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Effect of pruning of malformed flowers on the yield, quality and control of floral malformation of mango

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Abstract: An experiment was carried out for controlling malformation through pruning of flowers of mango cv. Amrapali at the Germplasm Centre of the Fruit Tree Improvement Project (GPC-FTIP), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from July 2001 to July 2002. The treatments werepruning of all lateral malformed flowers + 25% terminal malformed flowers (T_1), pruning of all terminal malformed flowers (T_2), pruning of all terminal + 50 % lateral malformed flowers (T_3), pruning of only 50 % lateral malformed flowers (T_4), pruning of only 25 % lateral malformed flowers (T_5), pruning of all terminal + 25% lateral malformed flowers (T_6), control (no pruning). The experiment was conducted in randomized complete block design (RCBD) with 3 replications. Deblossoming at bud burst stage resulted in lower malformation and higher yield. The highest (10%) fruit retention per plant was found in T_1 and the lowest (4%) was recorded from control (T_7) at 60 DAFS.The highest (8.99 t/ha) yield was obtained from T_1 and the lowest (3.61 t/ha) was obtained from T_7 (control).

Key words: Mango, pruning, malformation, yield

Introduction

Mango (*Mangifera indica* L) belongs to the family Anacardiaceae, originated in South Asia or Malayan archipelago. In terms of total area and production of fruit crops, mango ranks first in area and third in production in Bangladesh. It occupies 177590 hectares of land and total production is 76930 tons per annum with an average yield of 4.32 tons per hectare (BBS, 2008). But the yield is very low compared to that of India, Pakistan and many other mango growing countries in the world (Hossain and Ahmed, 1994). Mango malformation is mainly caused by *Fusarium moniliformae* (Ram and Yadav, 1999). It is the most important malady of mango and was first reported by Burn (1910). It causes a great loss of mango fruits ranging from 50-80% (Rawal, 1990). Malformation is found in both vegetative and floral parts. Vegetative malformation resulting in the formation of numerous branches, small thickened shoots and secondary branchlet, substantially reduced internodal length and tiny leaf rudiments, which are crowded together into a compact head resulting in a witch's broom-like appearance. The present study has been aimed to develop a technology for controlling mango malformation; to increase the yield and quality mango per unit area of land and to reduce the cost of production.

Materials and Methods

The investigation was carried out from July 2001 - July 2002 at the Germplasm Centre (GPC), FTIP, Department of Horticulture, BAU, Mymensingh. The experiment taking amrapli as the test crop was conducted in randomized complete block design (RCBD) with 3 replications. The treatments were pruning of all lateral malformed flowers + 25% terminal malformed flowers (T_1), pruning of all terminal malformed flowers (T_2), pruning of all terminal + 50 % lateral malformed flowers (T_3), pruning of only 50 % lateral malformed flowers (T_4), pruning of only 25 % lateral malformed flowers (T_5), pruning of all terminal + 25% lateral malformed flowers (T_6) and control (T_7: no pruning). Each treatment was considered ten malformed inflorescence. Malformed flowers were removed after panicle initiation but before fruit set. Plants, which were severely affected by floral malformation in previous season, were selected for the treatment. Only malformed flowers were pruned mechanically by hand. The recorded parameters were fruit retention per inflorescence; pre-mature fruits drop per inflorescence; fruit retention per plant (%) ; pre-mature fruits drop per plant; fruit weight; fruit size (cm); yield/plant; yield (t/ha) andtotal Soluble Solids (TSS). Spacing was 2.5m × 2.5m. The benefit-cost ratio (BCR) analysis was done using the following formula: BCR= Gross return/Total cost of production.

Results and Discussion

Fruit set per inflorescence was found significant due to different treatments (Table 1). Treatment T_3 resulted the highest (16.20) fruit set per inflorescence and the lowest (11.47) was found in T_6. A significant effect was found in respect of fruit retention per inflorescence at different days after fruit set (DAFS) due to different treatments (Table 1). Treatment T_1 resulted the highest (1.67) number of fruit retention per inflorescence followed by T_5 (1.20) and T_4 (0.73) treatments while the lowest (0.53) was observed in control at 60 DAFS. Treatments T_2, T_3 and T_6 produced the zero fruit retention at 60 DAFS. Treatment T_2, T_3 and T_6 finally failed to produce the fruit set. It was noted that Amrapali normally does not produced the lateral inflorescences. Lateral inflorescences produced due to malformation disease, which completely fail to fruit set. Microscopic study of flowers collected from malformed and healthy inflorescences revealed that flowers from malformed inflorescences produced the less number of healthy pollen and highest number of sterile pollen. This why the fruit set was lower incase of malformed inflorescences. Fruit retention per plant showed a significant variation due to the effect of pruning of malformed flowers. Fruit retention per plant was found in same trend as that of fruit retention per inflorescence. The highest (10%) fruit retention per plant was found in T_1 followed by T_5 (8.33%) and T_4 (6%) treatments and the lowest (4%) was recorded from control (T_7) at 60 DAFS. Number of pre-mature fruits drop per inflorescence was also significant among the different treatments (Table 2). The highest (16.20) fruits drop per inflorescence was found in T_3 treatment at 60 DAFS; while T_4 treatment showed the lowest (11.40) pre-mature fruits drop followed by T_6(11.47). Pre-mature fruits drop were higher in T_3 treatment than control because initial fruit set was higher

in T_3. Pruning of malformed flowers showed wide variations in number of pre-mature fruits drop per plant at different DAFS. Treatment T_1 always recorded with lower pre-mature fruits drop per plant in all DAFS than control treatment. The highest number (100%) of pre-mature fruits drop per plant was recorded from T_2, T_3 and T_6 treatments and the lowest (90%) was found in T_1 treatment (Table 2).

Table 1. Effect of pruning on fruit set and fruit retention of mango

Treatments	FS/I	No. of pre-mature fruits drop/ inflorescence at different DAFS						No. of pre-mature fruits drop/plant at different DAFS					
		10	20	30	40	50	60	10	20	30	40	50	60
T_1	13.47	4.60	7.33	8.73	10.40	11.07	12.13	34.33	54.33	65.00	76.33	84.00	90.00
T_2	13.33	3.47	10.73	11.60	13.33	13.33	13.33	25.67	80.00	86.67	100	100	100
T_3	16.20	6.93	13.87	15.07	15.73	16.00	16.20	42.33	85.33	93.00	96.00	98.67	100
T_4	12.13	3.86	6.07	8.20	10.53	11.07	11.40	32.00	50.00	67.33	87.00	92.33	94.00
T_5	14.40	4.80	7.87	9.73	12.40	13.20	13.20	33.00	54.33	67.00	86.00	91.67	91.67
T_6	11.47	2.47	7.67	9.73	10.87	11.47	11.47	21.00	65.33	84.00	94.33	100	100
T_7	13.13	3.73	6.87	9.53	10.00	12.33	12.60	28.33	52.00	72.67	76.33	94.00	96.00
LSD 1%	2.81	1.70	2.43	2.49	1.93	3.15	2.16	6.39	8.30	7.90	14.05	5.75	5.61

Table 2. Effect of pruning on pre-mature fruits drop of mango

Treatments	FS/I	Fruit retention/inflorescence at different DAFS						Fruit retention/plant (%) at different DAFS					
		10	20	30	40	50	60	10	20	30	40	50	60
T_1	13.47	8.87	6.13	4.73	3.07	2.07	1.67	65.67	45.67	35.00	23.67	16.00	10.00
T_2	13.33	9.87	2.60	1.73	0.00	0.00	0.00	74.33	20.00	13.33	0.00	0.00	0.00
T_3	16.20	9.27	2.33	1.13	0.47	0.20	0.00	57.67	14.67	7.00	4.00	1.33	0.00
T_4	12.13	8.27	6.07	3.93	1.60	1.07	0.73	68.00	50.00	32.67	13.00	8.67	6.00
T_5	14.40	9.60	6.53	4.67	2.00	1.20	1.20	67.00	45.67	33.00	14.00	8.33	8.33
T_6	11.47	9.00	3.80	1.73	0.60	0.00	0.00	79.00	34.67	16.00	5.67	0.00	0.00
T_7	13.13	9.40	6.27	3.60	3.13	0.80	0.53	71.67	48.00	27.33	23.67	6.00	4.00
LSD 1%	2.81	1.49	1.04	6.91	0.65	0.44	0.47	7.44	6.91	4.47	2.69	1.85	2.01

Table 3. Effect of pruning on yield and quality of mango

Treatments	TNF/plant	Total wt. Of fruits/plant	Wt. of individual Fruit (g)	Yield (t/ha*)	TSS	Benefit Cost Ratio (BCR)
T_1	35.00	5.62	182.00	8.99	26.00	2.46
T_2	00.00	00.00	00.00	_	00.00	_
T_3	00.00	00.00	00.00	_	00.00	_
T_4	18.33	3.07	196.00	4.91	25.00	1.35
T_5	24.33	3.76	197.67	6.02	23.00	1.66
T_6	00.00	00.00	00.00	_	00.00	_
T_7	12.67	2.26	197.67	3.61	23.00	1.02
LSD 1%	3.99	1.11	14.72		3.77	-

FS/I = Fruit set/Inflorescence at the initial stage, DAFS = Days after fruit set, TNF = Total no. of fruits TSS = Total Soluble Solid, T_1 = Pruning of all lateral malformed flower+ 50% terminal malformed flower, T_2 = Pruning ofall terminal malformed flower, T_3 = Pruning of all terminal + 50 % lateral malformed flower, T_4 = Pruning ofonly50 % terminal malformed flower, T_5 = Pruning of only 25 % lateral malformed flower, T_6 = Pruning of all terminal + 25 % lateral malformed flower, T_7 = Control, Note=Price of mango was considered to be TK 20/kg

Significant difference was found in respect of total number of fruits per plant due to the different treatments. Treatment T_1 resulted the highest (35.00) number of fruits per plant followed by T_5 (24.33) and T_4 (18.33) treatments; while the lowest (12.67) number was recorded from T_7 (untreated control). It was observed that there was significant difference in the total weight of fruits per plant (Table 3). The maximum (5.62 Kg) weight of fruits per plant was found in T_1 followed by T_5 (3.76 Kg) and T_4 (3.07 Kg) treatments, while the minimum (2.26 kg) weight was recorded from T_7 (untreated control). Weight of individual fruit was markedly influenced by different treatments. This result might be due to the highest fruit set, fruit retention and less pre–mature fruit dropping which resulted the highest number and weight of fruits per plant. The highest (197.67 g) weight of individual fruit was observed in T_5 and T_7 (control) and the lowest (182 g) from T_1. Highly significant variation in respect of per hectare yield was observed among the different treatments (Table 3). The highest (8.99 t/ha) yield was obtained from T_1 followed by T_5 (6.02 t/ha) and T_4 (4.91t/ha) and the lowest (3.61 t/ha) was obtained from T_7 (control).This results is close to similar have also been reported by (Khader, 1989) and Singh *et al.*(1983). They stated that pruning of malformed flowers gave the best results to reduce malformation. They also reported that removal of malformed flowers resulted the highest fruit yield. Total soluble solids content of different treatments were measured at ripe stage. There was an insignificant difference in total soluble solids by different treatments (Table 3). The highest (2.46) BCR was recorded from treatment T_1 and the lowest (1.02) BCR was found in

control treatment (Table 3). The highest net return and BCR were obtained from T_1 treatment due to the highest yield (t/ha) in this treatment. The treatment which gave fewer yields naturally gave lower net return and low BCR.

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References

BBS. 2008. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning. Gvernment of The Peoples' Republic of Bangladesh. pp. 390-392.

Burn, W. 1910. A common malformation of mango inflorescence. Poona Agricultural College Magazine, 2 : 38-39.

Hossain, A. K. M. A. and Ahmed, A. 1994. A monograph on mango varieties in Bangladesh. HRC-BARI and FAO/UNDP Mango Improvement Project. p. 3.

Khader, S. 1989. Effect of deblossoming on mango malformation and fruit quality. Indian J. Hort. Sci. 59 (10) : 667-668.

Ram, S. and Yadav, V. K. 1999. Mango malformation – a review. J. Appl. Hort. 1 (1) : 70-78.

Rawal, R. D. 1990. Fungal and bacterial diseases of fruits. A decade of research on disease of Horticultural crops under AICRP (1980-1989). Bangalore. pp. 215-231.

Singh, D., Pathak, S. R. A. and Singh, R. D.1983. Studies on the control of malformation cv. Bomby Green. Punjab Hort. J.,23 (3-4) : 220-221.

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