABSTRACT: The melon fruit fly, *Bactrocera cucurbitae* (coquillett) is an important pest on cucurbit crops in India. The performance of three trap types, each with two alternative dispenser types using cue lure as attractant was evaluated in Varnasi, India during 2018-19 kharif season. The Delta trap was more efficient than jar trap and foldable trap compared. Among the two dispenser options, the larger disc (4x4x1cm) enhanced the catches of fruit flies than the smaller disc (4x1x1 cm), when kept in the Delta trap. The present results have confirmed the variation in complementarity between trap types and dispenser options for attracting fruit flies with cue lure in cucurbit crop ecosystem.

Key words: *Bactrocera cucurbitae*, trap types, dispenser options, combination effect, cucurbit ecosystem

Introduction

The melon fly *Bactrocera cucurbitae* (Coquillett) is known to widely infest cucurbit vegetable crops throughout South-East Asia, besides elsewhere in the tropics. (Dhillon *et al.*, 2005). Agarwal *et al.*, (1987) had estimated that in India, nearly 50 per cent of cucurbits have been reported to be partially or completely damaged by *B. cucurbitae* every year. Cue-lure attractant traps have been used for monitoring and mass trapping the melonfly males in bitter melon as among other cucurbit crops (Vargas *et al.*, 2010). Jaiswalet *et al.*, (1997) reported that majority of cucurbit farmers adopted the use of

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attract ant traps with cuelure and obtained effective control of the pest. These attractant traps are becoming increasingly important in cucurbit fruit fly management, both in individual field level and in large area suppression programs. The present study was aimed at field evaluation of complementary between trap types and dispenser options for attracting fruit flies with Cue- lure in cucurbit crop ecosystem.

Materials & Methods

The experiment was undertaken in a farmers cucurbit crop field near Varanasi during 2018-19 *kharif* season. Three different commercial traps namely Delta small trap, foldable trap and cylindrical trap with two different size plywood disc (pheromone dispenser) charged with cue-lure, provided by M/S Sun Agro Biotech Research Centre, Chennai were installed in the field. These six treatments -three types of traps with two types of lure dispensers each-were compared in Randomized block design which was replicated four times. Brief description of the trap type specifications is as follows:

1. The delta small trap: Standard commercial trap of yellow colour made up of cardboard sheet which when folded forms into a triangular shaped trap, being 10 cm high and 14 cm base with 4 holes of 15 mm diameter on its side of the trap. Insects enter the traps mainly through two triangle shape entrances in response to the pheromone lure placed inside. Replaceable adhesive sheet is fixed at the base of delta traps.

2. Cylindrical white jar trap: It is a white colour jar of 500 ml capacity having 4 holes of 30 mm dia. on four sides. It has a red colour screwable lid which can be opened. It is fastened with the plant from the top side with red colour lid. Fruit flies are collected by opening the bottom lid.

3. Foldable yellow sheet: It is made of yellow colour foldable yellow plastic sheet, which are folded to form a cuboid shape having six surfaces. It has four openings on its four surfaces out of which two are rectangular openings (20 mm long) and two are circular (15 mm diameter). From one surface it is fastened with the plant and plywood disc by a string. Fruit flies are collected by opening from bottom.

The two alternative lure dispensers tested were of solid wooden discs with sizes of 4×4×1 cm versus 4×1×1 cm, respectively, fixed in each of above three trap types and dispensed the pheromone lure.

These constituted the following six treatment combinations:

T¹. Delta small trap-with large lure disc-4x4x1 cm

T². Delta small trap-with small lure disc-4x4x1 cm

T³. Cylindrical white jar trap with large lure disc-4x4x1 cm

T⁴. Cylindrical white jar trap with small lure disc-4x4x1 cm

T⁵. Foldable yellow sheet trap with large lure disc-4x4x1 cm

T⁶. Foldable yellow sheet trap with large lure disc-4x4x1 cm

The experiment was laid out in randomized block design with four replications. Following the installation of traps on 10th September 2018, the traps were interchanged in their positions at random within each replication at weekly interval to avoid position effect on the trap catches, with simultaneous observation on the fruit flies trapped in each of the treatments.

Results

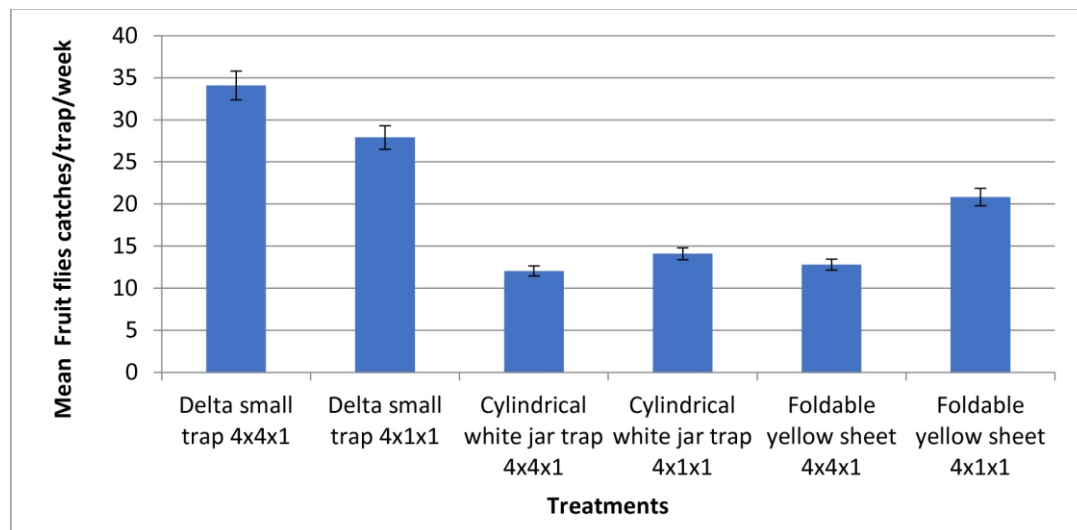
The pooled data on overall catch of *B. cucurbitae* in different traps was significantly different. (Table.1.1). It was evident that the small delta traps with large disc trapped significantly most fruit flies, with mean weekly catch of 34.1 fruit flies/ trap. This was followed by same trap type but with small disc (27.9 fruit flies/trap), foldable sheet trap with small disc (20.9 fruit flies/trap), cylindrical white jar trap with small disc (14.1 fruit flies/trap) and foldable sheet trap with large disc (12.8 fruit flies/trap). The cylindrical white jar trap with large disc recorded the least catch (12.0 fruit flies/trap/week) (Table 1.1).

Table 1.1: Fruit fly catches per week in pheromone traps during Kharif 2018

Treatments	Number of fruit fly catches per week						Mean
	Week1	Week2	Week3	Week4	Week5	Week6	
T ¹	64.5* (7.669)**	78.5 (8.7)	24.75 (4.541)	10.5 (3.311)	17 (3.733)	9.25 (2.756)	34.08333
T ²	67.5 (8.037)	58.25 (7.301)	13.25 (3.518)	9.5 (2.731)	13 (3.507)	6 (2.46)	27.91667
T ³	27.25 (5.19)	17 (4.139)	8.75 (4.123)	9.5 (3.205)	7 (3.159)	2.75 (2.14)	12.04167
T ⁴	17.5 (4.252)	22.33333 (4.768)	19.25 (3.914)	12.75 (3.456)	7 (1.98)	5.75 (1.923)	14.09722
T ⁵	17.5 (4.286)	28.75 (5.432)	13.5 (3.45)	9.5 (3.1)	5.5 (3.189)	2 (2.264)	12.79167
T ⁶	35.75 (5.742)	50.25 (6.745)	16 (3.488)	7.25 (3.146)	11.25 (2.862)	4.5 (1.492)	20.83333
Mean	38.3333 3	42.5138 8	15.9166 6	9.83333	10.125	5.04166	
SE(m)	0.792	0.796	0.794	0.536	0.593	0.508	-
C.D.	2.41	2.422	0.196	0.00	0.00	0.469	-

These results indicated that the delta trap-small was more efficient in fruit fly catches than other trap types, with either 4x4x1cm dispenser. (Fig.1)

Figure 1: Effect of different pheromone traps on fruit fly catches



Within the delta trap small type, the catches were greater with 4x4x1cm dispenser than 4x1x1cm dispenser, whereas such a trend was not evident with the other two types. These results point to greater and more beneficial complementarity of the dispenser options with delta trap type than the other two trap types compared.

Discussion

The present results have shown that among the trap types delta small is superior, while the larger dispenser (4x4x1cm) maximised the fruitfly catch in this trap type compared to the smaller dispenser (4x1x1cm). Our results are comparable to the findings of Rajitha and Viraktamath (2005) who found significant differences among three trap types with a common dispenser type., wherethey evaluated Fligh™ trap versus modified Steiner trap and Delta trap for trapping *B. cucurbitae* in cucurbit ecosystem. These results are also in conformity to the outcomes of Vignesh (2015) in evaluating the efficiency of five different trap designs namely Fine trap, Flight™ Trap, bottle trap, cylinder trap, sphere trap and reported that one among them was significantly more attractive to melon fruitflies. In searching for possible reasons for such trap differences in catches, Thomas *et al.*,(2006) found no critical connection between trap color and the melon fly, *B.cucurbitae* fascination on bittergourd. Similar studies by Patel *et al.*,(2006a) comparing McPhail, Rakshak protector, Block, Patel and jug trap, besides by Patel *et al.*,(2006b) comparing standard plastic bottle, McPhail (Flight model) and Patel Fruit Fly device (PFT) also showed significant differences among trap types with same lure dispenser for each study. In the present study there is new information on the relative benefit of Delta trap over jar trap for *B.cucurbitae*, which is in conformity with earlier findings by Suganthy *et al.*, (2014).Our present results

are supportive and supplementary to the findings by Amsaet *al.* (2018) relating to the role of trap types and dispenser options as factors influencing the trap catches of *B.cucurbitae* complex in cucurbit ecosystems.

Conclusion

Among the different trap types tested, delta-small trap with large (4×4×1) cm plywood disc attracted significantly higher and maximum number of fruit flies, the next best to follow being the same trap type with smaller (4×1×1) cm disc. Such combination effects between trap types and alternative dispenser types also showed that while larger disc size was more compatible with delta trap, but less so with the other two trap types studied. Further Delta trap was superior to the jar trap and foldable trap under each dispenser type compared.

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