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Standardization of Distance among Fruit Fly Traps against *Bactrocera Dorsalis* Hendel in Mango

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Abstract
Studies were made to Standardize the distance among fruit fly traps against *Bactrocera dorsalis* Hendel in mango orchards during 2019 to 2021at Fruit Research Station, Sangareddy. The water bottles of wooden blocks which were dipped in ethyl alcohol, methyl eugenol, malathion (6:4:2) ratio were hanged in mango ecosystem with different distances i.e. 20, 30, 40, 50 and 60 mt. Among the different trap distances, distance of 20 meters (T1) was found superior by attracting highest number i.e 9.127 mean fruit fly catches /trap/week during 2020-2021and 8.964 mean fruit fly catches/trap/week during 2019-2020.

Keywords: Fruit fly, Mango, Methyl eugenol, Para-pheromone and Trap distance

Introduction
The Mango (*Mangifera indica* L.) is member of the family Anacardiaceae, is one of the most important tropical fruits of the world. Mango production has been threatened by insect and disease problems. Tephritid flies with over 500 genera and around 4000 species, attack many host plants from various families and cause serious losses in agricultural products by direct and indirect injuries (Rattanapun, 2009; Khalil *et al*., 2010; Mosleh *et al*., 2011; El-Gendy, 2012; Draz, 2016) [8, 5, 7, 4, 3]. They cause direct losses to fruit and vegetable crops in the field, as well as indirect losses related to the restrictions on the export of fruits and vegetables due to bio-security concerns of these species in various parts of the world (Aketarawong *et al*., 2014) [1]. *Bactrocera* as a main genus in Tephritid has a wide host range and several aggressive species like *B. dorsalis.* Fruit flies are one of the significant pests that is difficult to control by insecticides. The use of different control methods is required to control this pest, among the various alternative strategies available for the management of fruit flies, Male attractants the use of Para-Pheromone Methyl Eugenol (ME) traps stands as the most viable, outstanding alternative. ME has both olfactory as well as phagostimulatory action and is known to attract fruit flies from a distance. ME when used together with an insecticide impregnated into a suitable substrate forms the basis of the male annihilation technique. This technique has been successfully used for the control of several species of *Bactrocera*. The present investigation is undertaken to standardize the distance between fruit fly traps suitable for trapping fruit flies in mango.

Mahesh *et al*. 2017 [6] reported that, 2% was significantly superior in attracting the highest number of *B. dorsalis* (5.00 fruit flies/trap/day) compared to its higher dose i.e., 5 percent (4.00 fruit flies/trap/day) and its lower doses. With respect to trap design, the bottle trap with a bottom hole charged with 2 percent methyl eugenol was found superior by attracting the highest number of fruit flies (9.66 flies/trap/day) compared to the trap with a top hole charged with 2 and 5 percent methyl eugenol (0.00 and 1.20 flies/trap/day, respectively). Among the different colored traps charged with 2 percent methyl eugenol transparent bottle captured significantly highest number of *B. dorsalis* (5.44 fruit flies/trap/day) as compared to yellow, green, blue, and white colored traps (1.44, 0.44, 0.44, 0.44 and 0.22 flies/trap/day, respectively),

Akter *et al*., (2021) [2] studied that the use of rubber foam as a base, basil oil (BO) was found to be highly toxic to *B. dorsalis* and *Z. cucurbitae*, and was evaluated for potency with ME and CL (Cuelure) as effective attraction mechanisms. Results revealed 15.7-20.3% of attraction for *B. dorsalis* using ME, separately or mixed with basil oil. The separate CL found 20.3% while the ME+CL mixture provided 21.5% attraction for *Z. cucurbitae*. In the same study,

field tests showed a greater number of *B. dorsalis* were trapped with ME alone (20.4 fly/trap/day), whereas the attraction of the ME and BO mixture was relatively low. In a laboratory condition, Sim *et al*., (2022) [10] stated that the use of lures (choice assays using Y-tube (Y), RC rotating carousel field-cage (RC), and SC small-cage arena (SC) against *B. dorsalis* bioassays, it was revealed that ME-feeding resulted in 75% and 65% decrease (RC, SC lures) in the number of total *B. dorsalis* males.

Syed Imran, *et.al* (2019) [11] were conducted an experiment to standardize the height and density of water trap (Wota-T™) pheromone traps for mass trapping diamond back moth in cabbage. The result showed that maximum numbers of DBM moths were trapped at heights between 0.1 to 0.4 meter above the ground, the trap density being 24 traps/ ac. The relationship of moth catches in traps and DBM infestation on plants showed that the number of larvae and pupae was less (0.94 larvae and 0.45 pupae per plant) in fields where 24 traps /ac were installed.

Shah *et al.* 2015 [9] reported, the highest moth catches (9630 during first year and 11272 during second year with an average of 10451 per ha) were recorded in the plots installed with 50 traps /ha. Further, the pigeon pea crop having treatment of 50 traps /ha recorded the lowest population of eggs (3.95 /twig) and larvae (2.89 /twig) as well as per cent pod damage (7.96) and found significantly superior then 30 and 40 traps/ha. Thus, 50 phermone traps /ha was found effective in annihilation of males of *H. armigera* and thereby in reducing population of eggs and larvae as well as per cent pod damage in pigeon pea crop.

Materials and Methods

The experiment was conducted during 2019-20 and 2020-21 in mango experimental orchard at Fruit Research Station, Sangareddy. The used water bottles of 1 lit capacity. The bottles were used with three circular holes and used prepared methyl eugenol solution (Mix Ethyl Alcohol- 60 ml + Methyl eugenol-40ml + Malathion 20 ml (i.e. in the ratio of 6:4:2) dipped wooden blocks was tied to one end a loop of iron wire inside the bottle and the other end was passed through the lid and hanged on to tree branch in all treatments.

Treatemnt Details

S. no	Trap distance	No of traps / acre
1.	20 meters	10
2.	30 meters	6
3.	40 meters	5
4.	50 meters	4
5.	60 meters	3

Observations and statistical analysis

The observation on number of fruit flies trapped in each of the treatment from mango orchard was recorded on weekly basis and the observations were recorded and the data were subjected to ANOVA analysis to draw the final conclusion.

Result and Discussion

Table 1: Mean fruit fly traps catch per week in mango orchard during 2020-2021

Mean fruit fly traps catch per week in mango orchard during 2020-2021											
Standard weeks/Treatments	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**Over all mean**
T1	3.742	4.027	3.142	3.237	3.310	3.222	3.079	3.315	2.104	1.846	9.127
T2	2.583	2.985	2.289	2.810	2.583	2.392	2.548	2.642	1.720	1.494	6.861
T3	2.284	2.920	2.207	2.171	2.171	2.171	2.343	2.171	1.537	1.287	5.089
T4	2.550	2.230	2.104	1.470	2.597	2.225	2.153	2.207	1.457	1.287	5.116
T5	1.903	2.573	2.343	2.104	2.284	2.153	1.978	1.787	1.104	1.000	5.187
CD (0.05)	0.608	0.690	0.522	0.484	0.328	0.406	0.360	0.378	0.530	0.433	1.103
SEm±	0.195	0.222	0.168	0.155	0.105	0.130	0.115	0.121	0.170	0.139	0.354
C V	14.950	15.034	13.864	13.161	8.138	10.725	9.536	9.997	21.458	20.116	11.284

Table 2: Mean fruit fly traps catch per week in mango orchard during 2019-2020

Mean fruit fly traps catch per week in mango orchard during 2019-2020								overall mean
Standard weeks/Treatments	**18**	**19**	**20**	**21**	**22**	**23**	**24**	
T1	11.250a	10.000a	10.500a	12.500a	5.250a	6.750a	5.500a	8.964a
T2	6.750b	3.500b	4.500b	3.000b	2.750b	2.000b	1.750b	3.464b
T3	3.500bc	2.500b	1.750b	2.250b	1.500bc	1.750b	1.250b	2.071b
T4	4.000bc	3.750b	1.750b	1.500b	1.250bc	1.500b	1.000b	2.107b
T5	2.500c	1.750b	1.750b	1.000b	0.750c	1.500b	1.250b	1.500b
CD (0.05)	4.208	2.053	3.981	2.460	1.700	1.441	1.818	2.523
SEm±	1.577	0.769	1.492	0.922	0.637	0.540	0.681	0.945
C V	48.768	30.984	63.793	39.429	47.958	34.645	54.869	45.778

The treatment of 20 meters distance of methyl eugenol trap recorded highest catches of mango fruit flies 9.127 fruit fly catches /trap/week during 2020-21 (Table. 1) compared to other treatments T2, T3, T4 and T5 respectively 6.8, 5.0,5,11,5.18 and 5.50 fruit fly catches/trap/week. During 2019-2020, also 20 meters distance of methyl eugenol trap recorded 8.964 highest catches of mango fruit flies per week compared to other treatments. The above results concluded that, the best treatment was 20 meter distance between fruit fly traps catches more no. of fruit flies compares to other treatments in mango orchards.

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