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MANAGEMENT OF FRUIT FLIES IN GUAVA THROUGH MALE ANNIHILATION TECHNIQUE

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ABSTRACT

Study on the management of fruit flies through male annihilation was undertaken on guava in five farmers' orchards. Three orchards were installed with methyl eugenol traps @ 10, 20 and 40 traps/ ha. One orchard with 25 methyl eugenol traps/ ha as per the recommended package of practices (POP) of TNAU and without any trap was used as control. Significantly maximum catch of 178.83 males/ trap/ fortnight was caught with 40 traps, followed by the one with TNAU POP traps (100.25/ trap/ fortnight). The least fruit damage was (6.14%) in orchard where 40 traps were placed. TNAU POP traps placed orchard revealed the least fruit damage (10.71%).

Key words: Fruit flies, methyl eugenol traps, trap design, TNAU POP traps, fruit damage, male catches

Guava *Psidium guajava* L. is an important fruit crop with an annual production of 4107 '000 mt in India (Anonymous, 2019). Guava is being planted in area of 2.68 lakh ha in India and 0.107 lakh ha in Haryana (Indian Horticulture database, 2014). Fruit flies *Bactocera correcta, B.zonata* and *B.dorsalis* are the most important pests causing economic loss to guava (Pruthi, 1940; Narayanan and Batra, 1960; Belavadi, 1979). About 90% of the fruit fly species can be identified accurately by microscopic examination of the adult (Plant Health Australia, 2011). The crop loss can vary from a few to 100% (Kumar et al., 2011; Singh and Sharma 2012). In the management of fruit flies, use of insecticides has limitations. Use of annihilation technique which involves trapping of males using methyl eugenol lure is highly advantageous as these traps have high specificity and efficiency (White and Elson Harris, 1992). The present study evaluates this technique in guava orchards.

MATERIALS AND METHODS

The study was carried out for one year during the peak fruiting period from June to November 2019 in five guava orchards in Madurai district of Tamil Nadu. There were four treatments which involved setting cylinder traps with 1% methyl eugenol of 30 ml wick type container in each of three orchards at the rate of 10, 20 and 40 traps/ ha and no traps in the fourth orchard which served as control. In addition to these four treatments, the TNAU recommended package of 25 traps/ ha was maintained in the fifth orchard. The trap design consisted of a white plastic cylinder with a wick type container having methyl eugenol lure (ME lure). Each trap had four holes of 20 mm dia with 30ml of ME lure. The bottom of the trap had a lid with small perforations to drain water during rainy seasons. A nylon wire was inserted inside the cylinder top with a knot inside the white cylinder and the other end of the wire is protruding out of the trap was used for hanging the traps to the guava tree. The traps were placed at 5 m above the ground level along with 15 ml of ME 1%. The lure was changed once in three months. Fruit fly catches were collected at fortnightly intervalas, identified and recorded. A sample of 25 fruits from each treatment was collected at fortnightly interval and was sorted out as infested based on brownish pin hole size ovipositional punctures (Belavadi, 1979), and % damage was worked out. The data on trap catches were subjected to square root transformation while % fruit damage were transformed to arcsine values and analysed statistically. The mean values were compared by Duncan's Multiple Range Test (DMRT, p=0.05) (Duncan, 1995) to assess the effective treatment.

RESULTS AND DISCUSSION

Observations on the fortnightly trap catches fruit flies for different months are presented in Table 1. The mean fruit fly catches were significantly maximum (314) in the orchard where 40 traps/ ha was installed: followed by the orchards with 25 traps (159); 20 traps/

Table 1. Efficacy of traps on catches of fruit flies in guava

Traps/ ha	June		July		August		September		October		November		
	I	II	I	II	I	II	I	II	I	II	I	II	
10	55 (7.42)[d]	58 (762)[d]	52 (7.21)[d]	53 (7.28)[d]	48 (6.93)[d]	45 (6.71)[d]	37 (6.08)[d]	34 (5.83)[d]	33 (5.74)[d]	32 (5.66)[d]	30 (5.48)[d]	30 (5.48)[d]	29.85 (6.45)[d]
20	90 (9.49)[c]	95 (9.80)[c]	83 (9.11)[c]	81 (9.11)[c]	72 (8.49)[c]	69 (8.31)[c]	64 (8.00)	61 (7.81)[d]	59 (7.68)[d]	56 (7.48)[d]	50 (7.07)[d]	46 (6.78)[d]	68.83 (8.27)[c]
40	298 (17.26)[a]	314 (17.72)[a]	220 (14.83)[a]	243 (15.59)[a]	193 (13.89)[a]	190 (13.78)[a]	123 (11.09)[b]	114 (10.68)[b]	103 (10.15)[b]	100 (10.00)[b]	96 (9.80)[b]	92 (9.59)[b]	178.83 (12.85)[a]
25 (POP)	153 (12.37)[b]	159 (12.61)[b]	129 (11.36)[b]	125 (11.18)[b]	110 (10.41)[b]	98 (9.90)[c]	86 (9.97)[b]	85 (9.22)[b]	73 (8.54)[c]	69 (8.31)[c]	59 (7.68)[d]	57 (7.55)[d]	100.25 (9.19)[b]
Control (No traps)	—	—	—	—	—	—	—	—	—	—	—	—	—

Figures in parentheses square root transformed values; Means followed by same letters ina column not statistically different (DMRT, p= 0.05)

Table 2. Efficacy of traps on fruit damage by fruit flies in guava

Traps/ ha	June		July		August		September		October		November		
	I	II	I	II	I	II	I	II	I	II	I	II	
10	48.00 (43,57)[e]	52.00 (45.57)[e]	49.00 (44.43)[e]	45.00 (42.13')[d]	39.00 (38.65)[d]	37.00 (37.86)[d]	25.00 (30.00)[c]	12.00 (20.27)[b]	9.00 (17.46)[e]	8.00 (16.43)[a]	5.00 (12.92)[a]	5.00 (12.92)[a]	27.83 (30.17)[d]
20	32.15 (34.51)[d]	28.00 (31.95)[d]	23.15 (28.79)[b]	25.00 (30.00)[d]	21.00 (27.27)[b]	19.20 (25.99)[b]	15.00 (22.79)[b]	7.15 (15.56)[a]	6.00 (14.18)[a]	4.00 (11.54)	3.0 (9.97)	3.00 (9.97)	13.89 (21.88)[c]
40	22.00 (27.97)[c]	25.00 (30.00)[c]	7.41 (15.79)[a]	5.75 (13.94)[a]	5.50 (13.56)[a]	5.00 (12.92)[a]	3.70 (11.09)[c]	3.70 (11.09)[c]	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	6.51 (12.81)[a]
25 (POP)	31.00 (33.83)[d]	35.00 (36.27)[d]	14.00 (21.97)[c]	12.50 (20.70)[b]	11.00 (19.37)[b]	10.00 (18.43)[b]	9.00 (17.46)[b]	6.00 (14.18)[a]	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	0.00 (4.05)	10.71 (16.53)[b]
Control (No Traps)	54.15 (47.41)[e]	51.00 (45.63)[e]	52.00 (46.14)[e]	57.15 (49.14)[e]	59.15 (50.30)[e]	62.00 (51.94)[e]	59.00 (50.18)[e]	56.15 (48.56)[e]	54.00 (47.29)[e]	53.00 (46.72)[e]	49.00 (44.43)[e]	47.00 (43.28)[e]	54.47 (43.26)[e]

Means followed by same letters in a column not statistically significant (DMRT, p= 0.05); Figures in parentheses arcsine values

ha (95) and 10 traps/ ha (58) during the second fortnight of June 2019. There after a continuous decline in trap catches was observed till November 2019. When mean trap catches was compared, significantly maximum catches were in the orchard with 40 traps/ ha (178.83 fruit flies/ trap/ fortnight) followed by the orchard with TNAUPOP (100.25); 20 traps/ ha (68.83) and 10 traps/ ha (29.85 fruit flies/ trap/ fortnight). *Bactrocera correcta* Bezzi was observed as the major fruit fly species, and % fruit damage revealed a similar trend with 40 and 25 traps/ ha bringing the damage to nil by October. Installation of 10 traps/ ha was not effective and it was superior only to control (54.47%). In the orchard with TNAU POP traps, the fruit damage was low (10.71%), and the least in orchard with 40 traps/ ha (6.51%); orchard with 20 traps/ ha showed a moderate level of damage (13.89%) while the orchard with 10 traps/ ha recorded more damage (27.83%). These findings are in agreement with those of Chiu and Chu (1991) reported that a trap density of 40 traps/ ha drastically reduced the male catches. Qureshi et al. (1981) and Koyama et al. (1984) also observed nil damage in orchards protected by male annihilation. Therefore, it is concluded that mass trapping by installing 40 ME traps/ ha is the most effective annihilation technique for management of fruit flies in guava.

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