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Effect of trap installation height on capturing of mango fruit flies under Saurashtra region of Gujarat

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Abstract

The tephritid flies are among the major pests of fleshy fruits which affect production throughout the world and represent the most economically important group of polyphagous Diptera. Use of male pheromone traps are the best control way to management of mango fruit fly. Further, the effectiveness of the pheromone traps dependence of the various factors in field condition. Among the various factors, the height of trap is key factor for capture of mango fruit fly and the trap efficacy. In this context, our scrutiny on evaluation of different trap installation height for mango fruit fly was conducted. Study results revealed that significantly the highest numbers of fruit flies were recorded in traps installed at the height of 2 meters and 3 meters from ground level (209.99 and 187.43 fruit flies / trap / month, respectively), which were at par each other. Further, the lowest (147.72 fruit flies / trap / month) number of fruit flies were trapped in traps installed at the height of 1 meter from ground level.

Keywords: Trap height, fruit fly, sawaj pheromone trap etc.

1. Introduction

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae. It is native to South Asia, from where the common mango or Indian mango, *Mangifera indica* has been distributed worldwide to become one of the most widely cultivated in the tropics. It is considered as the national fruit of India and is said to have originated in the Indo-Burma region [1]. The English word "mango" originated from the Malayalam word *manna* in the year 1498. Saurashtra region is the major mango growing region in the Gujarat state. There are several reasons for low productivity, among them, major reasons include insect pests, diseases, nutritional deficiency, biennial bearing, climate change, lack of necessary infrastructure that is required for harvesting, transporting, raw material storing, grading, processing, packaging and marketing of the output etc [2, 3]. Above the mentioned constrains, insect pests are major limiting factors of mango production at the field level. Fruit flies are among the world's most serious pests causing enormous yield losses [4, 5]. Tephritid flies of the genus *Bactrocera* are of particular concern throughout Asia and Australia [6]. Among the various alternate strategies available for the management of fruit fly, use of methyl eugenol traps are the most viable, outstanding alternative [7, 8]. Further, installation of pheromones trap at proper place is important aspect of effective mass trapping of mango fruit fly [9]. Besides these, trap height from the ground can also affect the preference of particular species. In this regard, our investigation on evaluation of different trap installation height for mass trapping of mango fruit fly under the saurashtra region was carried out.

2. Materials and Methods

The purpose of the current scrutiny was to determine the best trap installation height for catching the fruit fly adults. Considering to this, field examination was carried out in Engineering College mango orchard, Junagadh Agricultural University, Junagadh by using Completely Randomized Design (C.R.D.) with three treatments, seven repetitions during the mango growing seasons of the year, 2018-19 and 2019-20. For the evaluation of trap installation height for mango fruit fly, transparent 500 ml size trapezoid Sawaj fruit fly traps were used. Each trap has four holes of 2.5 cm in size on four sides. Soft wooden block of 5 × 5 × 5 cm sized blocks were changed with 8 ml methyl eugenol + 8 ml methanol + 2 ml malathion. Wooden block placed inside the trap with loop made of polythene string.

Each trap was replenished with these chemicals at fortnightly intervals. The traps were hanged on trees, care was taken to maintain a distance of 50 m between two traps to avoid trap interference and the position of traps were randomly change at fortnight intervals to nullify the effect of trap position in attracting fruit fly (Fig.03). The data is subjected to one-way ANOVA analysis after subjected to square root

transformations.

3. Results and Discussion

Obtained results in terms of the mean number of fruit flies attracted per trap in different treatments during the year 2018-19 and 2019-20 was exhibited in Table 01 and Fig. 01 and discussed hereunder;

Table 1: Evaluation of different trap installation heights for mango fruit fly

Treatments name (Trap installation height)	Mean number of male fruit flies captured / trap / month		
	2018	2019	Pooled
1 Meter above the ground level	12.40 (153.80)	11.91 (141.76)	12.15 (147.72)
2 Meters above the ground level	14.08 (198.29)	13.30 (176.88)	13.69 (187.43)
3 Meters above the ground level	14.72 (216.72)	14.26 (203.36)	14.49 (209.99)
S.Em.±	0.24	0.28	0.18
C.D. at 5%	0.72	0.83	0.53
C.V. %	4.64	5.63	5.15
Y			
S.Em.±			0.15
C.D. at 5%			0.43
YXT			
S.Em.±			0.26
C.D. at 5%			NS

Mean of seven replications

Figures in parenthesis are original values, while outside values are square root transformed

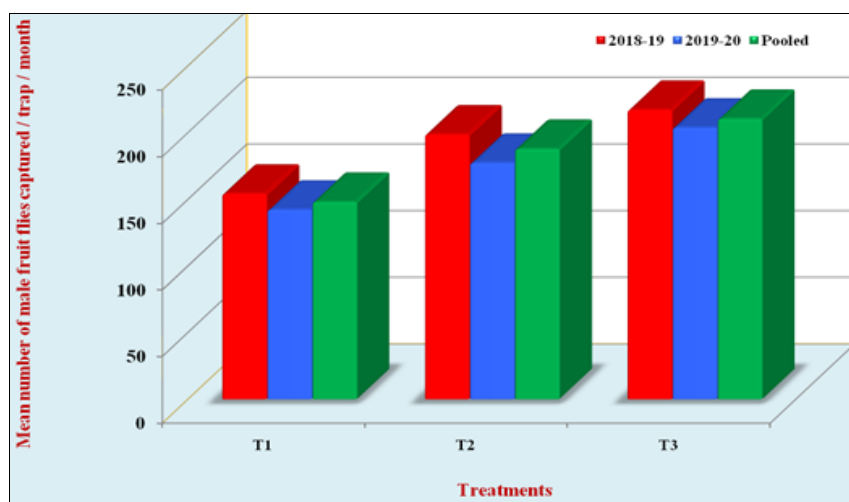


Fig 1: Evaluation of different trap installation heights for mango fruit fly

1. Year 2018-19

The mean number of fruit flies attracted per trap in different treatments during the year 2018-19 was exhibited in Table 01 and Fig. 02. The maximum (216.72 fruit flies / trap / month) number of fruit flies trapped in traps installed at the height of 3 meters above ground level, it was at par with traps installed at the height of 2 meters above ground level (198.29 fruit flies / trap / month). Whereas, the minimum (153.80 fruit flies / trap / month) number of fruit flies were trapped in traps installed at the height of 1 meter above ground level.

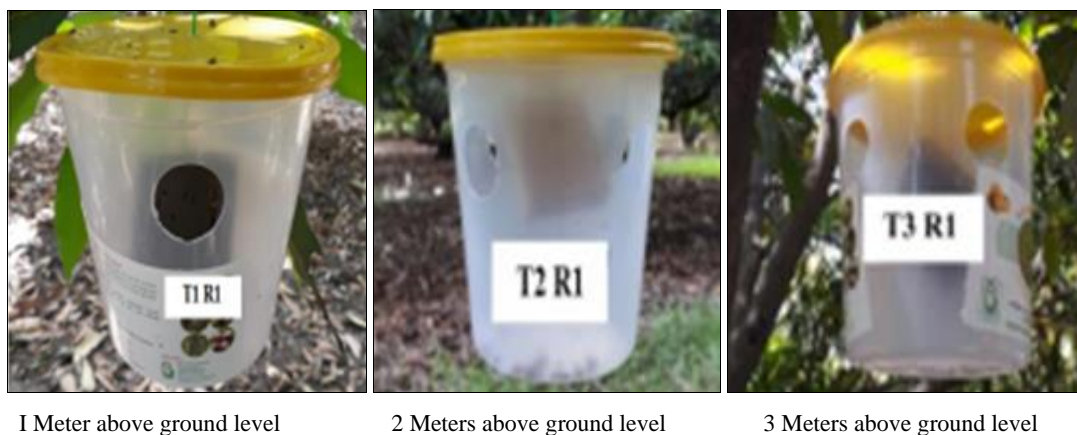
2. Year 2019-20

The mean number of fruit flies attracted per trap in different treatments during the year 2019-20 was given in Table 01 and Fig.02. It was recorded the highest (203.36 fruit flies / trap / month) number of fruit flies captured in traps installed at the height of 3 meters from ground level, followed with traps installed at the height of 2 meters from ground level (176.88 fruit flies / trap / month). While, the lowest (141.76 fruit flies / trap / month) number of fruit flies were trapped in traps

installed at the height of 1 meter from ground level.

3. Pooled (2018-19 and 2019-20)

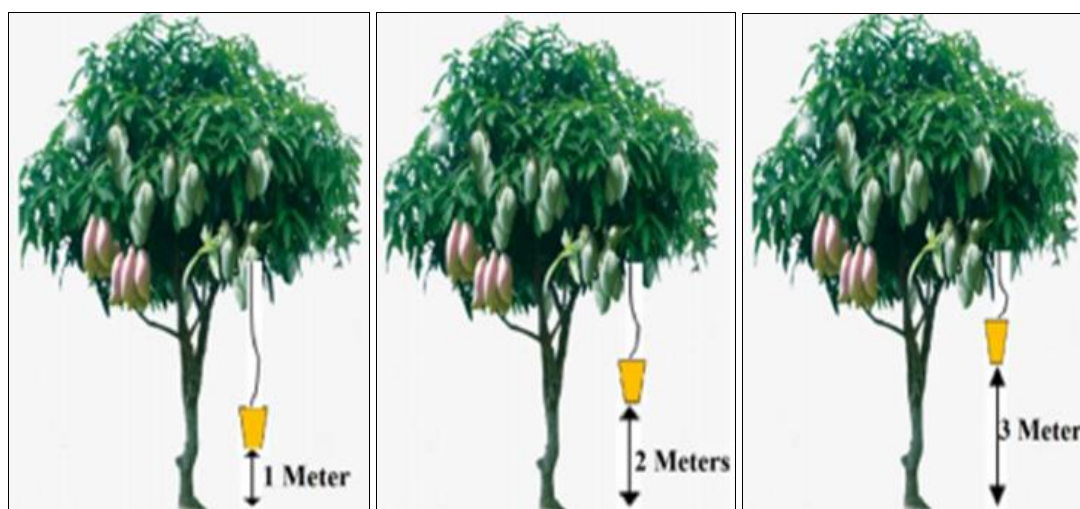
Looking to the pooled data during the year 2018-2019 (Table 01 and Fig.2), it was found that the greater (209.99 fruit flies / trap / month) number of fruit flies attracted in traps installed at the height of 3 meters from ground level (Plate-4.28), it was at par with traps installed at the height of 2 meters from ground level (187.43 fruit flies / trap / month). Although, the lowest (147.72 fruit flies / trap / month) number of fruit flies were trapped in traps installed at the height of 1 meter from ground level. Going over to the above obtained pooled data, it can be said that the all installed trap heights were captured the mango fruit flies. Howbeit, significantly highest numbers of fruit flies were recorded in traps installed at the height of 2 meters and 3 meters from ground level (209.99 and 187.43 fruit flies / trap / month, respectively), which were at par each other. Further, the lowest (147.72 fruit flies / trap / month) number of fruit flies were trapped in traps installed at the height of 1 meter from ground level.



1 Meter above ground level

2 Meters above ground level

3 Meters above ground level

Fig 2: Traps installed at different heights in field**Fig 3:** Diagrammatic representation of traps installed at different heights from ground

In this study findings on the effective trap installation height for mango fruit flies were in conformity with results of previous investigators. The efficiency of the traps with respect to height varies from species to species and with the vegetation [10]. The maximum Mexican fruit flies, *Anastrepha ludens* (Loew) were captured from the trap installed at 2 m above the ground (11). Effective trap hanging height was 3 m for *Bactrocera zonata* (Saunders) (1.02 ± 0.11 males / trap / hour) and 4 m for *Ceratitis capitata* (0.59 ± 0.07 males / trap / hour) [12]. *Grapholitha molesta* captured higher when traps were placed at the tops (2.5 m) [13]. The Jackson traps hanged at 2 m height was more efficient for male *B. zonata* [14, 15]. Moreover, present results were disagrees with some previous findings who noted that hanging traps at height of 1.5 m from ground level recorded more numbers of male *B. zonata* (5.17 ± 0.14 captured fruit fly / trap / day) [16]; traps set up at 25 and 50 cm above the ground captured significantly more adults of *Bactrocera dorsalis* (Hendel) (187.8 and 171.9 per trap) [7] and trap hanging at 1.5 m was effective (12.72 ± 0.52) [17]. This disagreement might due to the various reasons viz., height, age of the host crop, methodology adopted for the study and prevalent weather conditions in study area.

4. Conclusion

The trap installation heights for mango fruit fly scrutiny showed that all installed trap heights were captured the mango fruit flies. However, significantly highest numbers of fruit flies were recorded in traps installed at the height of 2 meters and 3 meters from ground level (209.99 and 187.43 fruit flies / trap /

month, respectively), which were at par each other. Further, the lowest (147.72 fruit flies / month) numbers of fruit flies were recorded in traps installed at 1 m above ground level. Eventually, investigations on installation heights traps can be concluded that the best height for the effective capturing of fruit flies were 2 meters and 3 meters from ground level.

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