

Effect of Different Mode of Pollination on Quantitative and Qualitative Parameters of Muskmelon

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ABSTRACT

Pollinators are the prime facie to maintain the diversity in universe. Hence, research on “Studies on pollinators of muskmelon (*Cucumis melo* Linnaeus)” was carried out at Chimanbhai Patel College of Agriculture, SD Agricultural University, Sardarkrushinagar during summer 2021. The mode of pollination had a highly significant effect on the quantitative and qualitative parameters of muskmelon. The mean percent fruit set, weight of fruit (kg), the volume of fruit (liter), length of fruit (cm), girth of fruit (cm), number of seeds per fruit and total soluble solid (%) in open and close pollination were 15.76 % and 10.52 %, 0.74 kg and 0.39 kg, 0.71 liters and 0.38 liter, 11.43 cm and 9.10 cm, 37.06 cm and 28.42 cm, 557.53 seeds and

401.30 seeds and 10.02 % and 8.66 %, respectively. These results indicated that pollinators are highly influenced the production of muskmelon.

Keywords Mode of pollination, Quantitative, Qualitative, Muskmelon, *Cucumis melo*.

INTRODUCTION

Muskmelon (*Cucumis melo* Linnaeus) is a tender and warmth loving fruit grown mainly in tropical and sub-tropical regions of the world. It is an annual vining plant in the family Cucurbitaceae. Melons are divided into two groups: Citrullus (watermelon) and Cucumis (muskmelon-cantaloupe group). Muskmelons consumed fresh or dry as an excellent source of vitamins ‘A’ and ‘C’ and also good source of potassium. Muskmelon is low in calories and high in skin-boosting, eye-strengthening. Pollination, an essential ecosystem service provided by insect pollinators, is many times taken for granted and little attention is paid to the need for conserving and enhancing the pollinator diversity in crop ecosystem. Majority of insect pollinators belong to three orders viz., Hymenoptera, Lepidoptera and Diptera (Jadhav *et al.* 2011). The pollens of cucurbitaceous crops are sticky, thus, cannot be blown by the wind. Cross pollination can thus be accomplished only, if the number of insect pollinators working on the flowers is optimum. Cucurbitaceous crops require insect pollinators, such as honey bees, to transfer pollen from staminate (male) to pistillate (female) flowers.

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MATERIALS AND METHODS

The effect of different modes of pollination on muskmelon (Gujarat Muskmelon 3) like their quantitative and qualitative parameter were investigated using two modes viz., open pollination and close pollination at Horticultural Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during summer, 2021. In open pollination (Fig. 1a), the field (4.5 m × 4.0 m) were exposed to the natural pollinators i.e., crop area was not covered with nylon net during the entire flowering period. In close pollination (Fig. 1b), a selected crop area of (4.5 m × 4.0 m) was enclosed with nylon net before initiation of flowering in the crop to restrain the entry of flower visitors and kept as such during the flowering period. Two sample 't' test design was used for statistical analysis.

Observations on growth and yield parameters viz., fruit set, fruit weight, fruit volume, fruit length, fruit girth, number of sound seeds per fruit and total soluble solid were recorded and compared for open pollination and close pollination condition. For this study thirteen fruits were selected from each treatment and worked out mean value of each parameter.

Quantitative parameters of muskmelon

Fruit set (%)

The percentage of fruit set was estimated by counting the number of fruits set out of female flowers. The mean fruit set was expressed in percentage.

$$\text{Fruit set (\%)} = \frac{\text{Total number of fruit set}}{\text{Total number of female flowers tagged}} \times 100$$

Fruit weight (kg)

In each treatment, weight of the individual matured fruit was taken with a digital weighing machine separately and then averaged the fruit weight. The mean fruit weight was expressed in kilograms.

Fruit volume (liter)

To record fruit volume, matured fruits were selected from each treatment and measured fruit volume using water displacement method with the single fruit. Pre-weighted fruit was sub-merged in five liter measuring cylinder along with water and the displaced water in measuring cylinder was collected in beaker. Water in the beaker was measured by using the measuring cylinder and data were recorded on fruit volume in liter. The mean fruit volume was calculated and express in liter.

Fruit length (cm)

Fruit length was recorded by measuring the distance from one end to other end of the fruit, with the help of a measuring tape. The mean fruit length was expressed in centimeter.

Fruit girth (cm)

The girth of the fruit (cm) was measured with the help of a measuring tape.



Fig. 1a. Open pollination condition. Fig. 1b. Close pollination condition.

Number of sound seeds per fruit

The matured fruits were dried and the total numbers of sound seeds per fruit were counted manually and the mean numbers of sound seeds per fruit were calculated.

Qualitative parameter of muskmelon

Total soluble solid (%)

The matured fruits were ground individually and liquid extract of the fruits were separated and a drop was placed on hand refractometer to record the total soluble solid content of the fruit and expressed in percentage.

pollination on quantitative and qualitative parameters of muskmelon are presented in Table 1. The results revealed that the mean fruit set in open and close pollination were 15.76 % and 10.52 %. The mean weight of fruit of open and close pollination observed 0.74 kg and 0.39 kg (Fig. 2a and 2b, respectively).

The mean volume of fruit (liter) in open and close pollination were 0.71 liter and 0.38 liter (Fig. 3a and 3b, respectively). While, mean length of fruit (cm) in open and close pollination were 11.43 cm and 9.10 cm (Fig. 4a and 4b, respectively). The mean girth of fruit (cm) in open and close pollination were 37.06 cm and 28.42 cm (Fig. 5a and 5b, respectively). It was also recorded that the mean number of seeds per fruit in open and close pollination were 557.53 and 401.30 seeds (Fig. 6a and 6b, respectively). It was also recorded that the mean number of TSS in open and close pollination were 10.02 and 8.66% (Fig. 7a and 7b, respectively).

RESULTS AND DISCUSSION

The data on different modes (open and closed) of

Table 1. Effect of different modes of pollination on quantitative and qualitative parameters of muskmelon.

No. of fruit	Open pollination condition							Close pollination condition						
	Fruit set (%)	Weight (kg)	Volume (liter)	Length (cm)	Girth (cm)	No. of seeds/ fruit	TSS (%)	Fruit set (%)	Weight (kg)	Volume (liter)	Length (cm)	Girth (cm)	No. of seeds/ Fruit	TSS (%)
1	14.70	0.72	0.70	11.60	38.00	443.00	9.70	9.09	0.33	0.22	9.00	29.00	437.00	8.30
2	10.52	0.87	0.86	12.20	40.10	407.00	11.10	11.42	0.34	0.34	9.30	27.00	327.00	8.80
3	15.09	0.71	0.66	11.00	35.20	519.00	9.60	8.10	0.38	0.38	8.90	29.50	371.00	9.10
4	18.91	0.77	0.79	13.50	36.10	491.00	9.30	8.33	0.39	0.39	8.70	31.10	332.00	9.70
5	10.86	1.00	1.00	11.90	41.70	754.00	10.60	6.45	0.33	0.33	7.80	28.90	407.00	8.10
6	15.68	0.90	0.93	11.10	40.90	563.00	9.60	11.76	0.41	0.41	9.20	30.90	430.00	8.40
7	17.14	0.80	0.77	13.00	39.70	542.00	11.00	10.80	0.46	0.46	9.40	30.20	433.00	9.90
8	14.58	0.70	0.69	10.90	37.00	896.00	11.20	10.52	0.42	0.42	9.90	29.50	372.00	8.60
9	19.04	0.60	0.55	10.40	33.80	520.00	9.90	11.62	0.37	0.37	8.90	29.20	445.00	8.00
10	23.68	0.63	0.58	9.90	35.40	591.00	8.90	7.69	0.45	0.45	10.40	29.90	265.00	7.60
11	11.66	0.65	0.57	10.60	35.00	557.00	10.80	17.64	0.57	0.57	10.10	34.00	554.00	8.60
12	11.36	0.63	0.51	11.80	34.00	487.00	9.70	12.90	0.39	0.40	9.00	29.00	462.00	7.20
13	21.62	0.67	0.65	10.80	35.00	478.00	8.90	10.41	0.33	0.31	7.80	11.30	382.00	10.40
Mean	15.76	0.74	0.71	11.43	37.06	557.53	10.02	10.52	0.39	0.38	9.10	28.42	401.30	8.66
Cal. 't'	3.73**	8.98**	6.76**	6.52**	5.16**	3.74**	3.97**							

** Significant at 1% level of significance.



Fig. 2a: Open pollination

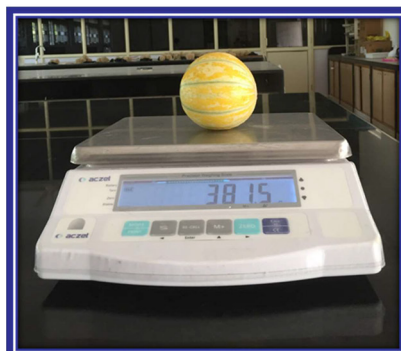


Fig. 2b: Close pollination

Fig. 2. Effect of different mode of pollination on fruit weight.



Fig. 3a: Open pollination



Fig. 3b: Close pollination

Fig. 3. Effect of different mode of pollination on fruit volume.

The present findings are supported by findings of Pateel (2006) and Sarwar *et al.* (2008) reported

that quantitative parameter viz., number of fruits per plant, number of healthy fruits per plant, diameter of cucumber fruit was significantly higher in open



Fig. 4a: Open pollination

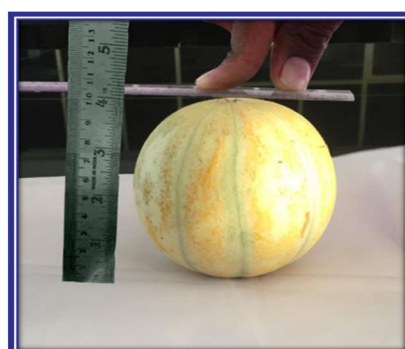


Fig. 4b: Close pollination

Fig. 4. Effect of different mode of pollination on length of muskmelon.



Fig. 5a: Open pollination

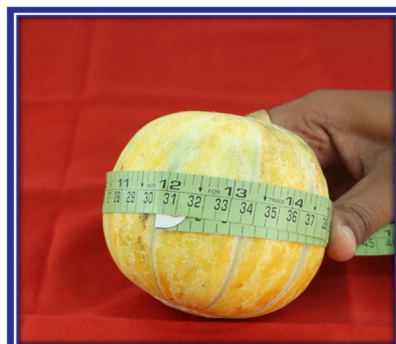


Fig. 5b: Close pollination

Fig. 5. Effect of different mode of pollination on girth of muskmelon fruit.

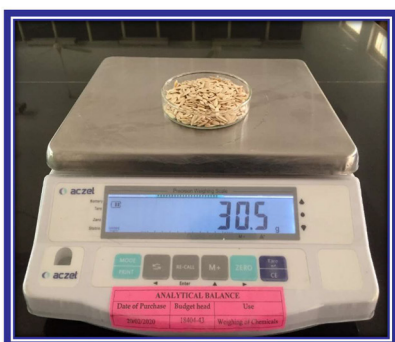


Fig. 6a: Open pollination



Fig. 6b: Close pollination

Fig. 6. Effect of different mode of pollination on seed weight of muskmelon.

pollination as compared to close plot. The study by Nagi and Mohammad (2016) revealed that highest fruit yield per plant (1037.9 g), highest fruit weight (583.8 ± 317.3 g) and greatest fruit size (546.5 ±

278.6 cm³) were obtained in the honey bee pollination system. Thakur and Rana (2008) said that weight of cucumber fruits (1184.5 g), number of seeds per fruit (472.8), fruit size (28.8 cm) and weight of 1000



Fig. 7a: Open pollination



Fig. 7b: Close pollination

Fig. 7. Hand refractometer for TSS measurement.

seeds (29.14 g) was highest in honey bee pollination as compared to other modes of pollination. Ribeiro *et al.* (2015) also reported that the honey bee pollinates muskmelon crop they improve production and quality of fruits and Shah *et al.* (2015) observed that the cucumber uncovered plots yielded significantly higher than covered plots in all the comparative treatments. Thus, above results are strongly supported to the present investigation.

CONCLUSION

The mean per cent fruit set, weight of fruit (kg), volume of fruit (liter), length of fruit (cm), girth of fruit (cm), number of seeds per fruit and total soluble solid (%) in open and close pollination were 15.76 % and 10.52 %, 0.74 kg and 0.39 kg, 0.71 liter and 0.38 liter, 11.43 cm and 9.10 cm, 37.06 cm and 28.42 cm, 557.53 seeds and 401.30 seeds and 10.02 % and 8.66 %, respectively.

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