J Krishi Vigyan 2023, 11 (2) : 154-158 DOI : 10.5958/2349-4433.2023.00029.6

Evaluation of Watermelon (*Citrullus lanatus)* Genotypes for Growth, Yield and Quality

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ABSTRACT

The present investigation was conducted at Department of Vegetable Science, College of Agriculture, Vellayani, Kerala Agricultural University, during 2020-2021 to study the performance of watermelon genotypes for growth, yield and quality. Thirteen genotypes were evaluated with three replications in randomized block design. Significant variation was recorded among the genotypes for all the vegetative, flowering, yield and quality characters. Among the genotypes used, CL11 had the longest vine length, CL3 was the earliest to produce male flower (29.90 d) and CL3 was the earliest with 35.80 d for first female flower anthesis. CL8 exhibited the highest fruit equatorial diameter (24.05 cm) and CL10 recorded highest fruit polar diameter. The highest fruit weight was observed in CL7 (4.76 kg). The genotype CL3 produced the highest yield (9.82 kg) and number of fruits per plant. The lowest number of seeds was observed in CL3 (219.50). The highest TSS content was observed in CL3. Based on the performance, genotypes CL3, CL6, CL2 and CL1 were noted as good performers for yield and quality parameters.

Key words: Evaluation, Growth, Quality, Watermelon, Yield.

INTRODUCTION

Watermelon [*Citrullus lanatus* (Thunb.) Matsum. & Nakai], cultivated in a wide range of tropical, sub tropical and dry regions of the world belong to the family Cucurbitaceae. China is the largest producer of watermelon in the world. In India, watermelon is cultivated in an area of 1.01 lakh hectare with a production of 25.2 lakh tonnes (GOI, 2018). Watermelon is fat free, low in calories and regarded an excellent diet food, as well as being high in energy, making it an excellent energy booster (Altuntas, 2008). Nutritional value per 100 g edible portion is 90 g moisture, 7.0 g carbohydrate, 7.0 mg phosphorous, 0.05 mg thiamine, 6.0 mg ascorbic acid, 1.0 g protein, 7.0 mg calcium, 599 IU vitamin A, and 0.05 g riboflavin (Sahu *et al*, 2011). Cooling, purgative, antihelminthic, antipyretic and carminative properties are found in the fruit. It purifies the blood, quenches thirst, cures biliousness, and is effective against sore eyes, scabies, and itching.

The effective evaluation and usage of genetic diversity is largely responsible for the success in genetic improvement. To achieve high yield, good quality, uniformity of produce, disease resistance, abiotic stress tolerance, etc., it is necessary to select superior genotypes. The farmers can use the improved genotypes directly as varieties to get maximum benefit or, selected genotypes can also be utilised in a number of genetic improvement programmes through hybridization. Genetic information related to yield improvement in watermelon is limited (Kumar and Wehner, 2013). Hence, the present study was carried out to evaluate watermelon genotypes for growth, yield and quality.

MATERIALS AND METHODS

The experiment was carried out at the Department of Vegetable Science, College of Agriculture, Vellayani, during 2020 - 2021. Experimental site was located at 8.25 North latitude and 76.59 East longitude, at an altitude of 20 m above mean

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Table 1. Analysis of variance for characters in watermelon genotypes.

Sr. No.	Source of variation	Replication	Genotypes	Error
1.	Vine length	0.014	1.633**	0.012
2.	Days to first male flower	1.122	55.632**	0.695
3.	Days to first female flower	0.025	75.272**	1.015
4.	Fruit equatorial diameter	0.615	13.071**	0.233
5.	Fruit polar diameter	0.154	29.407**	0.383
6.	Fruit weight	0.004	1.307**	0.005
7.	Fruits per plant	0.075	0.507**	0.035
8.	Yield per plant	0.299	8.171**	0.247
9.	Yield per plot	0.846	696.456**	4.332
10.	Seeds per fruit	81.385	20505.949**	35.885
11.	TSS	0.025	5.618**	0.145

** Significant at 1% level

sea level. The most predominant soil type at the experimental site was red loam from Vellayani series, which is texturally classified as sandy clay loam. The watermelon germplasm consisting of thirteen genotypes collected from different parts of India were selected for the experiment.

The experiment was laid out in a randomized block design with three replications. The seeds were sown directly in the main field with a spacing of 3 m × 2 m. The cultural and management practices were adopted as per recommended practices (KAU, 2016). The observations were recorded on vine length, days to first male flower, days to first female flower, fruit equatorial diameter, fruit polar diameter, fruit weight, fruits per plant, yield per plant, yield per plot, seeds per fruit and total soluble solids (TSS).

RESULTS AND DISCUSSION

The analysis of variance revealed that the mean sum of squares due to genotypes were significant for all the characters studied (Table 1). It indicated that there was enough genetic variability for all of the characters, that has to be exploited in breeding programme. Nisha *et al* (2018) reported significant differences among watermelon genotypes for different characters.

The mean performance of genotypes for various traits like growth, yield and quality parameters are presented in Table 2. Genotypes varied significantly for vine length, the vine length of genotypes ranged from 1.40 m to 5.18 m, with a mean of 3.76 m. Among the genotypes, CL11 had the longest vine length, whereas CL2 had the shortest vine length. This variation in vine length could be attributed to specific genetic makeup of the genotypes, inherent properties and vigour of the crop.

In cucurbits, early days to first male and female flower opening are desirable parameters for early harvest to fetch more price in the market. Among the genotypes, CL3 was the earliest to produce male flower (29.90 d) which was on par with CL12 (31.50 d). CL7 was late and took 51.50 d for male flowering. CL3 was the earliest with 35.80 d for first female flower anthesis, whereas CL7 took longest period of 60.60 d. Seven varieties flowered earlier

Table 2. Mean performance of watermelon genotypes.

Sr. No.	Treatments	Vine length (m)	Days to first male flower	Days to first female flower	Fruit equatorial diameter (cm)	Fruit polar diameter (cm)	Fruit weight (kg)	Fruits per plant	Yield per plant (kg)	Yield per plot (kg)	Seeds per fruit	TSS (°Brix)
1	CL1	3.34	36.90	46.00	18.30	20.15	3.62	1.50	6.86	51.29	296.00	11.25
2	CL2	1.40	35.60	43.70	15.90	16.50	2.58	2.00	5.15	41.64	269.50	10.15
3	CL3	3.51	29.90	35.80	17.85	23.10	3.25	3.00	9.82	98.18	219.50	12.65
4	CL4	4.39	40.10	49.20	16.30	17.35	2.70	2.10	5.65	41.92	239.00	8.50
5	CL5	4.28	41.60	50.60	17.15	21.10	2.73	1.20	3.28	27.35	231.00	8.25
6	CL6	3.61	38.40	49.10	16.00	18.10	4.31	2.10	9.05	69.41	295.00	11.75
7	CL7	4.14	51.50	60.60	23.05	24.45	4.76	1.30	6.19	47.00	487.50	8.70
8	CL8	4.31	41.30	53.70	24.05	26.30	4.17	2.10	8.76	60.54	464.50	11.50
9	CL9	3.57	38.10	50.30	16.35	17.15	2.64	1.90	5.01	35.46	431.50	7.35
10	CL10	4.27	39.70	47.40	19.00	27.80	3.34	1.50	5.38	40.58	388.00	8.00
11	CL11	5.18	36.30	45.50	17.55	25.70	2.60	1.30	3.38	29.82	357.50	8.45
12	CL12	3.04	31.50	40.20	18.10	24.95	3.74	1.80	7.11	52.18	260.50	9.00
13	Sugar Baby (Check)	3.84	36.20	44.70	19.50	22.05	4.67	1.30	6.06	50.46	491.50	9.75
Mean		3.76	38.24	47.45	18.39	21.90	3.47	1.78	6.28	49.68	340.85	9.64
SEm (±)		0.08	0.59	0.71	0.34	0.44	0.05	0.13	0.35	1.47	4.24	0.27
CD at 5%		0.24	1.82	2.19	1.05	1.35	0.15	0.41	1.11	4.53	13.05	0.83

than the general mean of 47.45 d. Early production of male and female flowers indicates crop earliness. These findings are in line with Alimari *et al* (2017) and Anumala *et al* (2020) in watermelon.

Fruit Characteristics

Genotypes showed significant difference for the trait, fruit equatorial diameter. CL8 exhibited the highest fruit equatorial diameter of 24.05 cm among genotypes. Lowest diameter was expressed by CL2 (15.90 cm) which was on par with CL6 (16.00 cm), CL4 (16.30 cm) and CL9 (16.35 cm). The fruit polar diameter exhibited a range of 16.50 cm to 27.80 cm. CL10 recorded the highest fruit polar diameter while, CL2 recorded the lowest. The shape and size of watermelon fruit are determined by the equatorial and polar diameters, which was directly related to consumer preferences (Mohanta and Mandal, 2016).

Fruit Weight

Fruit weight is an important trait to be considered in any breeding programme because it has a direct impact on yield. The data related to fruit weight revealed significant difference among genotypes. The highest fruit weight was observed in CL7 (4.76 kg) which was on par with the check Sugar Baby (4.67 kg). Lowest weight of 2.58 kg was recorded in CL2 and was on par with CL11 (2.60 kg), CL9 (2.64 kg), CL4 (2.70 kg) and CL5 (2.73 kg). The highest weight of fruits might be due to genetic capacity of the accessions to make available higher assimilates for fruit development. Similar range of average fruit weight was recorded by More *et al* (2015) (2.57 kg to 6.28 kg) in watermelon.

The average number of fruits per plant was 1.78, with a range of 1.20 to 3.00. The highest number of 3.00 fruits per plant was recorded in CL3, while lowest in CL5 (1.20), this might be due to the genetic composition of genotypes. Mohosina *et al* (2020) noticed a similar range of 1.50 to 4.50 fruits per plant in their genetic diversity study in watermelon.

Yield

Yield is the ultimate aim in any crop production system, the genotypes varied significantly for the trait yield. The genotype CL3 produced the highest yield per plant (9.82 kg) which was on par with CL6 (9.05 kg) and CL8 (8.76 kg). The lowest yield was registered in CL5 (3.28 kg) and was on par with CL11 (3.38 kg). CL3 (98.18 kg) produced the highest yield per plot and CL5 (27.35 kg) recorded the lowest. Significant difference in yield could be attributed to differences in fruit weight and number of fruits per plant, which are important components of yield.

The number seeds per fruit showed significant difference among genotypes with the lowest number in CL3 (219.50). The check, Sugar Baby recorded the highest number of seeds (491.50) followed by CL7 (487.50). These findings are in line with Jadhav *et al* (2014) and Rabou *et al* (2021) in watermelon. Tetraploid watermelon genotypes had fewer seeds per fruit than diploid genotypes (Jaskani *et al,* 2005).

Total Soluble solids content is an important trait which determines the quality and consumer preference for watermelon. The highest TSS content was observed in CL3 and the lowest in CL9. Six genotypes exhibited higher TSS values than the average of 9.64^{0}B.

CONCLUSION

Thus, the present study showed that ample variation was present in watermelon genotypes and therefore, selection for early and productive genotypes can be practiced from the collected genotypes. The genotypes CL3, CL12 and CL2 were identified as early types on the basis of flowering. These genotypes can be utilized in breeding programme to induce earliness in high yielding genotypes by hybridization followed by selection in progenies. Genotype CL3, which produce highest number fruit per plant and highest yield per plant can be suggested to grow commercially. Genotypes

CL6, CL2 and CL1 were also noted as good performers based on yield and TSS content.

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Received on 19/12/2022/ Accepted on 23/4/2023