



Comparative Performance of Muskmelon (*Cucumis melo*) Hybrids at Farmers' Field in District Kapurthala

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ABSTRACT

The performance of 10 muskmelon hybrids was studied by using an experimental design RCBD at three locations in the district. The results revealed that the fruit diameter was maximum in Farm Glory and Sharda Chand (52.0 cm) followed by Sunny (51.2 cm) and Inthanon (48.5 cm), in case of fruit length, Sunny had maximum value (18.9 cm) followed by Sharda Chand (17.6 cm). Highest fruit weight (1900g) was observed in Sharda Chand followed by Sunny (1870g), Inthanon (1733.3g) whereas, lowest fruit weight (653.3 g) was found in Bobby followed by Kesar (741 g) and MH 27 (783 g). The data revealed that fresh seed weight of different cultivars ranged between 42.7g (Muskan) to 119.7g (Kesar) per fruit. Lowest values of cavity length and breadth were observed with bobby (8.1 cm and 5.9 cm), respectively. The overall seed cavity of Bobby was at par with Muskan, MH 27 and Kesar, which was mainly due to smaller fruit size of these hybrids, as compared to all other hybrids. It was pertinent to note that maximum fruit flesh was found in Sharda Chand (3.2 cm). TSS varied between 9.6° brix to 15.7° brix amongst different muskmelon hybrids. Maximum shelf life was observed for Inthanon and Sunny compared to other cultivars. Higher fruit yield was obtained in Farm Glory (304.2 q/ha) compared to Kesar (171.7 q/ha) followed by Sharda Chand, Sunny and Inthanon (250 to 270.8 q/ha) and Muskan, Golden Glory and Madhu yielded between (218.3 to 245.8 q/ha). Four muskmelon hybrids namely MH 27, Farm Glory, Golden Glory and Kesar possessed typical flavour and flesh colour which were most desirable in muskmelon. Out of 10 hybrids, only MH 27 possessed suture on fruit, whereas, other were having profuse netting (Farm Glory, Inthanon, Golden Glory and Sunny), scattered netting (Muskan, Madhu and Kesar) and minimum netting (Sharda Chand). Two hybrids namely Inthanon and Sunny possessed more shelf life (16.0 and 14.5 d) after harvest and were more suitable for transportation to distant markets compared to other muskmelon hybrids.

Key Words: Hybrid, Kapurthala, Muskmelon, Organoleptic, Yield.

INTRODUCTION

Most of the people gorge on mangoes during summer season, another fruit that should be a part of one's summer diet is muskmelon also known as cantaloupe. Its high water content helps to stay hydrated during the hot season. Melons are divided into two groups namely *Citrullus* (water melons) and *Cucumis* (muskmelon-cantaloupe group). The muskmelon is a member of the Cucurbitaceae family, which also includes cucumbers, watermelons and honey dew, Persian, Casaba, and crenshaw melons. Muskmelon (*Cucumis melo.L*) is one of the most important crops grown all over the world. It is

highly relished because of its flavour, sweet taste and refreshing effect. It is a good source of dietary fibre, beta-carotene, folic acid, potassium, vitamins C and A, muskmelon not only helps to stay healthy and is also good for skin and hair. A number of muskmelon hybrids and varieties are grown in different regions of India (Uttar Pradesh, Andhra Pradesh, Punjab, Madhya Pradesh, Karnataka, Bihar, Chattisgarh, Rajasthan, Tamil Nadu) which are highly variable in shape, size, colour, netting, sweetness and flavour.

Muskmelon is grown in limited commercial acreage in Punjab and the main muskmelon

producing districts are Kapurthala, Jalandhar and Patiala from where produce is exported to different parts of the country like Mumbai, Kolkata and Jammu & Kashmir. Commission agents as well as traders prefer a cultivar that has less suturing with excellent quality, flavour and good shelf life suitable for long transportation. Melons with profuse netting are usually preferred for the distant markets. Fruit characteristics of melon like netting and rind thickness affect the shelf life and thus transportation. Therefore, the present study was undertaken to compare the yield and postharvest quality of muskmelon cultivars grown under open field conditions by the farmers in district Kapurthala.

MATERIALS AND METHODS

Climatic requirements

Muskmelons grow best at average air temperatures between 18 and 24°C but the optimum temperature for germination of the seed is 27-30°C. Temperature above 35°C or below 10°C slows down the growth and maturation of the crop. This crop is very sensitive to cold temperatures and even a mild frost can damage the crop, therefore, should be planted after the last chance of frost has passed. With the increase in temperature, the plants complete their vegetative growth earlier.

Table 1. Monthly rainfall and temperature data of Kapurthala.

Month	Rainfall (mm)	Minimum (°C)	Maximum (°C)
January	41.5	7.2	19.4
February	3.5	11.6	23.0
March	21.0	17.4	27.1
April	10.0	18.9	37.5
May	52.0	23.7	40.7
June	399.0	24.0	37.8

Stormy weather particularly dust storm during flowering reduces fruit setting. Dry weather with clear sunshine during ripening ensures high sugar content, better flavour and a high percentage of marketable fruits. High humidity increases

the incidence of diseases, particularly those affecting foliage. Cool nights and warm days are ideal for accumulation of sugars in the fruits.

The data regarding temperature at Kapurthala during the study period (January, 2017 to June, 2017) on fortnightly basis has been presented in Table 1.

Soil requirements

Muskmelons grow well on a wide range of soil types. Medium-textured soils (loams) will generally produce higher yields and better-quality melons but in order to get early harvesting, lighter soils where there is good air drainage are considered to be the best. It prefers a soil pH between 6.0 and 7.0 but should be above 5.8 and preferably near 6.2. Alkaline soils with high salt concentration are also not suitable. Soil beds should be raised 15 to 20 cm to facilitate soil drainage because well-drained soils that warm up quickly are best suited for muskmelon.

Cultivation practices followed at the farmers' field

The experiment was conducted during the year 2016-2017 at three locations of district Kapurthala where maximum area was under muskmelon crop in order to evaluate different hybrids for yield and quality parameters. The muskmelon hybrids studied were Bobby, Muskan, Kesar, Farm Glory, Golden Glory, Inthanon, Sunny, Sharda Chand, Madhu and MH-27. Sowing of these hybrids was done in first week of March except hybrid Kesar which was sown in first week of February at farmers' field. Experimental design used was a randomized complete block with three locations (environments taken as replications). The soil fertility status of these locations was found to be medium in organic carbon and available phosphorus and high in available potassium (Singh *et al*, 2016).

The fields were prepared for sowing of seed using conventional tillage in early February. Fertilizer was applied at the rate of 250 kg of urea, 187 kg of diammonium phosphate and 125 kg of muriate of potash per hectare before final disking

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and leveling. Beds were prepared measuring 2.0 m wide with 2 rows per bed. Row to row spacing of 150 cm and plant to plant spacing of 30cm was maintained while sowing. Seeds were sown at a depth of 1-2 cm with 1 seed /hill. Seed germination took about 10-15 d and gaps noticed were filled up manually with the seedlings prepared in polythene bags.

At the time of sowing Furadon (Carbofuron) @ 5 kg/ha was placed at the base of seed in order to prevent attack of insect pests especially red pumpkin beetle. Similarly, after 30-35 days after sowing, a preventive spray with Indofil M 45 @ 1250g/ha was applied at interval of 7- 10 days repeatedly. Later on, depending upon the severity of disease attack, spray of Ridomil fungicide @ 1250g/ha was also applied. Irrigation was applied in furrows as and when required. A continued watch was kept on the growth and disease incidence appearance on all hybrids grown at farmers' field. Data regarding muskmelon marketable fruit weight was taken from four harvests from first week of May to mid of June and yield was recorded accordingly.

From each location, five average size muskmelon fruits of each hybrid were selected at harvest and data were recorded on different parameters namely, fruit weight (g), fruit length (cm), fruit diameter (cm), seed cavity length (cm), seed cavity breadth (cm), rind thickness (cm), flesh thickness (cm), TSS (^obrix) and pH. Rind and flesh thickness was measured with the help of Vernier Calliper. For total soluble solids content, five mature fruits were chosen and a 1 inch by 1 inch center piece of each fruit was squeezed and the obtained juice was placed on a digital hand-held pocket refractometer (model PAL-1, Atago, Bellevue, WA). Total soluble solids content was measured on 28th May, 2017. After dissecting the fruit into two halves, flesh colour was judged with the help of shade chart (Apolite) developed by Asian paints. Organoleptic parameters like smell, taste, juiciness and look were analyzed by a panel of 5 judges by giving individual ranking between 1 to 10 points scale. Best was given 10

rank and worst 1. The data was analyzed by using OPSTAT (Sheoran *et al*, 1998).

RESULTS AND DISCUSSION

Fruit diameter, length and weight

Fruit diameter was observed maximum in Farm Glory and Sharda Chand (52.0 cm) followed by Sunny (51.2 cm) and Inthanon (48.5 cm), which was statistically non significant with each other (Table 2). In case of fruit length, Sunny had maximum value (18.9 cm) followed by Sharda Chand (17.6 cm) and was at par with each other. So, from fruit size point of view, Sunny and Sharda Chand were better options followed by Farm glory and Inthanon.

It is a known fact that fruit weight had a significant effect on the marketing of fruits. It has been observed that earlier cultivars of watermelon were having weight of 10-12 kg/fruit and most of the buyers were reluctant to purchase because needs of the family was found to be less. Hence, scientists developed smaller fruit size and today, in the market one can find watermelon in range about 1-3 kg/fruit. Similar situation exists for muskmelon fruits also. In the present study, highest fruit weight (1900g) was observed in Sharda Chand followed by Sunny (1870g), Inthanon (1733.3g) and the differences in three cultivars was non-significant, whereas, lowest fruit weight (653.3 g) was found in Bobby followed by Kesar (741 g) and MH 27 (783 g) (Table 2). The study revealed that differences in fruit weight of different hybrids were significant. Therefore, this parameter had a major role in marketing of muskmelon fruits.

Seed weight and cavity

Seeds of muskmelon are also sold in the market at very high rate due to its nutritive value. The data revealed that weight of the fresh seed of different cultivars ranged between 42.7g (Muskan) to 119.7g (Kesar) per fruit (Table 2). It was interesting to note that there was no correlation between fruit weight and fresh seed weight obtained, which might probably due to difference in the genetic makeup of different hybrids because research scientists are

eager to develop seedless cultivar of different fruits like Papaya cultivar Red Lady 786 and Grapes.

Small seed cavity is a desirable character in the muskmelon as it affects the fruit flesh. Lowest values of cavity length and breadth were observed with bobby (8.1 cm and 5.9 cm), respectively. The overall seed cavity of Bobby was at par with Muskan, MH 27 and Kesar, which was mainly due to smaller fruit size of these hybrids, as compared to all other hybrids.

Thickness and quality parameters

Rind thickness and tightness of fruits are important parameters that determine the shelf life of fruit. In some cultivars like Inthanon, Sunny rind thickness was found to be 1.3 cm and 1.0cm respectively and fruits were also tighter which adds to their more shelf life. Flesh thickness was found to be maximum in Sharda Chand (3.2 cm) and fruits were more tight although rind thickness was not so good (0.6cm) (Table 2). Due to more rind thickness and tightness of the fruit, there was less attack of fruit fly noticed on Inthanon, Sunny and Sharda Chand, on the other hand, maximum attack of insect pests was noticed in Muskan may be due to scattered netting and less firmness of the fruit. It was observed that shelf life of muskmelon fruit had a very strong correlation with rind thickness indicating that it was desirable character for distant transportation of the fruit.

Total soluble solids (TSS) and Shelf life

This is an important fruit quality parameter because the consumer desires high level of TSS (Table 2 and 3). In the present study, TSS varied between 9.6° brix to 15.7° brix amongst different muskmelon hybrids. The difference in the TSS values of different hybrids was found to be significantly different. Maximum TSS was found in Bobby (15.7° brix) but fruit yield was less, however, its selling price was found to be highest due to higher value of TSS. Therefore, a producer must take into account various fruit quality parameters while selecting a hybrid for its cultivation so that it did not face any difficulty in marketing.

The study indicated that there was large variation in the shelf life of different fruit cultivars, which varied between 2.5 d to 16 d (Table 2 and 3). Similarly, maximum shelf life was observed for Inthanon and Sunny compared to other cultivars. Hence, farmers must pay attention, while selecting the cultivars keeping in view the marketing distance otherwise, whole produce will get damaged during transit period and result in huge loss to the trader as well as farmer.

Fruit Yield

Out of 10 muskmelon hybrids, significantly higher yield was obtained in Farm Glory (304.2 q/ha) compared to Kesar (171.7 q/ha) (Table 2 and 3). Three hybrids namely, Sharda Chand, Sunny and

Table 4. Ranking of different muskmelon hybrids based on organoleptic characters.

Sr. No.	Hybrid	Netting	Suture	Colour (colour code)	Organoleptic rating
1.	Bobby	Less profuse	Absent	Lemon pie (7859)	7
2.	Muskan	Scattered	Absent	Limon (7778)	6
3.	Farm Glory	Profused	Absent	Barley (0572)	5
4.	Golden Glory	Profused	Absent	Barley (0572)	5
5.	Sunny	Profused	Absent	Lime grove (7729)	4
6.	Inthanon	Profused	Absent	Misty vale (0946)	4
7.	MH-27	Less	Present	Orange essence (8009)	3
8.	Madhu	Less	Absent	Mango shake (7960)	2
9.	Sharda Chand	Very Less	Absent	Kesar milk (7962)	2
10.	Kesar	Profused	Light	Orange (8009)	1

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Inthanon gave yield between (250 to 270.8 q/ha) where as Muskan, Golden Glory and Madhu yielded between (218.3 to 245.8 q/ha). The difference in the fruit yield was mainly due to the number of fruits per vine and weight of the fruit.

Organoleptic parameters

Four muskmelon hybrids namely MH 27, Farm Glory, Golden Glory and Kesar possessed typical flavor and flesh colour was either Orange (colour code 8009) or barley (colour code 0572). Both these characters are most desirable in muskmelon. However, all other hybrids, possessed flesh colour either green or creamy, are less juicy and crispy (Table 4).

It was noted that 40 per cent of the consumer did not like the Lemon pie colour of hybrid Bobby inspite of its maximum TSS value (15.7⁰ brix). On the same ground, flesh colour of Sharda Chand (Kesar milk), Sunny (lime grove colour), misty vale colour of Inthanon and limon colour of Muskan were not preferred in local market, inspite of good fruit weight and TSS value. Therefore, farmers must take into account the area in which these hybrids are to be sold or marketed.

Netting and suture on fruit

It was pertinent to mention that earlier consumer preferred suture on muskmelon fruits to a great extent (Table 4). But the major disadvantage with this type of fruit was, its shelf life was too poor (2-3 days) after harvest. As a result of which, this type of hybrids did not fetch a good market price in the distant markets due to rapid spoilage during the transit period. Later on, scientists develop more number of hybrids without suture but fruit was lined with heavy netting. This type of hybrids possessed more shelf life (10-16 d) after harvest and was more suitable for transportation purpose. Out of 10 ybrids, only MH 27 possessed suture and light suture on Kesar fruit were also visible, whereas, other were having profuse netting (Inthanon, Sunny, Farm Glory and Golden Glory), scattered netting (Muskan, Madhu and Kesar) and minimum netting (Sharda Chand).

Salient features of the varieties

During the study, it was found that total area in Kapurthala district during the year 2016-17 was found to be 1700 ha under muskmelon crop. Per cent area under different hybrids was found to be Farm Glory (35), Madhu (30), Golden Glory (25), Kesar (7) and Bobby, Muskan, Inthanon, Sunny and Sharda Chand (3). Farmers preferred a particular hybrid due to the following reasons:

Farm Glory – Fruit possessed good colour, netting, fragrance, flesh thickness, suitable for local and distant marketing, takes 70-80 days to mature, ranked 3rd in preference by consumer for organoleptic characters.

Madhu – Fruit possessed more flesh and less rind, minimum wastage during transit to distant markets, mostly preferred in Jammu and Kashmir.

Golden Glory – Fruit were of good size and preferred fragrance, flesh thickness, takes 75 days to mature and suitable for local and distant marketing, ranked 3rd in preference by consumer.

Kesar – Suitable for early sowing during February, fruits are available in market during first week of May takes 65 days to mature, fetches maximum price due to earliness.

Bobby – Maximum TSS value, very sweet, smallest in size suitable for single person, minimum seed cavity, highest pH and crispy texture, suitable for local as well as distant market, ranked 1st in preference by consumer.

Muskan – Fruits are sweet, higher pH, lower seed price as compared to Bobby but TSS value as good as Bobby, ranked 2nd in preference by consumer for organoleptic characters.

Inthanon – Fruit possessed maximum shelf life due to tightness, less insect pest attack, higher fruit weight, ranked 4th in preference by consumer for organoleptic characters, preferred in five star hotels.

Sunny – Tightness, large fruit size, less insect pest attack, ranked 4th in preference by consumer for organoleptic characters.



Table 2. Yield and fruit characteristics of different muskmelon hybrids.

Varieties	Fruit Diameter (cm)	Fruit length (cm)	Fruit Weight (g)	Fresh seed weight (g)	Seed cavity (cm)		Thickness (cm)			Quality parameters			Yield (q/ha)
					Length	breadth	Rind	Flesh	Total	TSS	pH	Shelf life (days)	
Farm Glory	52.0	15.9	1300.0	112.3	14.8	9.8	0.9	3.1	4.0	12.1	5.2	7.5	304.2
Inthanon	48.5	15.6	1733.3	79.7	16.5	6.0	1.3	2.6	3.8	14.0	5.1	16.0	270.8
Sunny	51.2	18.9	1870.0	77.7	16.7	6.4	1.0	3.1	4.2	14.3	5.2	14.5	270.0
Sharda Chand	52.0	17.6	1900.0	68.0	16.6	8.7	0.6	3.2	3.8	11.1	5.2	13.5	250.0
Madhu	38.7	14.6	963.3	82.0	13.1	8.0	0.8	2.9	3.7	11.0	5.1	11.0	245.8
Golden Glory	45.5	14.6	1133.3	106.0	14.6	9.8	0.7	3.1	3.8	12.3	5.2	7.5	237.5
Muskan	44.3	15.4	923.3	42.7	9.0	6.5	0.9	3.1	4.0	14.0	5.4	5.5	218.3
Bobby	42.3	12.5	653.3	87.3	8.1	5.9	0.6	2.5	3.1	15.7	5.5	5.5	204.2
MH 27	42.7	10.5	783.3	117.7	9.4	6.1	0.3	3.0	3.3	11.2	5.2	2.5	180.8
Kesar	39.0	11.5	741.7	119.7	8.6	6.5	0.4	2.9	3.2	9.6	5.1	4.0	171.7
C.D.	4.0	1.6	267.6	4.1	1.1	0.7	0.1	0.4	0.4	0.7	0.1	1.5	32.3

Table 3. Ranking of different muskmelon hybrids based on yield, TSS and shelf life.

Varieties	Yield (q/ha)	Varieties	TSS	Varieties	Shelf life (days)
Farm Glory	304.2	Bobby	15.7	Inthanon	16.0
Inthanon	270.8	Sunny	14.3	Sunny	14.5
Sunny	270.0	Muskan	14.0	Sharda Chand	13.5
Sharda Chand	250.0	Inthanon	14.0	Madhu	11.0
Madhu	245.8	Golden Glory	12.3	Farm Glory	7.5
Golden Glory	237.5	Farm Glory	12.1	Golden Glory	7.5
Muskan	218.3	MH 27	11.2	Bobby	5.5
Bobby	204.2	Sharda Chand	11.1	Muskan	5.5
MH 27	180.8	Madhu	11.0	Kesar	4.0
Kesar	171.7	Kesar	9.6	MH 27	2.5
C.D.	32.3	C.D.	0.7	C.D.	1.5

Sharda Chand – Good keeping quality, available throughout the year in celebrations, most attractive colour, fetches good price in markets, preferred when no other variety is available in the market.

MH 27 – Most suitable for local market, only variety with suture on fruits, fruits sweet and orange in colour.

CONCLUSION

A large variation was found in the performance of different hybrids regarding yield and various fruit quality parameters like TSS, shelf life, pH and netting etc. This variation was mainly due to the genetic makeup of the hybrids procured by the farmers every year, as well as, management practices followed while raising the crop. Hybrids namely Inthanon, Sunny, Sharda Chand were found to be more suitable for distant marketing mainly due to more shelf life irrespective of flesh colour. It was

noticed that occurrence of rain at the time of crop maturity and virus infestation plays a vital role in the profitability of this crop, as a result of which, the area under both muskmelon and watermelon keep on dwindling every year in the district. Conclusively, it can be said that price of hybrid seed, potential marketing area and consumer preference are the factors responsible for the selection of a hybrid for its cultivation by the farmers.

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