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Short communication

Effect of bunch-trimming on yield and quality in banana

M. A. Hasan, R. Ray Chowdhury, S. Sarkar and S. Mathew
Department of Fruits and Orchard Management
Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya
Mohanpur, Nadia-741252, India
E-mail:mdahasan@yahoo.com

ABSTRACT

The experiment consisted of different intensities of hand removal viz. 1,2 and 3 hands (H_1, H_2 and H_3 respectively) and time of hand removal i.e., immediately after opening of last hand (T_1), one week after opening of last hand (T_2), and two weeks after opening of last hand (T_3). Results were statistically analysed using augmented 2 factor factorial CRD. The time of hand removal did not show any significant difference on yield while hand weight, finger weight, finger length, finger diameter and volume of finger increased with the increase in number of hands removed. It is suggested that removal of three hands between one and two weeks after opening of last hand is beneficial for improving yield and finger quality of banana cv. Martaman (*Musa* AAB).

Key words: Banana (*Musa* AAB) , bunch trimming, production, quality

INTRODUCTION

Basal hands of a banana bunch are often larger in size than the terminal hands. These are usually discarded or sold as third quality fruits in the market. Thus, at least two or three hands in a bunch fail to reach the finger quality standards required for the specialized markets thereby reducing income to the producers. Dehanding consists of removing two or three terminal hands of each bunch and is a routine practice in banana production system for export. By removing the terminal hands, it may be expected that dry matter would be redistributed among the remaining hands of the bunch thus helping to increase the size of the remaining hands (Rodriguez *et al*, 1988). Keeping the above aspects in view the present investigation was carried out.

MATERIAL AND METHODS

The experiment was conducted in the Research Station of All India Coordinated Research Project on Tropical Fruits at Mondouri of Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal on the dessert cultivar, Martaman (*Musa* AAB). One hundred and twenty four (124) plants of cv. Martaman spaced at 1.8 m ´ 1.8 m were selected for bunch trimming with three replications laid out in augmented 2 factor factorial CRD. The experiment consisted of different intensities of hand removal viz. 1, 2, or 3 hands (H_1, H_2 and H_3 respectively) and time of hand removal viz. immediately after opening of hand, one week after opening of last hand, two weeks after opening of last hand (T_1, T_2, T_3 respectively) along with control. Allocation of bunch trimming treatments were done on the bunches which had opened on the same day with uniform length, finger size and having nine hands. The floral remnants and male buds were removed. Observations on yield, hand weight, finger weight, finger volume, finger density, pulp weight, peel weight, pulp/peel ratio, pulp thickness, peel thickness, TSS, sugar and acidity were recorded. For statistical analysis, Principal Component Analysis was followed, based on correlation matrix.

RESULTS AND DISCUSSION

It was evident that hand removal had significant effect on bunch weight, yield, hand weight, finger weight, finger length, diameter, pulp weight, peel weight, pulp thickness, peel thickness, total sugar, reducing and non-reducing sugar, acidity and TSS/acid ratio. The highest bunch weight of 14.95 kg was recorded with removal of one hand (H_1). Time of hand removal and interaction effect of number of hands removed and time of hand removal (H ´ T) significantly affected bunch weight. Bunch weight of 15.14 kg was recorded with removal of one hand after one week of opening of last hand (H_1T_2) followed by removal of one hand after two weeks of opening of last hand (H_1T_3) and immediately after opening of last hand (H1T1).

However, the untrimmed plants yielded a maximum bunch yield of 15.20 kg as compared to trimmed bunches. Among the various intensities of hand removal, one hand removal (H_1) showed yield of 46.14 t/ha. The time of hand removal did not show any significant difference on yield

Table 1. Effect of intensity and time of hand removal on bunch characters

Treatment	Weight of bunch (kg)	Yield (t/ha)	Weight of hand (kg)	Weight of finger (g)
Number of hand removal (H)				
H_1	14.95	46.14	1.821	141.99
H_2	13.17	40.63	1.833	145.33
H_3	12.75	39.36	2.002	153.27
S.Em (±)	0.168	0.518	0.004	0.592
CD *(P=0.05)*	0.496	1.528	0.012	1.746
Time of hand removal (T)				
T_1	13.61	41.99	1.862	144.85
T_2	13.63	42.06	1.885	149.43
T_3	13.64	42.08	1.909	146.30
S.Em (±)	0.168	0.518	0.004	0.592
CD *(P=0.05)*	NS	NS	NS	1.746

Treatment	Length of finger (cm)	Diameter of finger (cm)	Volume of finger (cc)	Density of finger (g/cc)
Number of hand removal (H)				
H_1	11.74	4.02	146.6	0.969
H_2	11.89	4.11	150.60	0.965
H_3	12.20	4.25	158.17	0.968
S.Em (±)	0.038	0.034	0.559	0.001
CD *(P=0.05)*	0.112	0.100	1.649	0.003
Time of hand removal (T)				
T_1	11.86	4.09	150.02	0.965
T_2	11.96	4.18	154.23	0.969
T_3	12.00	4.11	151.13	0.967
S.Em (±)	0.038	0.034	0.559	0.001
CD *(P=0.05)*	0.112	NS	1.649	0.003

Treatment	Total soluble solids (^{0}birx)	Total sugar (%)	Reducing sugar (%)	Non-reducing sugar (%)	Acidity (%)	TSS: Acidity ratio
Number of hand removal (H)						
H_1	18.35	16.29	8.25	7.63	0.482	38.24
H_2	18.36	16.44	8.62	7.43	0.494	37.15
H_3	18.33	16.78	8.83	7.55	0.527	34.75
S.Em (±)	0.041	0.009	0.007	0.01	0.003	0.183
CD *(P=0.05)*	NS	0.027	0.021	0.029	0.009	0.540
Time of hand removal (T)						
T_1	18.35	16.38	8.49	7.49	0.486	37.93
T_2	18.34	16.46	8.55	7.51	0.504	36.41
T_3	18.34	16.67	8.66	7.61	0.513	35.80
S.Em (±)	0.041	0.009	0.007	0.010	0.003	0.183
CD *(P=0.05)*						
Control vs Rest						
S.Em (±)	0.137	0.031	0.025	0.036	0.010	0.645
CD *(P=0.05)*	0.286	0.065	0.052	0.075	0.021	1.345

Note: H_1 = Removal of one hand, H_2 = Removal of two hands and H_3 = Removal of three hands; T_1 =- Removal of hand (s) immediately after opening of last hand, T_2 = Removal of hand (s) one week after opening of last hand, and T_3 = Removal of hand (s) two weeks after opening of last hand

although hand weight, finger weight, finger length, finger diameter and volume of finger increased with the increase in number of hands removed. Increase in fruit weight due to dehanding might be due to higher rate of fruit filling because of reduction in sink size (Jullien *et al*, 2001). Removal of one hand showed highest finger density of 0.969 g/cc. On the contrary, pulp weight, peel weight, pulp thickness, total sugar and reducing sugar improved significantly with the increasing intensity of hand removal. But in case of acidity content and TSS/acid ratio, the data showed a reverse pattern i.e., removal of one hand (H_1) produced fruits having lowest acidity (0.482%) and higher TSS/acid ratio (38.24) compared to two hands (H_2) and three hands (H_3) removal.

Hand removal after two weeks of opening of last hand produced maximum hand weight (1.909 kg), finger weight (149.43 g), finger length (12.0 cm), pulp: peel ratio (3.06) and also the sugar content of fruit. Finger diameter (4.18 cm), finger volume (154.23 cc), density of finger (0.969 g/cc), pulp weight (112.169), peel weight (37.27 g) and pulp thickness (3.91 cm) were higher in T_2

Table 2. Effect of intensity and time of hand removal and their interaction on finger parameters

Treatment	Weight of pulp (g)	Weight of peel (g)	Pulp : Peel ratio	Pulp thickness (cm)	Peel thickness (cm)
Number of hand removal (H)					
H_1	105.88	36.11	2.94	3.73	0.271
H_2	109.05	36.28	3.01	3.83	0.273
H_3	115.87	37.15	3.12	3.98	0.269
S.Em (±)	0.410	0.709	0.066	0.034	0.004
CD *(P=0.05)*	1.209	NS	NS	0.100	NS
Time of hand removal (T)					
T_1	108.59	36.26	3.00	3.81	0.275
T_2	112.16	37.27	3.01	3.91	0.270
T_3	110.05	36.00	3.06	3.82	0.269
S.Em (±)	0.410	0.709	0.066	0.034	0.004
CD *(P=0.05)*	1.209	NS	NS	NS	NS
Control vs Rest					
S.Em (±)	1.427	2.393	0.222	0.120	0.014
CD *(P=0.05)*	2.977	4.992	NS	0.250	0.029

Note:H_1= Removal of one hand, H_2 = Removal of two hands and H_3 = Removal of three hands; T_1 =- Removal of hand (s) immediately after opening of last hand, T_2 = Removal of hand (s) one week after opening of last hand, and T_3 = Removal of hand (s) two weeks after opening of last hand

treatment. Time of hand removal did not show any significant variation in TSS content.

Interaction effect of number of hand removal and time of hand removal significantly affected bunch weight, hand weight, finger weight, finger length, finger diameter, finger volume, density of finger, pulp weight, peel weight, pulp: peel ratio, pulp thickness, TSS, total sugar, reducing sugar and TSS/acid ratio. In respect of bunch weight and yield the untrimmed bunches yielded maximum. This result is supported by the findings of Irizarry *et al* (1992) who reported that three hands removal reduced total yield. Mandal and Sharma (2000) also reported that removal of 1, 2 and 3 lower hands reduced yield by 9, 12.7 and 17.4%, respectively in cultivar Alpan. Removal of three hands after two weeks of opening of last hand (H_3T_3) produced fruits with maximum hand weight (2.020 kg) followed by H_3T_1. Removal of the hands after one week of opening of last hand (H_3T_2) recorded maximum finger weight (156.33) followed by H_3T_3 and H_3T_1 treatments. Control plants yielded the lowest finger weight (119.09 gm) as compared to treatment of hand removal irrespective of its time of removal. H_3T_3 also produced fruits with maximum length (12.33 cm), finger diameter (4.28 cm), pulp: peel ratio (3.15), and pulp thickness (4.01 cm). Arcila *et al* (2002) found that longer size fruit was attained with hand tear off at 20 days after flowering and leaving 4-6 hands per bunch in banana hybrid FHIA-21. Removal of three hands after one week of opening of last hand (H_3T_2) produced fruits with maximum volume (160.93 cc) closely followed by H_3T_3. The same interaction (H_3T_2) proved beneficial in respect of density of finger and also pulp weight. Total sugar content was highest (16.85) in H_3T_2 interaction. In respect of TSS : acid ratio, H_1T_1 i.e., removal of one hand immediately after opening of last hand proved to be the best. Loss of biomass was partially compensated by increasing fruit weight, length and circumference. Treatments of hand removal at different time increased fruit weight, length and diameter through redistribution of dry matter content by reducing competition for photosynthate among the different hands.

REFERENCES

Arcila, M. I., Valencia, J. A., Bclalcazar Carvajal, S. and Morales, Osorno, H. 2002. Effect of tear off on the quality and production of the hybrid of plantain 'FHIA-21'. *AUGURA*, pp.446-449

Irizarry, H., Rivera, E. and Rodriguez, J. A.1992. Bunch and ratoon management for profitable production of high quality bananas. *J. Agri. Univ. Puerto Rico,* **76:**119-129

Jullien, A., Munier, Jolian, N. G.; Malezieux, E.; Chillet, M. and Ney, B. 2001. Effect of pulp cell number and assimilate availability on dry matter accumulation rate in a banana fruit (*Musa* sp. AAA Group "Grande Naine" (Cavendish sub group) *Annals Bot*., **88:**321-330

Mandal, B. K. and Sharma, S. B.2000. Productivity of banana (cv. Alpan) as influenced by removal of terminal hands from the bunch. *Orissa J. Hort.,* **28:**46-50

Rodriguez, J. A., Irizarry, H. and Rivera, E. 1988. Effect of bunch trimming on yield and quality of plantains (*M. acuminata* X *M. balbisiana*, AAB). *Asociacion de Bananeros de Uraba*, pp.537-541

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