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Evaluation of F_2 Segregating population and parents for growth and yield characters in Muskmelon (*Cucumis melo* L.)

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Abstract
During the summer season of 2023, an experiment was conducted at the experimental block of the Department of Vegetable Science, College of Horticulture in Anantharajupeta, Annamaya district, Andhra Pradesh. The primary aim was to assess the performance of various progenies from the F_2 segregating population. Among these progenies, $F_{2.33}$ displayed the highest mean values for vine length, number of branches, sex ratio, and shorter days to the first appearance of the female flower. However, it exhibited the lowest yield per vine. In contrast, $F_{2.65}$ and $F_{2.69}$ excelled in terms of vine length, number of branches, and shorter days for the first appearance of the female flower. $F_{2.11}$ demonstrated the highest number of branches, shorter days for the first appearance of the female flower, and a commendable yield per vine. Meanwhile, $F_{2.10}$, $F_{2.18}$, $F_{2.20}$, $F_{2.21}$, $F_{2.22}$, $F_{2.98}$ and $F_{2.108}$ exhibited the highest number of branches and shorter days for the first appearance of the female flower. On the other hand, $F_{2.27}$ recorded the lowest yield per vine among all the evaluated progenies. These findings provide valuable insights into the performance of different progenies and can guide future efforts in crop improvement.

Keywords: Progenies, vine length, yield per vine

Introduction
Muskmelon (*Cucumis melo* L., 2n=2X=24.) commonly known as kharbooja is one of the most important dessert cucurbits of India. It is a major crop of the riverbeds, covering 80 per cent area of total muskmelon cultivation (Nandpuri, 1989) [3]. It is a predominantly cross-pollinated crop that originated in Asia (Sebastian *et al*., 2010) [7] and India is considered to be the secondary centre of diversity. Uttar Pradesh, Andhra Pradesh, Punjab, Madhya Pradesh, Haryana, Rajasthan, Maharashtra, and Gujarat are the most prominent muskmelon-growing states in India. Uttar Pradesh is the top producer of muskmelon. It is primarily grown in the districts of Ananthapur, Annamayya, Kadapa, and Chittoor in Andhra Pradesh. Fruit properties such as fruit size, shape, TSS, β-carotene, and flesh colour vary significantly in muskmelon. Muskmelon exhibits significant variability in fruit properties, including size, shape, total soluble solids (TSS), β-carotene content, and flesh colour. Given this variability, the present experiment was conducted to identify and advance the most promising muskmelon lines for future generations, aiming to enhance the crop's overall quality and productivity.

Materials and Methods
The current study was conducted in the College of Horticulture, Anantharajupeta, Dr. YSR Horticultural University, Andhra Pradesh, during the summer of 2023. In this study, 111 F_2 progenies and their parents were assessed. The management practices for this crop were followed according to the recommendations of Dr. YSR Horticultural University. Observations were made on various attributes, including vine length, number of branches, days to first appearance of female flower and yield per vine. To facilitate this, for parents and F_1, parameters were recorded from an average of five plants, Whereas for F_2, parameters were recorded from individual plants.

Results and Discussion
The acquired results are shown below under the following subheadings (in Table 1).

Vine length (m)
A higher average value for vine length is considered favourable. The measurements for vine length varied between 1.14 m ($F_{2.95}$) and 5.25 m ($F_{2.36}$) among the different offspring, with an

overall average of 2.74 m. The most notable vine length was documented in $F_{2.36}$ at 5.25 m, closely followed by $F_{2.65}$ at 4.86m as indicated at Table 1. Among 111 progenies within the F_2 population, 49 of them exhibited superiority over the mean vine length of 2.74 m.

Comparatively, the F_1 generation displayed an average vine length of 3.01 m, while the parent plants, P_1 and P_2 had average vine lengths of 1.52 m and 2.31 m, respectively.

Number of branches

Regarding the number of branches, a higher mean value is considered advantageous. The recorded counts for the number of branches varied between 9.00 ($F_{2.86}$) and 29.00 ($F_{2.65}$) across the offspring, with an average of 19.77. The most notable number of branches was observed in was observed in $F_{2.65}$ at 29.00, closely followed by $F_{2.6}$ at 28.00, as outlined in Table 1. Among 111 progenies of F_2 population, 58 of them demonstrated superiority over the overall mean number of branches (F_2) of 19.77.

In comparison, the F_1 generation exhibited an average of 22.40 branches, while the parent plants, P_1 and P_2, displayed averages of 18.40 and 29.20 branches, respectively.

Days to first appearance of female flower

When considering the timeframe until the first appearance of a female flower, a lower mean value is considered advantageous. The mean durations in days for the initial appearance of a female flower ranged from 41 days ($F_{2.71}$) to 54 days ($F_{2.43}$) among the progenies resulting in an average of 55.69 days. The highest mean values were noted in $F_{2.43}$ (54) followed by $F_{2.105}$ 53 days as outlined in Table 1. Among 111 progenies of F_2 population, 59 progenies were superior than the grand mean (F_2) of 44.95 days.

In comparison, the F_1 generation had an average duration of 43.60 days until the first appearance of female flower, while the parent plants, P_1 and P_2 had average durations of 40.40 days and 43.40 days respectively.

Sex ratio (%)

When considering the sex ratio, a lower mean value is considered preferable. The mean sex ratio values ranged from 8.17 ($F_{2.33}$) to 12.5 ($F_{2.61}$) across the progenies, resulting in an average of 10.25. The highest mean sex ratio values were observed in F_2.61 at 12.50 followed by 12.31 in $F_{2.80}$ (as presented in Table 1). Among the 111 progenies within the F_2 population, 55 progenies exhibited superiority over the mean sex ratio (F_2) of 10.25.

In comparison, the F_1 generation displayed an average sex ratio of 10.32, while the parent plants, P_1 and P_2 showed average sex ratio of 9.81 and 9.34 respectively.

Yield per vine

Concerning yield per vine, a higher mean value is considered favorable. The average yield per vine ranged from 1.29 kg ($F_{2.27}$) to 8.34 kg ($F_{2.7}$) among the progenies, resulting in an average of 2.96 kg. The highest average yield per vine were observed in $F_{2.7}$ (8.34 kg) followed by 6.08 kg in $F_{2.4}$. (as presented in Table 1). Out of the 111 progenies of F_2 population, 38 progenies demonstrated superiority over the mean yield per vine (F_2) of 2.96 kg.

On the other hand, the F_1 generation displayed an average yield per vine of 5.51 kg, while the parent plants, P_1 and P_2 exhibited average yields of 3.01 kg and 5.22 kg respectively.

For growth and yield parameters the same results were obtained by Rad *et al*. (2010) [6], Pandey *et al*. (2010) [5], Venkatesan *et al*. (2016) [8], Indraja *et al*. (2020) [1], Omprasad *et al*. (2021) [4] and Lakshmikala *et al*. (2022) [2] in muskmelon.

Table 1: Mean performance of progenies of F_2 population for growth and yield characters

Rank no	Vine length (m)	Progenies	Number of branches	Progenies	Days to first appearance of female flower	progenies
1.	5.25	$F_{2.36}$	29	$F_{2.65}$, $F_{2.69}$, $F_{2.98}$	41	$F_{2.4}$, $F_{2.11}$, $F_{2.22}$, $F_{2.35}$, $F_{2.46}$, $F_{2.65}$, $F_{2.81}$, $F_{2.97}$
2.	4.86	$F_{2.65}$	28	$F_{2.6}$, $F_{2.21}$, $F_{2.33}$, $F_{2.46}$, $F_{2.91}$	42	$F_{2.3}$, $F_{2.12}$, $F_{2.20}$, $F_{2.28}$, $F_{2.32}$, $F_{2.39}$, $F_{2.48}$, $F_{2.53}$, $F_{2.58}$, $F_{2.69}$, $F_{2.71}$, $F_{2.73}$, $F_{2.76}$, $F_{2.83}$, $F_{2.98}$, $F_{2.99}$, $F_{2.101}$, $F_{2.103}$, $F_{2.110}$
3.	4.70	$F_{2.33}$	27	$F_{2.9}$, $F_{2.10}$, $F_{2.11}$, $F_{2.13}$	43	$F_{2.8}$, $F_{2.14}$, $F_{2.18}$, $F_{2.21}$, $F_{2.27}$, $F_{2.29}$, $F_{2.33}$, $F_{2.42}$, $F_{2.61}$, $F_{2.78}$, $F_{2.80}$, $F_{2.85}$, $F_{2.89}$, $F_{2.94}$
4.	4.67	$F_{2.84}$	26	$F_{2.24}$,$F_{2.36}$, $F_{2.108}$	44	$F_{2.7}$, $F_{2.10}$, $F_{2.16}$, $F_{2.40}$, $F_{2.44}$, $F_{2.57}$, $F_{2.66}$, 2.82, $F_{2.95}$, $F_{2.108}$, $F_{2.111}$
5.	4.57	$F_{2.69}$	25	$F_{2.16}$, $F_{2.17}$, $F_{2.18}$, $F_{2.19}$, $F_{2.20}$, $F_{2.22}$, $F_{2.23}$	45	$F_{2.1}$, $F_{2.5}$, $F_{2.17}$, $F_{2.38}$, $F_{2.51}$, $F_{2.54}$, $F_{2.60}$, $F_{2.72}$, $F_{2.74}$, $F_{2.86}$, $F_{2.90}$, $F_{2.100}$
Lowest	1.14	$F_{2.95}$	9.00	$F_{2.86}$	54	$F_{2.43}$
F_2 mean	2.74		5.33		44.95	
P_1 mean	1.52		3.60		40.40	
P_2 mean	2.31		3.80		43.40	
F_1 mean	3.01		3.80		43.60	

Rank no.	Sex ratio (%)	Progenies	Yield per vine (kg)	Progenies
1.	12.50	$F_{2.61}$	8.34	$F_{2.7}$
2.	12.31	$F_{2.80}$, $F_{2.100}$	6.08	$F_{2.4}$
3.	12.26	$F_{2.6}$, $F_{2.68}$	6.00	$F_{2.11}$
4.	12.22	$F_{2.42}$	5.46	$F_{2.3}$
5.	12.21	$F_{2.94}$, $F_{2.103}$	5.10	$F_{2.38}$
Lowest	8.17	$F_{2.33}$	1.29	$F_{2.27}$
F_2 mean	10.25		2.96	
P_1 mean	9.81		3.01	
P_2 mean	9.34		5.22	
F_1 mean	10.32		5.51	

Conclusion

The data revealed that, among all the progenies, $F_{2.33}$ recorded the highest mean values for vine length, number of branches, sex ratio, lower days for days to first appearance of female flower and lowest in yield per vine. $F_{2.65}$ and $F_{2.69}$ recorded the highest for vine length, number of branches and lower days for days to first appearance of female flower. $F_{2.11}$ recorded highest for number of branches, lower days for days to first appearance of female flower and yield per vine whereas $F_{2.10}$, $F_{2.18}$, $F_{2.20}$, $F_{2.21}$, $F_{2.22}$, $F_{2.98}$ and $F_{2.108}$ recorded highest for the number of branches and days to first appearance of female flower. $F_{2.27}$ recorded lowest for yield per vine.

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