

Evaluation of wooden block lure traps for mass trapping of fruit flies, *Bactrocera* spp in mango orchards

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ABSTRACT

A study was conducted in which wooden blocks (80 × 20 × 18 mm) made up of plyboard and locally available exotic Meranti wood (*Shorea* sp) impregnated with a mixture of ethanol, methyl eugenol and malathion (6:4:1) were evaluated from June 2007 to August 2008 for efficacy in mass trapping fruit flies in a mango orchard in low hills of Himachal Pradesh. Suspension traps containing 100 ml solution of methyl eugenol (0.1%) and malathion (0.05%) in plastic bottles were used for comparison. The plyboard blocks were found more effective than Meranti wood blocks in trapping the fruit flies. During 2007 at peak of fruit fly activity in mango orchard (24 to 31 standard weeks) significantly higher average number of adults (397.3/trap/week) was recorded in plyboard blocks compared to Meranti wood blocks (194.2/trap/week) and suspension traps (43.6/trap/week) the latter being significantly lesser than the former. The catch in Meranti wood blocks was at par with plyboard blocks only up to three weeks of installation and significantly higher than suspension traps only for five weeks of installation. The plyboard blocks were found effective even after one year of treatment resulting in higher catch than suspension traps. During the fruiting season of 2008 (23 to 34 standard week) the average number of fruit flies/trap/week was 570.1, 103.4 and 38.9 in freshly treated, one year old plyboard blocks and suspension traps respectively. These results showed that plyboard lure traps were highly effective and persistent in mass trapping of fruit flies in mango orchards.

Keywords: Fruit flies; *Bactrocera* spp; mango orchard; mass trapping; methyl eugenol; wooden blocks

INTRODUCTION

The fruit flies, *Bactrocera* spp (Tephritidae: Diptera) are serious pests of number of fruits and cause heavy losses in mango and other fruits. In India the annual loss due to fruit flies has been estimated to

the tune of Rs 29460 million in mango, guava, citrus and sapota (Mumford 2001). The use of synthetic insecticides to control these pests leads to environmental hazards including toxic residues in the harvested produce. Therefore an integrated approach using bio-rational methods as one of the

components is urgently required for managing these pests. The male annihilation technique (MAT) using parapheromone and methyl eugenol along with insecticides has been used to suppress the populations of fruit fly males (Qureshi et al 1981, Stonehouse et al 2007, Singh et al 2013). However the efficacy of MAT in mass trapping fruit flies is influenced by the type of substrate used as carrier for parapheromone (Patel et al 2005). A study was therefore conducted to evaluate the effectiveness of wooden blocks made of plyboard and locally available exotic Meranti wood (*Shorea* spp) as carrier of methyl eugenol for mass trapping of fruit flies in mango orchards.

MATERIAL and METHODS

The study was conducted in a mango orchard with Dashehari variety planted at 10 × 10 m in village Jalari of Hamirpur district of Himachal Pradesh from June 2007 to August 2008. The wooden blocks (80 × 20 × 18 mm) made of plyboard and locally available exotic Meranti wood (*Shorea* sp) were impregnated with a mixture of ethanol, methyl eugenol and malathion (6:4:1 v/v). The blocks were soaked in the solution for 24 h. Before installation in the field the blocks were put in bottle traps in order to avoid wetting by rain. For comparison suspension traps containing 100 ml solution of methyl eugenol (0.1%) and malathion emulsion (0.05%) were used. Three traps

each of plyboard, Meranti wood and suspension were hung on the mango trees at 1.5 m above the ground level. The wooden blocks were treated once during the study period whereas suspension traps were replenished with the solution at each weekly/fortnightly counting. The data on fruit fly catch were recorded at weekly interval during the peak period of adult activity and at fortnightly interval as the activity declined. During 2008 the effectiveness of one year old impregnated plyboard blocks was compared with that of freshly impregnated blocks of other two types of traps. The data on fruit fly catches were subjected to square root transformation and analyzed using randomized block design (factorial).

RESULTS and DISCUSSION

The results showed that plyboard blocks were more efficient and persistent than Meranti wood blocks in trapping fruit flies in the orchard. At peak period of fruit fly activity in mango orchard (24 to 31 standard week; SW) during 2007 the highest average number of adults (397.3/trap/week) was recorded in plyboard traps followed by Meranti wood and suspension traps with 194.2 and 43.6 adults/trap/week respectively (Table 1, Fig 1). The fruit fly catch in Meranti wood traps was at par with that of plyboard traps only during 24 to 26 SW while in rest of the period the catch was significantly higher in plyboard traps. The catch in Meranti wood traps

Evaluation of traps for mass trapping of fruit flies

Table 1. Fruit fly catches in blocks made of different types of wood and in suspension traps in mango orchard at Hamirpur, Himachal Pradesh during 2007

Standard Week	Average number of adults/trap/week			
	Wooden block trap		Suspension trap	Mean
	Plyboard	Meranti wood		
24	418.3 (20.05)	273.3 (16.41)	60.0 (7.69)	250.6 (14.72)
25	459.7 (21.14)	308.3 (17.52)	63.7 (7.96)	277.2 (15.54)
26	407.0 (19.85)	277.3 (16.62)	50.3 (6.90)	244.9 (14.46)
27	516.3 (22.47)	255.7 (15.66)	55.3 (7.44)	275.8 (15.19)
28	395.0 (19.67)	190.3 (13.69)	38.3 (6.13)	207.9 (13.16)
29	324.7 (17.92)	100.0 (9.23)	33.0 (5.69)	152.6 (10.95)
30	396.7 (19.83)	91.7 (8.59)	26.7 (5.16)	171.7 (11.19)
31	260.7 (16.10)	57.3 (7.34)	21.3 (4.61)	113.1 (9.35)
Mean	397.3 (19.63)	194.2 (13.13)	43.6 (6.45)	

Figures in parentheses are square root transformed values

CD_{0.05}
 Traps= 1.57
 Weeks= 2.56
 Traps x weeks= 4.44

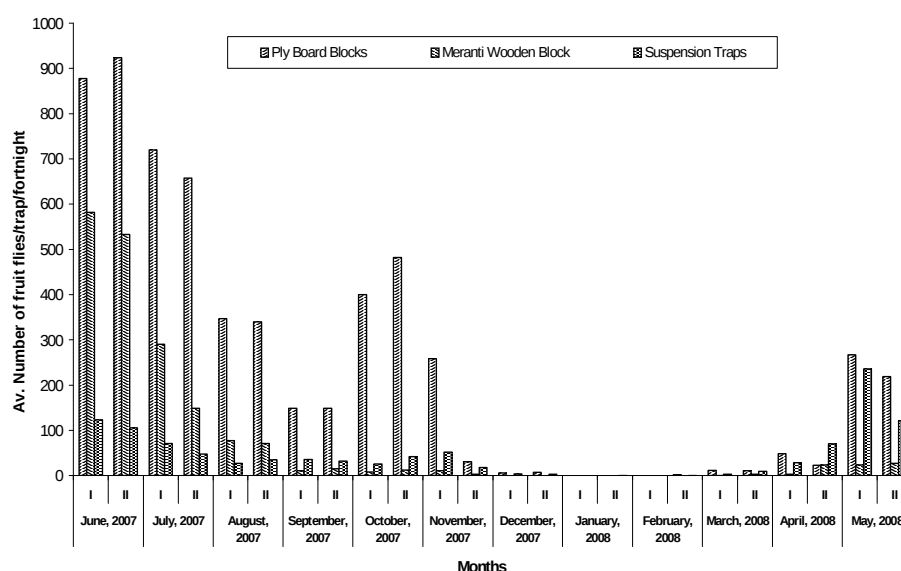


Fig 1. Comparative efficacy of plyboard blocks, Meranti wooden blocks and suspension traps in mass trapping fruit flies in mango orchard

Table 2. Fruit fly catches in fresh and one year old wooden traps treated with methyl eugenol in a mango orchard at Hamirpur, Himachal Pradesh during 2008

Standard week	Average number of adults/trap/week			
	Plyboard block trap		Suspension trap	Mean
	Fresh	One year old		
23	472.3 (21.60)	66.3 (8.07)	61.7 (7.53)	200.1 (12.40)
24	641.7 (25.28)	111.0 (10.47)	78.3 (8.73)	277.0 (14.83)
25	632.0 (24.86)	93.7 (9.44)	48.7 (6.85)	258.1 (13.72)
26	777.7 (27.84)	210.7 (14.47)	46.3 (6.72)	344.9 (16.34)
27	852.7 (29.18)	228.3 (15.08)	42.3 (6.49)	374.4 (16.92)
28	589.7 (24.15)	213.7 (14.46)	26.7 (5.12)	276.7 (14.57)
29	766.0 (27.65)	198.0 (13.89)	44.0 (6.61)	336.0 (16.05)
30	738.0 (27.15)	71.7 (8.37)	27.0 (4.94)	278.9 (13.48)
31	577.7 (23.86)	24.3 (4.91)	37.7 (6.10)	213.2 (11.62)
32	279.0 (16.70)	15.3 (3.90)	22.7 (4.71)	105.7 (8.44)
33	224.7 (14.96)	5.0 (2.21)	17.0 (4.09)	82.2 (7.08)
34	290.0 (16.85)	2.3 (1.47)	15.0 (3.86)	102.4 (7.39)
Mean	570.1 (23.34)	103.4 (8.90)	38.9 (5.98)	

Figures in parentheses are square root transformed values

CD_{0.05}

Traps= 0.90

Weeks= 1.80

Traps x weeks= 3.13

was higher than suspension traps during June, July and August 2007 (Fig 1) but the differences were significant only during 24 to 28 SW (Table 1).

Although the catch was higher in freshly treated blocks yet the plyboard traps remained effective even after one year of installation and significantly higher number of adults were trapped compared to suspension traps after one year of treatment (Table 2). During 2008 the average catch was 570.1, 103.4 and 38.9/trap/week in freshly treated plyboard block traps, one year old treated plyboard block traps and

fresh suspension traps respectively. These results thus showed that while the Meranti block traps remained effective for three months (June, July and August), plyboard block traps were effective even after one year of treatment. These results are in agreement with the work of Patel et al (2005) who evaluated blocks of 18 types of wood as carrier of ethanol, methyl eugenol and malathion and reported the maximum catch in plywood blocks. Similarly Singh et al (2008) studied the suitability of plywood, straw board, soft board, cotton wool and water as substrates for male annihilation technique in mango and

also reported plywood as superior to other substrates.

The study thus pointed out that blocks made of plyboard were more effective and persistent than those made of Meranti wood in mass trapping of fruit fly adults in mango orchard and hence could be used as substrate for mass trapping of fruit flies in mango orchards.

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Received: 9.3.2015

Accepted: 24.8.2015