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Effect of deblossoming on the yield, quality and control of floral malformation of mango

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Abstract: An experiment was conducted to control the floral malformation and achieving higher yield and quality 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 2003. Five deblossoming treatments viz. T_1 = Last week of January (January 30), T_2 = 1st week of February (February 7), T_3 = 2nd week of February (February 14), T_4 = 3rd week of February (February 21), T_5 = Last week of February (February 28) and T_6 = Control were included in this study. The highest (6.15 tha^{-1}) yield was recorded from 2nd year and the lowest (5.50 tha^{-1}) yield was obtained from 1st year. Treatment T_1 resulted the highest (10.83%) percentage of fruit retention per plant at 60 days after fruit set and the lowest (6%) was found in control. The highest (8.66 tha^{-1}) yield was recorded from T_1 treatment and the lowest (3.66 tha^{-1}) was obtained from untreated control (T_6). In 2nd year × T_1 produced the highest (8.73 tha^{-1}) yield and the lowest (2.71 tha^{-1}) was obtained from 1st year × T_6 treatment. The highest (2.41) BCR was found in T_1 treatment in 2nd year. It may be concluded that T_1 treatment might be considered as the best treatment in respect of fruit set, fruit retention per inflorescence, and per plant, total number and weight of fruit per plant, per hectare yield and also economics.

Key words: Mango, deblossoming, malformation, yield

Introduction

Mango (*Mangifera indica* L) belongs to the family Anacardiaceae, originated in South Asia or Malayan archipelago. In Bangladesh in terms of total area and production of fruit crops, mango ranks first in area and third in production. 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). This 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 per cent (Rawal, 1990). Deblossoming is an effective method to control floral malformation and increased yield. In India the observation showed that single deblossoming treatment at bud burst stage in mango resulted in increased yield. Many authors (Singh and Khan, 1940; Sen, 1943; Singh, 1960) emphasized that deblossoming of mango flowering shoots in one year (on year) would result in better flowering shoots in the next year. In Bangladesh no research works have been conducted in this regard. The present research work was, therefore, initiated to study the effectiveness of deblossoming time to control floral malformation of mango.

Materials and Methods

The experiment was carried out during July 2001 to July 2003 at Germplasm Centre (GPC), FTIP, Department of Horticulture, BAU, Mymensingh. The single-factor experiment was conducted in randomized complete block design (RCBD) with 4 replications. Pooled analysis was done. The crop variety Amrapali was used in this experiment. The treatments were T_1 = Last week of January (January 30), T_2 = 1st week of February (February 7), T_3 = 2nd week of February (February 14), T_4 = 3rd week of February (February 21), T_5 = Last week of February (February 28) and T_6 = Control. Deblossoming was done at bud burst stage. Plants, which were severely affected by floral malformation in previous season, were selected for the treatments. Only malformed buds were deblossomed by hand. Deblossoming was done in all malformed twigs except control. The plant spacing was 2.5m x 2.5m. Fertilizers were applied after harvest of the fruits. The recorded parameters were total number of inflorescences per plant; number of healthy inflorescences per plant; number of malformed inflorescence per plant; % healthy inflorescence per plant; % malformed inflorescence per plant; number of fruit retention per inflorescence; fruit retention per plant (%); fruit weight (g); yield/plant (Kg); yield (tha^{-1}) and total Soluble Solids (TSS).

Results and Discussion

Significant effect was observed on fruit set per inflorescence due to different year (Table 1). The highest (15.34) fruit set per inflorescence was obtained in 1st year and the lowest (13.50) was found in 2nd year. It was found that the highest (3.29) fruit retention per inflorescence was found incase of 2nd year and the lowest (2.08) was recorded in 1st year at 40 DAFS. In 2nd year, the highest (9.94%) percentage of fruit retention per plant was recorded at 60 DAFS and the lowest (7.17%) in 1st year. Different deblossoming treatments effectively produced the highest fruit set, fruit retention per inflorescence and per plant and higher yield per plant than control (Tables 1 & 2). The highest (29.00) number of fruits were recorded in 2nd year and the lowest (22.06) was found in 1st year as shown in Table 2. Total weight of fruits per plant was also significantly varied due to the influence of different year (Table 2). In 2nd year, the trees produced the highest (3.84 kg) weight of fruits per plant whereas in 1st year it had the lowest (3.34 kg) total weight of fruits per plant. The highest (198.00 g) weight of individual fruit was found incase of 2nd year while the lowest (190.31 g) was found in 1st year. The highest (25.00) TSS was found from 2nd year and the lowest (24.83) from 1st year.

Significant effect was observed on fruit set per inflorescence due to different deblossoming treatments (Table 1). The highest (15.70) fruit set per inflorescence was obtained from T_1 treatment followed by T_3 (15.20) and T_4 (14.63) and the lowest (12.60) was found in the

control. It was found that the highest (1.73) fruit retention per inflorescence was found incase of T_1 treatment followed by T_2 (1.50) and T_3 (1.22) treatments and the lowest (0.80) was recorded in control at 60 DAFS. Significant difference was also observed incase of fruit retention per plant.

Table 1. Single effect of year and deblossoming on fruit set and fruit retention 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
1st year	15.34	11.34	7.78	6.49	2.08	1.52	1.11	74.44	52.00	42.83	21.67	10.06	7.17
2nd year	13.50	9.01	5.53	3.46	3.25	1.35	1.34	66.11	40.44	25.61	15.17	9.89	9.94
LSD 1%	1.85	1.19	1.87	1.07	0.58	0.58	0.54	2.16	7.84	1.95	1.83	1.14	2.40
T_1	15.70	11.70	7.80	5.50	3.30	2.10	1.73	74.67	50.17	35.50	21.33	13.50	10.83
T_2	14.07	10.60	7.20	5.23	2.88	1.87	1.50	75.50	51.17	37.33	20.50	13.33	10.83
T_3	15.20	11.09	6.70	5.03	2.60	1.39	1.22	73.00	44.67	33.17	17.33	9.50	8.50
T_4	14.63	10.03	6.47	4.60	2.53	1.31	1.13	69.33	44.83	31.33	17.00	9.00	8.00
T_5	14.33	10.30	5.97	5.00	2.63	1.17	0.97	71.00	72.33	34.00	18.00	8.33	7.17
T_6	12.60	7.34	5.80	4.48	2.17	0.77	0.80	66.67	44.17	34.00	16.33	6.17	6.00
LSD 1%	2.65	1.58	1.01	1.05	0.84	0.40	0.38	5.83	5.69	3.77	2.02	2.40	1.54

Table 2. Single effect of year and deblossoming on yield and quality of mango

Treatments	TNF/ plant	Total weight of fruits (kg)	Wt. of individual fruit (g)	Yield/ (tha^{-1})	TSS (%)
1st year	22.06	3.34	190.31	5.50	24.83
2nd year	29.00	3.84	198.00	6.15	25.00
LSD 1%	4.80	0.83	9.60	1.81	2.58
T_1	36.00	5.41	174.94	8.66	26.50
T_2	32.00	4.31	194.17	6.90	25.50
T_3	27.83	3.67	197.50	5.87	25.00
T_4	23.33	3.24	199.50	5.69	24.50
T_5	18.50	2.61	197.67	4.18	24.00
T_6	15.50	2.30	201.17	3.66	24.00
LSD 5%	23.82	0.98	15.82	2.96	3.34

FS/I = Fruit set/Inflorescence at the initial stage, DAFS = Days after fruit set, TNF = Total no. of fruits, TSS = Total Soluble Solids, T_1 = Last week of January (January 30), T_2 = Ist week of February (February 7), T_3 = 2nd week of February (February 14), T_4 = 3rd week of February (February 21), T_5 = Last week of February (February 28), T_6 = Control

Table 3. Combined effect of year and deblossoming on fruit set and fruit retention 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
1st year													
T_1	15.20	11.80	8.00	6.40	3.60	2.20	1.50	78.00	53.67	42.67	24.00	14.67	9.67
T_2	14.07	11.47	8.00	6.53	3.47	2.07	1.33	81.67	57.00	46.67	24.67	14.67	9.67
T_3	16.00	12.40	7.40	6.40	2.80	1.40	1.07	78.00	46.33	40.00	18.00	9.67	7.33
T_4	16.20	11.40	7.40	6.20	3.20	1.40	1.00	72.33	47.33	38.67	20.00	8.67	6.33
T_5	15.87	12.60	7.73	7.00	3.67	1.27	0.87	79.67	48.67	44.33	23.00	8.00	5.67
T_6	14.73	8.40	8.13	6.53	3.00	0.80	0.87	57.00	55.67	44.67	20.33	5.33	5.00
2nd year													
T_1	16.20	11.60	7.60	4.60	3.00	2.00	1.96	71.33	46.67	28.33	18.67	12.33	12.00
T_2	14.07	9.73	6.40	3.93	2.30	1.67	1.67	69.33	45.33	28.00	16.33	12.00	12.00
T_3	14.40	9.77	6.00	3.67	2.40	1.38	1.38	68.00	43.00	26.33	16.67	10.00	10.33
T_4	13.07	8.67	5.53	3.13	1.87	1.22	1.26	66.33	42.33	24.00	14.00	9.33	9.67
T_5	12.80	8.00	4.20	3.00	1.60	1.08	1.07	62.33	32.67	23.67	13.00	8.67	8.67
T_6	10.47	6.27	3.47	2.43	1.33	0.73	0.73	59.33	32.67	23.33	12.33	7.00	7.00
LSD 1%	3.75	2.23	1.43	1.48	1.19	0.56	0.53	8.24	8.04	5.34	3.30	2.40	2.18

These results were supported by Singh *et al.* (1980). They stated that number of fruits per inflorescence and fruit retention per inflorescence were significantly increased by deblossoming on the month of January at bud burst stage. Chadha *et al*. (1979) also reported that deblossoming at bud burst stage was more useful to control malformation. Treatment T_1 and T_2 resulted the highest (10.83%) percentage of fruit retention per plant followed by T_3 (8.50) and T_4 (8.00) treatments at 60 DAFS and the lowest (6.00%) was found in control (Table 1). Among the different treatments, T_1 significantly produced the highest (36) number of fruits followed by T_2 (32.00) and T_3 (27.83) treatments and the lowest (15.50) was found in control (T_6) as shown in Table 2. Treatment T_1 produced the highest (5.41 kg) weight of fruits per plant followed by T_2 (4.31 kg), T_3 (3.67 kg) and T_4 (3.24 kg) treatments

whereas control (T_6) had the lowest (2.30 kg) weight of fruits per plant. Significant variation was found incase of weight of individual fruit due to different deblossoming treatments (Table 2). The highest (201.17 g) weight of individual fruit was found incase of T_6 treatment while the lowest (174.94 g) was found in T_1 treatment. The lowest number of total fruits may be contributed to the highest individual fruit in T_6 treatment. Significantly the highest (8.66 tha^{-1}) yield was recorded from T_1 treatment followed by T_2 (6.90 tha^{-1}), T_3 (5.87) and T_4 (5.69) treatments and the lowest (3.66 tha^{-1}) yield was obtained from untreated control (T_6). The highest (26.50) TSS was found from T_1 and the lowest (24.00) from T_6.

Table 4. Combined effect of year and deblossoming on yield and quality of mango

Treatments	TNF/ plant	Total weight of fruits (kg)	Wt. of individual fruit (g)	Yield/ (tha^{-1})	TSS (%)	BCR
1st year						
T_1	32.00	5.37	159.33	8.59	26.00	2.38
T_2	29.00	4.32	194.00	6.91	25.00	1.88
T_3	24.67	3.43	196.00	5.49	25.00	1.50
T_4	20.67	2.98	199.00	5.77	24.00	1.57
T_5	15.00	2.12	200.00	3.39	24.00	0.91
T_6	11.00	1.70	200.33	2.71	25.00	0.77
2nd year						
T_1	40.00	5.45	190.67	8.73	26.00	2.41
T_2	35.00	4.30	194.33	6.88	26.00	1.93
T_3	31.00	3.90	199.00	6.24	25.00	1.75
T_4	26.00	3.50	200.00	5.60	25.00	1.57
T_5	22.00	3.10	202.00	4.96	24.00	1.33
T_6	20.00	2.89	202.33	4.61	24.00	1.31
LSD 5%	5.40	1.38	22.38	1.96	4.72	-

BCR= Gross return / Total cost of production, Note = Price of mango was considered to be TK 20/kg

The combined effect of year and deblossoming treatment had significant influence on the fruit set per inflorescence (Table 3). The highest (16.20) fruit set per inflorescence was obtained from 2nd year × T_1 treatment and also 1st year x T_4 treatment followed by 1st year x T_3 (16.00) and 1st year x T_5 (15.87) and the lowest (10.47) was found in 2nd year x control. Fruit retention per inflorescence was also varied significantly due to different year and deblossoming treatment (Table 3) and it was found the highest (1.96) in 2nd year x T_1 followed by 2nd year x T_2 (1.67) and 1st year x T_1 (1.50) and the lowest (0.73) was found in 2nd year x T_6 (control) at 60 DAFS. The highest (12.00%) fruit retention per plant was obtained from T_1 and T_2 treatments in 2nd year at 60 DAFS. On the other hand, 1st year x T_6 (control) had the lowest (5.00%) fruit retention per plant. In 2nd year x T_1 significantly produced the highest (40.00) number of fruits per plant followed by 2nd year x T_2 (35.00), 1st year x T_1 (32.00) and 2nd year x T_3 (31.00) and the lowest (11.00) number of fruits per plant was found in 1st year x T_6 (control) as shown in Table 4. Total weight of fruits per plant was also significantly varied due to the influences of different year and deblossoming treatments and it was found the highest (5.45 kg) in 2nd year x T_1, followed by 1st year x T_1 (5.37 kg), 1st year x T_2 (4.32 kg) and 2nd year x T_2 (4.30 kg) and the lowest (1.70 kg) was harvested from the 1st year x control. Significant variation was found incase of individual fruit weight due to different year and deblossoming treatments. In 2nd year x T_1 resulted as the highest weight and number of fruits per plant and per hectare yield. This result might be due to that treatment, 2nd year x T_1 gave the highest fruit retention which brought to the more number and weight of fruit per plant as well as per hectare yield. The highest (202.33g) weight of individual fruit was obtained from 2nd year x control. In 1st year x T_1 had the lowest (159.33 g) weight of individual fruit. In 2nd year x T_1 produced the highest (8.73 tha^{-1}) yield followed by 1st year x T_1 (8.59 tha^{-1}), 1st year x T_2 (6.91 tha^{-1}) and 2nd year x T_2 (6.88 tha^{-1}) while the lowest (2.71 tha^{-1}) was obtained from 1st year x T_6 treatments. Different year x deblossoming treatment had no significant differences on the total soluble solids of mango. The highest (2.41) BCR was found in T_1 treatment in 2nd year and the lowest (0.77) BCR was obtained from control treatment in 1st year. The highest net return and BCR was obtained from T_1 treatment in 2nd year due to the highest fruit yield in this treatment.

Among the treatments, treatment T_1 resulted in the highest fruit set, fruit retention per inflorescence, and per plant. Total number and weight of fruit per plant, per hectare yield and BCR were highest in T_1 treatment as compared to control. From the above discussion, it may be concluded that treatment T_1 i.e. deblossoming on last week of January is effective in controlling malformation leading to maximum yield.

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