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Control of fruit fly of mango through integrated crop management practices

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Abstract: An experiment was carried out at the BAU Germplasm Center of Fruit Tree Improvement Project (FTIP), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from March, 2011 to July 2011 to study the control of mango fruit fly through management practices. Three mango varieties viz. Gopalbhog, Amrapali, Mallika and six management practices viz. bagging of fruits, sex pheromone trap, bait trap, insecticide application ,sanitation and control were used. The experiment was laid out in randomized complete block design (RCBD) with three replications. The varieties showed significant variations on the all parameters studied. The highest fruits set in Amrapali (290)with sanitation management practices and the lowest fruit set in Mallika (25)without management (control)practice. The lowest percent premature fruit drop per plant in Amrapali (3.20%) under Bagging management practice and the highest percent premature fruit drop in Mallika (16%) without management (control) practice. The highest mature fruits found in Amrapali (270) under sanitation management practices and the lowest mature fruit set in Mallika (21)without management (control) practice.

Key words: Fruit fly, Integrated Crop Management (ICM), Mango.

Introduction

Mango (*Mangifera indica* L.) is one of the most valuable, popular and commercially important fruits in Bangladesh. In nutritional aspects, both ripe and unripe mango is rich in several vitamins as well as minerals (Paramanik, 1995). Besides, mango contains appreciable quantity of iron, vit-C, carotene and soluble sugar. Moreover, it provides a lot of energy (as much as 74 kcal/100g edible portion) which is nearly equals the energy values of boiled rice of similar quantity by weight (Hossain, 1989). It occupies 32010 hectares of land and total production is 1047849 tons in the year of 2010 (BBS, 2011). Fruit fly is a serious pest of mango. Sometimes premature fruits drop and mature fruits per plant is reduced due to fruit fly infestation. The fruit flies belong to the order Diptera, family Tephritidae and the attacking genera are *Anastrepha* (8 species), *Bactrocera* (30 species), *Ceratitis* (7 species), *Dirioxa* (2 species) and *Toxotrypana* (one species). Rahman (2005) reported 37.5% infestation in mango due to fruit fly. Integrated pest management is the successful way to control mango fruit fly. Sex pheromone trap and bait trap are two traps, which used to catch guava fruit fly. According to Mohyuddin and Mahmood (1993), 75% fruit fly can be controlled through Methyl eugenol (sexpheromone traps). Most of the farmers of Bangladesh are not aware of the harmful effects of this pest and do not take proper control measure against them. Indiscriminate and improper use of pesticides create major problems such as development of pest resistance to pesticide, outbreak of secondary pests, destruction of beneficial organisms, hazards to the human health and pollution of the environment. To overcome the problems of pesticide use, environmentally sound and safe methods of pest management is of prime importance. Integrated Pest Management (IPM), recently termed as Integrated Crop Management (ICM) can play an important role in this respect.

Materials and Methods

The experiment was conducted at the Germplasm Centre of the Fruit Tree Improvement Project (FTIP), situated at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh to reduce the mango fruit fly population through the use of different management practices. The two-factor experiment was conducted in randomized complete block design (RCBD) with three replications. Fruits were randomly collected from plants for the study. The present experiment included two factors which were as follows-

Factor A: It consists of three varieties; i) V_1 = Gopalbhog, ii) V_2 = Amrapali, iii) V_3 = Mallika; Factor B: six management practices; i) T_1 = Bagging of fruits, ii) T_2 = Sexpheromone trap, iii) T_3 = Bait trap, iv) T_4 = Application of insecticides and, v) T_5 = Sanitation (Weeding and pruning of dead branches) vi) T_6 = Control.

The data collection were done based on the following points-number of harvested fruits/plant, number of fresh fruits/plant, number of infested fruits/plant, per cent fresh fruits/plant, per cent infested fruits/plant, Yield. The collected data were analyzed by a statistical programme MSTAT-C following the appropriate design of the experiment (Gomez and Gomez, 1984). The means for all the treatments were calculated and the analysis of variance (ANOVA) for most of the characters under consideration were performed by the Least Significance Difference (LSD) test taking the probability level 1% as the maximum unit of significance.

Results and Discussion

Effect of variety

Performance of variety on number of fruits set per plant: Number of fruits set per plant varied significantly due to the influence of different varieties . The highest number (266.66) of fruits set per plant was obtained from Amrapali followed by Gopalbhog (97.50) and the lowest was in Mallika (45.00) (Table 1). Such variations were partially supported by the findings of Sarker and Rahman (1993), and Rahman (2005).

Performance of variety on number of premature fruits drop per plant: Different varieties showed significant difference in respect of number of premature fruits drop per plant and the variety Amrapali resulted the highest number premature fruits drop (15.33) followed by Gopalbhog (7.00) and the lowest was in Mallika (5.33) (Table 1). This variation in number of premature fruits drop per plant was due to varietal characters.

Performance of variety on percent premature fruits drop per plant: The percentage of premature fruits drop per plant varied significantly due to the influence of different varieties . The higher percentage

of premature fruits drop per plant was obtained from Mallika (12.13) followed by Gopalbhog (7.27) and the lowest (5.74%) was in Amrapali (Table 1).

Table 1. Effect of variety on number of fruits set, premature fruits drop, percent premature fruits drop and mature fruits drop per plant

Variety	No. of fruits set/plant	Premature fruits drop/plant	% premature fruits drop/plant	Mature fruits/plant
Gopalbhog	97.50	7.00	7.27	90.50
Amrapali	266.66	15.33	5.74	251.33
Mallika	45.00	5.33	12.13	39.66
LSD0.05	3.014	0.250	0.219	2.560
LSD0.01	4.040	0.335	0.293	3.431
Level of significance	**	**	**	**

** = Significant at 1% level

Performance of variety on mature fruits per plant: Number of mature fruits per plant varied significantly due to the influence of different varieties. The highest number of mature fruits per plant was obtained from Amrapali (245.50) followed by Gopalbhog (87.50) and the lowest (38.16) was in Mallika (Table 1). This variation might be occured due to varietal characters.

Effect of management practices

Main effect of management practices on number of fruits set per plant: Different management practices had significant influence on the number of fruits set per plant. Sanitation of plant resulted the highest fruits set per plant (153.33) followed by sexpheromone (146.66), bait trapping (143.33) and bagging(130.00) and the lowest (125.00) was in control (Table-2). Proper management practices might have influenced fruits set per plant.

Main effect of management practices on premature fruits drop per plant: The effect of management practices on average premature fruits drop was found to be statistically significant. The lowest premature fruits drop was found under bagging (5) management practice followed by bait trapping (8.66), insecticide (9.66), sexpheromone (10), and control (10.66) and the highest (11.33) was in sanitation (Table 2). This variation might be occurred due to different management practices.

Table 2. Effect of management practice on number of fruit set, premature fruit drop, percent premature fruit drop and mature fruit drop per plant

Treatment	No. of fruits set/plant	Premature fruits drop/plant	% premature fruits drop/plant	Mature fruits/plant
Bagging	130.00	5.00	4.77	125.00
Sexpheromone	146.66	10.00	8.18	136.66
Bait trap	143.33	8.66	7.91	134.66
Insecticide	120.00	9.66	9.76	110.33
Sanitation	153.33	11.33	8.52	142.00
Control	125.00	10.66	11.13	114.33
$LSD_{0.05}$	4.258	0.353	0.309	3.617
$LSD_{0.01}$	5.713	0.474	0.415	4.852
Level of significance	**	**	**	**

** = Significant at 1% level

Main effect of management practices on percent premature fruits drop per plant: The effect of management practices on percent premature fruits drop was found to be statistically significant. The lowest (4.77%) premature fruits drop was found under bagging management practice and the highest (11.13%) premature fruits drop was found in control where no management practices were applied (Table 2). This variation might be occured due to different management practices.

Main effect of management practices on mature fruits per plant

The effect of management practices on mature fruits per plant was found to be statistically significant. The highest number of mature fruits (142) was found under sanitation management practice followed by sexpheromone (136.66), bait trapping (134.66), bagging (125), and control (114.33) and the lowest (110.33) in insecticide (Table 2). This variation might be occured due to different management practices.

Combined effect of variety and management practices

Number of fruits set per plant: The combined effect of variety and management practices on number of fruits set per plant was found to be statistically significant. The highest number of fruit set (290) was found in the Amrapali variety followed by Gopalbhog(120) with the combination of sanitation practice and on the contrary the lowest fruits was found in Mallika varieties (25) followed by Gopalbhog (80) with the combination of

without management (control) practice (Table 3). This variation might be due to the combination of varietal characterts of differenet plants with the management practices. Such variations were partially supported by the findings of Rahman (2005).

Number of premature fruits drop per plant: The combined effect of variety and management practices on number of premature fruits drop per plant was found to be statistically significant. The lowest premature fruits drop were found in Mallika (3) followed by Gopalbhog (4) and Amrapali (8) varieties with the combination of bagging practices. On the contrary the highest premature fruits drop 8 and 20 were found in Gopalbhog and Amrapali varieties with the combination of without management (control) practice, respectively (Table 3). These variations might be due to the combination of varietal characters of different plants with the different management practices. Such variations were partially supported by the findings of Sarker and Rahman (1993), and Rahman (2005).

Table 3. Combined effects of variety and management practice on number of fruits set, premature fruits drop, percent premature fruits drop and mature fruits drop per plant

Variety x management practices		No. of fruits set per plant	Premature fruits drop per plant	% premature fruits drop per plant	Mature fruits per plant
Gopalbhog	Bagging	100.00	4.00	3.63	96.00
	Sexpheromone	105.00	7.00	6.67	98.00
	Bait trap	90.00	7.00	7.77	83.00
	Insecticide	90.00	8.00	8.89	82.00
	Sanitation	120.00	8.00	6.67	112.00
	Control	80.00	8.00	10.00	72.00
Amrapali	Bagging	250.00	8.00	3.20	242.00
	Sexpheromone	270.00	15.00	5.56	255.00
	Bait trap	280.00	12.00	4.29	268.00
	Insecticide	240.00	17.00	7.08	223.00
	Sanitation	290.00	20.00	6.90	270.00
	Control	270.00	20.00	7.41	250.00
Mallika	Bagging	40.00	3.00	7.50	37.00
	Sexpheromone	65.00	8.00	12.31	57.00
	Bait trap	60.00	7.00	11.67	53.00
	Insecticide	30.00	4.00	13.33	26.00
	Sanitation	50.00	6.00	12.00	44.00
	Control	25.00	4.00	16.00	21.00
$LSD_{0.05}$		7.364	0.611	0.535	6.255
$LSD_{0.01}$		9.904	0.822	0.719	8.411
Level of significance		**	**	**	**

** = Significant at 1% level

Percent premature fruits drop per plant: The combined effect of variety and management practices on percent premature fruits drop per plant was found to be statistically significant. The lowest percent premature fruits drop 3.63% , 3.20%, 7.50% were found in the Gopalbhog, Amrapali and Mallika varieties with the combination under bagging practices respectively; on the contrary the highest percent premature fruits drop 10%, 7.41% and 16% were found in the Gopalbhog, Amrapali , Mallika variety with the combination without management (control) practices, respectively (Table 3). These variations might be due to the combination of varietal characters of differenet plants with the different management practices. Such variations were partially supported by the findings of Sarker and Rahman (1993), and Rahman (2005).

Mature fruits per plant: The combined effect of variety and management practices on mature fruit per plant was found to be statistically significant. The highest mature fruits 112, 270 were found in Gopalbhog and Amrapali varieties with the combination under sanitation practices respectively; on the contrary the lowest mature fruits 72 and 21 were found in Gopalbhog and Mallika varieties with the combination without management (control) practices, respectively (Table 3). These variations might be due to the combination of varietal characters of different plants with different management practices. Such variations were partially supported by the findings of Sarker and Rahman (1993), and Rahman (2005).

From the above results it may be said that sanitation management practice helps to higher number fruits set in all varieties and this practice also helps to get maximum mature fruits per plant in all varieties. Bagging is most suitable management practice in all varieties to reduce premature fruits drop per plant. Wide variability exists among the mango varieties and management practices used in this experiment. These variabilities could be used for further research programme of mango varieties.

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