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Evaluation of pheromone dispensers for eco-friendly management of mango fruit fly

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ABSTRACT

The fruit fly is a pest of quarantine importance and is difficult to manage. It has a great impact on agricultural and causes enormous damage to fruits and vegetables. For the management of mango fruit flies, the Methyl eugenol-based pheromone trap was used. The trap efficacy is most affected by different factors. Among them, the dispenser played a crucial role in attracting fruit flies. In this regard, our investigation on the evaluation of pheromone dispensers was carried out and the results revealed that all the treatments were attracted to the fruit flies. Though, significantly more fruit flies were captured in both the plywood block (418.26 fruit flies/trap/month), and softwood block (389.58 fruit flies/ trap/month), which were at par with each other. Whereas, the least fruit flies were captured in the coal block (225.55 fruit flies/trap/month). It can be concluded that the plywood and softwood block performed better in terms of the number of fruit flies captured in the field and these can be used as dispensers in fruit fly traps for the management of fruit flies.

Key words: *Dispensers, Fruit flies, Methyl-eugenol, Pheromone, Mango and Traps*

Introduction

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae. It is native to South Asia, from where the common mango or Indian mango, *M. indica* L. has been distributed worldwide. There are several reasons for low productivity. Among them, insect pests are major limiting factors in mango production. Of the insect pests of mango, Fruit Flies cause major losses. It was reported that the economic loss due to fruit flies in mango ranged from 5 to 80 percent (Verghese *et al*., 2002; Singh *et al*., 2010). For the management of the fruit fly, the use of methyl eugenol traps is the most viable and outstanding alternative. Methyl eugenol, when used together with an insecticide impregnated into a suitable substrate, forms the basis of the male annihilation technique. Continuous research in the development of an efficient trapping system generated new opportunities for the control of fruit flies. A current emerging topic in eco-friendly fruit fly management is the efficient deployment of its attractants in dispensers for effective detection, monitoring, and mass trapping. Pheromone constituents require formulation in suitable dispensing systems to protect them and their emission over a prolonged period for controlling pests. In this context, our studies on evaluating the pheromone dispensers were conducted under field conditions.

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Materials and Methods

An investigation on the evaluation of different pheromone blocks for the mango fruit fly trap was conducted in a selected farmer's orchard by using the 500 ml size triangular Sawaj fruit fly traps. The different wooden blocks *viz*., pinewood block, plywood block, and softwood block were taken from locally available carpenter shops and made 5×5×5 cm size blocks. The coal blocks were prepared with wooded coal and made the equal surface of 5×5×5 cm size block. The sponge blocks were prepared from construction work sponge and cut into a 5×5×5 cm size block. The cotton and cardboard blocks were prepared with cotton and waste cardboard which were taken from the Bio-control Research Laboratory, JAU and made the same size block shape. All these blocks were changed with 8 ml methyl eugenol + 8 ml methanol + 2 ml malathion. The blocks were placed inside the trap with a loop made of polyethylene wire. Each block was replenished at fortnightly intervals. The traps with different blocks were hung on the mango trees. Care was taken to maintain a distance of 50 m between two traps to avoid trap interference and the position of traps was randomly changed at fortnight intervals to nullify the effect of the position of the trap in attracting fruit flies. The entire field experiments were conducted at Sathalpur (Village), Vanthali (Taluka), Junagadh (District) by using a Completely Randomized Design (CRD) with seven treatments and three repetitions during the mango growing seasons of the year, 2018-19 and 2019.

The year 2018-19

The mean number of fruit flies attracted per trap in different treatments during the year 2018-19 is provided in Table 1. It was noticed that more (457.79 fruit flies/trap/month) fruit flies were trapped in plywood block. It was at par with softwood block (431.50 fruit flies/trap/month) followed by cotton block (381.64 fruit flies/trap/month), cardboard block (377.74 fruit flies/trap/month), sponge block (302.69 fruit flies/trap/month) and pinewood block (292.60 fruit flies/trap/month). Among the tested blocks, the less effective treatment was the coal block as it captured the less (230.27 fruit flies/trap/month) number of fruit flies compared to other blocks.

The year 2019-20

The mean number of fruit flies attracted per trap in different treatments during the year 2019-20 is exhibited in Table 1. The data showed that the highest (380.52 fruit flies/trap/month) number of fruit flies were captured in the plywood block as it was at par with the softwood block (349.79 fruit flies/ trap/ month) followed by the cotton block (310.96 fruit flies/trap/month), cardboard block (300.73 fruit flies/trap/month), sponge block (297.45 fruit flies/

Table 1. Evaluation of different pheromone block dispensers for mango fruit fly trap

Treatments name	Mean number of fruit flies captured/trap/month		
	2018-19	2019-20	Pooled
Coal block	15.17 (230.27)	14.86 (220.87)	15.02 (225.55)
Sponge block	17.40 (302.69)	17.25 (297.45)	17.32 (300.07)
Pinewood block	17.11 (292.60)	16.68 (278.14)	16.89 (285.32)
Plywood block	21.40 (457.79)	19.51 (380.52)	20.45 (418.26)
Cotton block	19.54 (381.64)	17.63 (310.96)	18.53 (343.54)
Softwood block	20.77 (431.50)	18.70 (349.79)	19.74 (389.58)
Cardboard block	19.44 (377.74)	17.34 (300.73)	18.39 (338.14)
SEm±	0.62	0.50	0.40
CD at 5 %	1.87	1.52	1.15
CV %	5.72	4.99	5.40
Y			
SEm±		0.21	
CD at 5 %		0.62	
YXT			
SEm±		0.56	
CD at 5 %		NS	

Mean of three replications; Figures in parenthesis are original values, while outside values are square-root transformed

trap/month) and pinewood block (278.14 fruit flies/trap/month). While the less (220.87 fruit flies/trap/month) effective treatment was coal block.

Pooled (2018-19 and 2019-20)

The pooled data of the mean number of fruit flies trapped per trap in different treatments during the year 2018-2019 is provided in Table 1. The results disclosed that significantly more (418.26 fruit flies/trap/month) fruit flies were found in the plywood block, it was at par with the softwood block (389.58 fruit flies/ trap/month) followed by cotton block (343.54 fruit flies/trap/month), cardboard block (338.14 fruit flies/trap/month), sponge block (300.07 fruit flies/trap/month) and pinewood block (285.32 fruit flies/trap/month). Whereas, the coal block captured fewer (225.55 fruit flies/trap/month) number of fruit flies compared to other blocks. Present results are in accordance with previous findings of Stonehouse *et al.* (2002) who reported that the plywood blocks killed more ies than woodblocks. Satarkar *et al.* (2006) indicated that soft board blocks capture higher flies (14.69, fruit fly/trap/week). The same blocks were also evaluated by Sidahmed *et al.* (2014), Singh *et al.* (2015) and Nagendra and Nripendra (2019) for *B. dorsalis* showed a similar result. Mir and Ahmad (2017) suggested that the plywood block was the most attractive and long-lived (10 weeks) dispenser for capturing of *B. dorsalis*. According to Mohinder *et al.* (2017), fruit fly catches increased with the increasing length of blocks for *B cucurbitae, B. tau* and *B. scutellaris*.

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