



Title: Evaluation of Growth and Yield Performance of Year Round Watermelon (*Citrullus lanatus*)

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ABSTRACT

An experiment was conducted during July 2021 at Bangabandhu Academy for Poverty Alleviation and Rural Development (BAPARD) agricultural farm to evaluate growth and yield performance of four year round watermelon (*Citrullus lanatus*) viz. Golden Crown, Black Boss, Sweet Black and Karishma. The experiment was laid out in Randomized Complete Block Design (RCBD) with four replications. Data were collected on selected growth and yield attributes. Days to first male and female flowering and ratio of male and female flower were almost similar for all varieties. The highest number of male and female flower was recorded in Golden Crown 50.0 and 12.67, respectively. As a result, the maximum number of fruit setting (6.08) was found in Golden Crown and the minimum in Sweet Black (2.92). The length of fruit was ranged from 17.42- 21.43cm. The maximum diameter of fruit was found in Golden Crown (13.68cm) and the minimum in Black Boss (10.6cm). The weight of individual fruit was observed from 2.34 kg to 2.95 kg which was statistically identical among the varieties. The maximum yield per plant was in Golden Crown (17.73 kg) due to highest number of fruit setting. Finally, it might be concluded that the growth and yield performance of Golden Crown were better in compare to other tested varieties.

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INTRODUCTION

Watermelon (*Citrullus lanatus*) is the most important popular and delicious horticultural commodity throughout the world which is widely cultivated in Bangladesh (Rabbany et al., 2013). It is known for its thirst-quenching attribute, sweet and juicy fruit (Mangila et al., 2007) which is widely grown coastal area of

Bangladesh including Khulna, Bagerhat, Barguna, Patuakhali.

Watermelon is also a nutritionally rich fruit and contains about 95% water hence called watermelon (Rabbany et al., 2013). Every 100 g watermelon contains 0.5 g protein, fat 0.2g, fiber 0.2g, carbohydrate 6.5g, vitamin-A 569

mg, vitamin-C 6 mg, Calcium 11 mg, and phosphorus 12 mg. The potassium in watermelon helps to control high blood pressure. It has also a highly efficient flavonoids and antioxidants that providing protection against cardio-vascular disease and some cancers (Perkins-Veazie et al., 2007).

According to FAO (2014), China is the world's leading producer of watermelon and 67.4% in total world production in 2011 (111 million M. ton). In Bangladesh it is well cultivated occupying 40860.73 acres of land producing 345955.44 M tons of fruit in 2020-'21. The average yield of watermelon was 21.36 ton/ha (BBS, 2022). Among different watermelon producing districts of Bangladesh, the soil, weather conditions and availability of irrigation water of Patuakhali favours mostly the cultivation of watermelon (DAE, 2016). A total of 1,200 hectare of land has been brought under watermelon cultivation with a production of 33,600 metric tons in Gopalganj during 2015 (DAE, 2016).

This crop has a vast economic importance to human (Asuquo and Umunna, 2017) and has great demand in the domestic market as a major portion of income of the farmer comes from this crop. Recently commercial cultivation regarding off season cultivars of water melon has been popularized among farmers in Char areas of Bhola, Patuakhali, Barguna and hilly and low-lying areas of Sunamganj and Pabna. Though the farmers get more prices from off-season crops, but it is constrained by fruit abortion, early fruit drop and fruit deformation due to low temperature and insufficient light. Since there is a few varieties of watermelon released in Bangladesh, but there are some exotics cultivars having good quality attributes are needed to be introduced in major water melon growing areas of Bangladesh to select suitable watermelon varieties. Therefore, the present study was conducted to find out the growth and yield performance of four year round watermelon varieties and identify the better cultivar to fit the agro-climatic conditions of Agro Ecological Zone 14 (AEZ-14). This helps to introduce of new crop in the existing

cropping pattern of this area and can change the socio-economic condition of the farmer's level.

MATERIAL AND METHODS

Experimental conditions

The experiment was conducted at Bangabandhu Academy for Poverty Alleviation and Rural Development (BAPARD) Agricultural Farm, Kotalipara, Gopalganj during 05 July, 2021 to 05 October, 2021. The location of the site is between 21°51' and 23°10' North latitude and between 89°56' and 90°10' East longitude under the AEZ-14. The topography of the farm area was medium high land and the soil is sandy loam type. The average temperature of this location ranged from 12.1°C to 36.1°C. Heavy rainfall occurred during rainy season.

Experimental material

Four year-round watermelon varieties namely Golden Crown (V₁), Karishma (V₂), Black Boss (V₃), Sweet Black-2 (V₄) were collected from local market which were used as experimental material. Golden Crown is aptly named since the rind color is a golden yellow when mature. This cultivar produces oval icebox size melons weighing about six to eight pounds. Golden Crown is early to mature, about 60 days from transplanting (<https://all-americanselections.org/product/watermelon-golden-crown>). Karishma is a virus free, temperature tolerant, quickly matured (about 65-70 days) watermelon variety. The single fruit weight is about 2-4 kg and red color flesh when mature (<https://successfarmbd.com/product/karishma-watermelon/>). Black Boss is Oblong Fruit, Black and attractive rind. Flesh color is bright red crispy. Average fruit weight is 3-5 kg and required days for maturity is about 75 to 80 days.

Preparing and planting the seedlings

Seeds were soaked in water for 24 hours and then covered in a cotton cloth to keep in warm place. After 2 days the seeds were germinated and sown in pits in the experimental field on 10 July, 2021. The size of the experiment field was 17m×12.5m.

Design of experiment

The experiment was conducted by using Randomized Complete Block Design (RCBD) with four replications. The plant to plant and row to row distance was maintained as 1.5m and 3m, respectively. After 2 rows of plants about 1m space was left for walking and nursing the plants. Every row contains 8 plants. For every two rows a stage (called macha) was prepared. Black polythene sheet was used as mulching sheet in every row.

Intercultural operations

Fertilizer was used according to the recommendation of Agricultural Information Services (Roy and Rahman, 2023). The fertilizer dose was Cow dung 1.5 t ha⁻¹, Urea 300 kg ha⁻¹, TSP 300 kg ha⁻¹, MoP 300 kg ha⁻¹, boron 11 kg ha⁻¹, gypsum 150 kg ha⁻¹ and Zinc sulphate 7 kg ha⁻¹. Equal amount of fertilizer was used in each plot. All fertilizers were given as basal dose during land preparation. Weak, injured and dead seedlings were removed and gaps were filled within 20 days of sowing. Weeding was done as and when necessary. As it was the rainy season, the irrigation was given depending on the soil moisture conditions. Red pumpkin beetle was controlled by using Karate 2.5 EC @ 1mL⁻¹ of water.

Collection and analysis of data

Data were recorded on the parameters as days to first male flowering, days to first female flowering, number of male flowers plant⁻¹, number of female flowers plant⁻¹, ratio of male to female flower, number of fruits plant⁻¹, length of fruit (cm), diameter of fruit (cm), weight of individual fruit (Kg), fruit yield (Kg plant⁻¹) and total yield (tha⁻¹). First harvesting was started 10 September, 2021. Final harvesting was done at 05 October, 2021. Data were analyzed by using the software STAR (Statistical Tool for Agricultural Research) Version: 2.0.1.

RESULTS AND DISCUSSION

Days to first male and female flowering

Days to first male and female flowering among varieties were not varied significantly but numerically ranged from 24.17 to 28.50 and 28.17 to 30.67 days (Table-1). In case of Karishma (V₂) the first male and female flowering were observed on 24.17 and 28.67 DAT (Days After Transplanting) which was about 4 days for male and 2 days for female less than Black Boss (V₃). In case of Sweet Black-2 (V₄) the days to first male and female flowering were observed on 25.42 and 28.17 DAT. Golden Crown (V₁) the days to first male and female flowering were shown on 27.75 and 30.50 DAT. As a result, four varieties viz. Golden Crown, Karishma, Black Boss and Sweet Black-2 actually had no difference required DAT to first male and female flowering. Although a little different for first blossom of male and female flower.

Number of male and female flowers plant⁻¹

The number of male flower per plant was varied significantly from 26.0 to 50.0 (Table-1). The maximum number of male flower per plant (50.0) was found in Golden Crown (V₁) and the minimum was in Sweet Black-2 (V₄) (26.0) which was statistically similar with Karishma (V₂) (31.33) and Black Boss (V₃) (34.67). The number of female flower per plant varied significantly from 7.67 to 12.67 (Table-1). The maximum number of female flower per plant was found in Golden Crown (V₁) (12.67) and the minimum number of female flower per plant (7.67) was found in Sweet Black-2 (V₄) which was statistically similar with Karishma (V₂) (8.67) and Black Boss (V₃) (9.33). The results signify that Golden Crown variety is the highest for male and female flower per plant than Karishma (V₂), Black Boss (V₃) and Sweet black-2 (V₄). Variation in the number of male flowers was reported to vary among varieties due to environmental and genetic differences (Adelberg et al., 1997; Wehner et al., 2001).

Ratio of male to female flower

Male and female flower ratio varied from 3.29:1 in Sweet Black-2 (V₄) to 3.93:1 in Golden Crown (V₁) (Table-1). The maximum ratio was found 3.93:1 in Golden Crown (V₁)

and the minimum ratio was found 3.29:1 in Sweet Black-2 (V₄) which was non-significant but statistically identical. Result

showed that Golden Crown (V₁) was the best variety for ratio of male and female flower.

Table-1. Comparison among for watermelon varieties in respect of flowering behavior

Variety	Days required to first male flowering	Days require to first female flowering	Number of male flowers plant ⁻¹	Number of female flowers plant ⁻¹	Ratio of male to female flower
Golden Crown (V ₁)	27.75	30.50	50.00a	12.67a	3.93
Karishma (V ₂)	24.17	28.67	31.33b	8.67b	3.63
Black Boss (V ₃)	28.50	30.67	34.67b	9.33b	3.48
Sweet Black-2 (V ₄)	25.42	28.17	26.0b	7.67b	3.29
CV (%)	12.36	6.76	14.99	13.80	16.35
Level of Significance	NS	NS	*	*	NS

In a column, means with a same letter do not differ significantly; *Significant at 5% level of significance; NS= Non-significant; Data are means of four replications.

Number of fruits plant⁻¹

The number of fruits per plant significantly varied from 2.92 to 6.08 (Table-2). The maximum number of fruits per plant (6.08) was found in Golden Crown (V₁). The minimum number of fruits per plant (2.92) was found in Sweet Black-2 (V₄) which was statistically similar with Karishma (V₂) (3.25) and Black Boss (V₃) (2.92). Result showed that Golden Crown was the best variety for number of fruits per plant in this experimental area. Bernard et al. (2009) reported one to five fruits per plant that is similar to this experiment.

Fruit length (cm)

The length of fruit was varied significantly from 17.42cm to 21.43cm (Table-2). The maximum length of fruit (21.43cm) was found in Black Boss (V₃) which was statistically similar with Karishma (V₂). The minimum length of fruit (17.42cm) was found in Golden Crown (V₁). The observation of this experiment was the fruit length of Golden Crown variety was minimum than Karishma Black Boss and Sweet black-2. Fruit size may be increased using varieties with many

branches and many male and female flowers (Wien, 1997).

Fruit diameter (cm)

The diameter of fruit was varied significantly from 10.60cm to 13.68cm (Table-2). The maximum diameter of fruit (13.68cm) was found in Golden Crown (V₁) which was statistically dissimilar with Karishma (V₂) and Sweet Black-2 (V₄). The minimum diameter of fruit (10.60cm) was found in Black Boss (V₃). As a result among the four varieties, the Golden crown was the maximum fruit diameter than Karishma, Black Boss and Sweet black-2.

Weight of individual fruit (Kg)

The weight of individual fruit was observed from 2.34 kg to 2.95 kg (Table-2). The maximum weight of individual fruit (2.95 kg) was found in Karishma (V₂) and the minimum weight of individual fruit (2.34 kg) was found in Sweet Black-2 (V₄) which was statistically identical. Bernard et al. (2009) found 2-3 kg weight per fruit in his experiment.

Fruit yield (Kg plant⁻¹)

The yield per plant was varied significantly from 6.90 kg to 17.73 kg (Table-2). The maximum yield per plant (17.73 kg) was found in Golden Crown (V₁) because of the number of female flower was higher than other three varieties (Karishma, Sweet Black-2, Black Boss). The minimum yield per plant (6.90 kg) was found in Sweet Black-2 (V₄) which was statistically similar with Karishma (V₂) and Black Boss (V₃). Result observed that the variety of Golden Crown yield per plant was higher because of the number female flower, number of fruit was higher than variety of karishma, sweet black and black boss-2.

Total yield (t ha⁻¹)

The yield (ton/ha) was varied significantly from 39.39 to 15.33 (Table-2). The maximum yield per hectare (39.39 ton) was found in Golden Crown (V₁). The minimum yield per plant (15.33 ton) was found in Sweet Black-2 (V₄) which was statistically similar with Karishma (V₂) and Black Boss (V₃). Result showed that the total highest yield of the variety of golden crown due to number of male and female flower, fruit per plant was higher than other three varieties of this experiment.

Table-2. Comparison among for watermelon varieties in respect of yield and fruit characters

Variety	Number of fruits plant ⁻¹	Length of fruit (cm)	Diameter of fruit (cm)	Weight of individual fruit (Kg plant ⁻¹)	Fruit yield per Plant (Kg plant ⁻¹)	Total yield (t ha ⁻¹)
Golden Crown (V ₁)	6.08a	17.42c	13.68a	2.90	17.73a	39.39a
Karishma (V ₂)	3.25b	20.50ab	12.03b	2.95	9.54b	21.19b
Black Boss (V ₃)	3.42b	21.43a	10.60d	2.72	9.16b	20.36b
Sweet Black-2 (V ₄)	2.92b	19.80b	11.52c	2.34	6.90b	15.33b
CV (%)	28.53	2.54	2.15	8.88	30.89	30.89
Level of Significance	*	*	*	NS	*	*

In a column, means with same letter do not differ significantly; *Significant at 5% level of significance; NS= Non-significant; Data are means of four replications.

CONCLUSION

The result of the study showed that the performance of the year round watermelon varieties were almost similar regarding days to first male flowering, days to first female flowering, ratio of male and female flower and weight of individual fruit (Kg). The variety called Golden Crown gave maximum yield due to highest number of female flowers as well as highest number of fruit setting than the Karishma, Black Boss and Sweet Black-2. Color of Golden Crown is yellow and attractive for customer resulting selling

percentage and market price is bit higher in compare to others. Thus, year round watermelon cultivation of Golden Crown is more profitable among tested varieties for farmer's level in the Agro Ecological Zone 14.

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