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EFFECT OF PLANTING DENSITY ON EARLINESS AND FRUIT AND SEED YIELD OF MUSKMELON

Deepak Arora*, P.S. Brar, Rajinder Singh and V.K. Vashisht

Department of Vegetable Science, Punjab Agricultural University, Ludhiana

**E-mail: deepak_veg@rediffmail.com*

ABSTRACT: The effects of varying planting densities on earliness and fruit and seed yield in muskmelon were investigated during 2012 and 2013 at University Seed Farm, Ladhowal of PAU, Ludhiana. The results indicated that the wider plant spacing of 1.1 plants per linear furrow meter not only produced early harvest but the vines were also healthy and longer than the others. There was significant increase in total yield with higher planting density of 3.3 and 2.2 plants per linear furrow meter over recommended planting density of 1.7. But there was decrease in the marketable yield at the higher plant population of 3.3 and 2.2 plants per linear furrow meter. The higher planting density of 3.3 plants per linear furrow meter had maximum number of fruits per unit area and also produced the boldest seed among all the treatments and thus had high seed yield index. Therefore, if the ultimate aim is getting the maximum seed yield from muskmelon, the planting density of 3.3 proved to be the best.

Keywords: *Muskmelon, planting density, fruit yield, seed yield.*

The association of planting density and crop yield has been extensively studied on various vegetable crops. Generally the plant population is directly proportional to yield per unit area upto a certain limit, thereafter, the competition between adjacent plants cause resources to become limited and the yield either levels off or declines (Weiner, 10). When the marketable yield of the vegetables is considered, one has to be very critical as increased population decreases yield and influences the number of flowers per plant and yield per unit area because of light deficiency and competition for uptake of nutrients (Sangoi, 9). The yield of muskmelons can be improved by increasing the plant population (Maynard and Scott, 2; and Nerson, 5). Although there might be increase in marketable yield per unit area with higher plant population (Paris *et al.,* 7) but the number of fruits per plant and fruit size are often reduced (Kultur *et al*, 1). The studies on the effect of planting density on fruit yield in muskmelon have been well documented but the studies on influence of planting density on earliness and seed yield are lacking. Therefore, an effort has been made in the present two years studies to determine the effect of varying plant population within linear furrow meter on earliness and fruit and seed yield in muskmelon.

MATERIALS AND METHODS

The present investigations were carried out at the University Seed Farm, Ladhowal of Punjab Agricultural University, Ludhiana during the summer seasons of 2012 and 2013. The crop of muskmelon variety Punjab Sunheri was grown on raised (0.3 m high) beds (3 m apart) under various *in-rows* spacings (0.3m, 0.45m, 0.6m, 0.75m and 0.9m) which corresponded to planting densities of 3.3, 2.2, 1.7, 1.3 and 1.1 plants for one linear furrow meter. The experiment was laid out in randomized block design with three replications. The planting density of 1.7 plants per linear furrow meter is recommended by PAU, Ludhiana and was, therefore, taken as control. The data for earliness related traits were recorded for days to anthesis, days to first fruit harvest and vine length (cm). The mature fruits were harvested once a week for one month and data were recorded for number of fruits per 10 m^2, mean fruit weight (g) and total and marketable yield (kg/10 m^2). A fruit was considered marketable if it had no external defect and weighed

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more than 500g. The seeds of all the fruits were extracted, fermented for 48 hours, cleaned by tap water rinsing and dried in ambient air. The data were recorded for mean seed weight (mg), seed yield (g/10m^2) and the ratio of seed yield (g)/fruit yield (kg) i.e. seed yield index.

RESULTS AND DISCUSSION

The effects of varying plant density on earliness (Table 1) revealed that wider plant spacing of 1.1 plant per linear furrow meter not only produced early harvest but the vines in the wider spacing were also healthy and longer than the others as the plants at spacing of 3.3 plants per furrow meter took 31.5 days in 2012 and 31.9 days in 2013 to anthesis as compared to 29.2 days (2012) and 29.6 days (2013) in 1.1 plants per furrow meter spacing. Accordingly the days to first fruit harvest were 52.7 (2012) and 53.1 (2013) in former and

Table 1: Effect of planting density on earliness related traits of muskmelon.

Plant Density (plants per linear furrow meter)	Days to anthesis		Days to first fruit harvest		Vine length (cm)	
	2012	2013	2012	2013	2012	2013
3.3	31.5	31.9	52.7	53.1	98.4	97.8
2.2	30.9	30.7	51.8	51.7	100.5	102.4
1.7 (Control)*	30.8	31.2	50.7	50.4	103.8	105.9
1.3	30.4	30.8	49.9	49.7	106.4	107.9
1.1	29.2	29.6	48.7	48.6	105.6	108.4

Table 2 : Effect of planting density on fruit traits of muskmelon.

Plant Density (plans per linear furrow meter	No. of fruits per 10 m^2		Mean Fruit Weight (g)		Total Fruit yield (Kg/10 m^2)		Marketable Fruit yield (Kg/10 m^2)	
	2012	2013	2012	2013	2012	2013	2012	2013
3.3	42	37	528	484	22.18	17.91	3.24	3.16
2.2	31	24	653	618	20.24	14.83	8.37	7.48
1.7 (Control)*	21	16	742	704	15.58	11.26	14.43	8.94
1.3	13	8	917	946	11.92	7.57	11.92	6.08
1.1	8	6	1134	1048	9.07	6.29	9.07	6.29

Table 3 : Effect of planting density on seed traits of muskmelon.

Plant Density (plans per linear furrow meter)	Number of seeds /fruit		Mean Seed Weight (mg)		Seed Yield (g/10 m^2)		Seed Yield Index (%)	
	2012	2013	2012	2013	2012	2013	2012	2013
3.3	217	224	40.3	38.4	367	318	16.56	17.77
2.2	284	268	35.3	34.9	311	224	15.35	15.13
1.7 (Control)*	313	298	38.2	36.2	251	173	16.12	15.32
1.3	348	324	36.4	37.8	165	98	13.81	12.95
1.1	419	398	34.3	34.6	115	83	12.68	13.14

*Planting density as recommended by PAU.

48.7 (2012) and 48.6 (2013) in the later thus the widely spaced plants were about 4 days advance in first fruit harvest than closely spaced treatments. Mendlinger (3) and Nerson (5) have also reported similar results of early harvest in muskmelon with wider spacing.

There were pronounced effects of higher planting density on the fruit yield as there was significant increase in total yield (kg/10 m^2) with higher planting density of 3.3 and 2.2 plants per linear furrow meter over recommended planting density of 1.7 (Table 2). As the plants spaced at 3.3 per linear furrow meter produced total yield of 22.18 kg/10 m^2 and 17.91 kg/10 m^2 during 2012 and 2013, respectively and the plants spaced at 2.2 per linear furrow meter produced total yield of 20.24 kg/10m^2 and 14.83 kg/10 m^2 during 2012 and 2013, respectively which were higher than that of control producing 15.58 kg/10 m^2 and 11.26 kg/10 m^2 during both the cropping seasons. But as the planting density increases, due to shortage of space and higher competition between plants for uptake of the nutrients, there was decrease in mean fruit weight, as a result of which the marketable yield reduced significantly at the higher plant population of 3.3 and 2.2. The total fruit yield reduced at extreme *in-row* spacing of 0.9 m between two plants during both the years, but the mean fruit weight was maximum at this planting density. Thus the planting density had clear and significant effects on total and marketable fruit yield in muskmelon. The *in-row* spacing of 0. 45 and 0.6 proved to be best for attaining higher total and marketable yield. These results are in line with the findings of Peirce and Peterson (8) and Nerson *et al*. (6).

However, for the optimal seed production in muskmelon, the planting density of 3.3 plants proved to be best which was statistically at par with control planting density of 1.7 plants per linear furrow meter (Table 3). The seed yield in muskmelon comprised of number of fruits per unit area, seed number per fruit and mean seed weight , the higher planting density of 3.3 plants per linear furrow meter although produced smaller fruits (528 g in 2012 and 484 g in 2013) yet had maximum number of fruits per unit area (42 in 2012 and 37 in 2013) and also produced the boldest seed among all the treatments, thus if for getting the maximum seed yield from muskmelon, the planting density of 3.3 proved to be the best as it outnumbered the recommended spacing of 1.7 plants per furrow meter. The present studies implied that seed yield index is reliable indicator of seed production efficiency as the positive association was observed between the seed yield and seed yield index. The closely spaced fruits produced smaller plants with bold seeds and had high seed yield index. As the seed yield index was 16.56 per cent in 2012 and 17.77 per cent in 2013 for spacing of 3.3 which was significantly higher than the recommended controlled spacing of 1.7 plants per furrow meter. These findings corroborated with the results of Nerson (4).

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