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Morphological Characterization of Promising Genotypes of Mango (*Mangifera indica* L.)

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ABSTRACT :

The present investigation was conducted in the pre-established orchard under Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra from 2022-2023. The experiment was conducted for 27 genotypes and 6 check varieties. To get the promising genotypes it is important to study the morphological characters. The leaf characters and flowering characters were studied. The data showed that, the most of leaves were dark green and all are simple type of leaf. The maximum leaf length was recorded in RHRMH-16 (35.50 cm) and the maximum leaf breadth was recorded in RHRMH-16 (8.70 cm). The highest hermaphrodite flowers were observed in RHRMH-52 (240.30), the highest male flowers in Alphonso (850.70), the highest number of flowers in RHRMH-52 (1026.40) whereas RHRMH-16 (0.38) had the highest value of sex ratio.

Keywords : Mango, morphological, characters, flowering, leaves.

INTRODUCTION :

The mango (*Mangifera indica* L.) holds the esteemed title of being India's oldest fruit, revered as the 'King of fruits' for its abundance of nutrients, distinct flavor, delightful aroma, and its significance in religious and medicinal contexts. Believed to have originated in Southeast Asia, particularly in the Indo-Burma region near the foothills of the Himalayas, the mango has spread across various geographical regions worldwide from its origins in the Indian-Myanmar area. Its exceptional qualities and medicinal benefits have made it a beloved fruit enjoyed by people from all walks of life around the globe. The mango has deeply intertwined itself with the cultural, religious, aesthetic, and economic aspects of Indian society since ancient times. (Mukherjee, 1951).

Morphological characterization serves as a fundamental method for assessing mango genetic diversity, with standardized descriptors allowing for visual assessment of traits. Understanding the physico-chemical characteristics of mango germplasm aids in identifying superior genotypes with desired traits. Both morphological and biochemical markers play vital roles in assessing genetic diversity in mango, although they may have limited detection capabilities for inter and intra-varietal polymorphisms due to environmental influences. (Ramessur and Sanmukhiya, 2011). Systematic characterization of mango germplasm facilitates identifying potential candidates for breeding programs and conservation efforts aimed at reducing genetic erosion and promoting the sustainable use of mango genetic resources. (Sennhenn *et al.,* 2013)

The success in mango improvement primarily depends on the nature and magnitude of variation present in the population. An ideal mango cultivar should have characters like precocious, dwarf, regular and prolific in bearing, early flowering and fruit setting, attractive fruit colour and size, resistant to major diseases and other biotic-abiotic stresses (Kanpur *et al*.,2009). There are many factors that influence yield, maturity and quality of fruits as the same cultivar can attain different characteristics in different growing conditions. Even in the same region, different environmental conditions at different years can affect maturity and quality of the fruit (Devilliers, 1998). For successful mango cultivation, evaluation of different promising mango varieties for a given set of ecology is one of the pre-requisites (Singh and Singh, 1996). The proper selection of varieties for different ago-climatic zones is very essential for obtaining good yield and quality of mango and to establish suitable varieties for domestic and export markets. With this perceptive the investigation was conducted to study leaf and flower characters of 27 genotypes and 6 check varieties in Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra.

MATERIAL AND METHODS :

The present investigation was conducted in the pre-established orchard under Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra from 2022-2023. The experiment was conducted for 27 genotypes and 6 check varieties.

A. Leaf characters

The leaf length (cm) of randomly selected five leaves of all genotypes excluding petiole was taken from tip of the bearing shoot and average was calculated and expressed in centimetres. The leaf breadth of all genotypes was measured in the widest part of fully developed leaves and average was calculated and expressed in centimetres.

The leaves of all genotypes were visually observed and recorded for leaf type as simple, oblanceolate and alternate. The leaf colour of leaves of all genotypes was observed and recorded as pale green, Green and Dark green. The leaf waxiness of all genotypes was recorded as waxy and non-waxy. (Anon., 2006)

B. Flowering characters

Date of panicle emergence of all genotypes was recorded from the trees. The flushes were visually observed by visiting the orchard regularly.

The colour of the inflorescence was observed and recorded as light green, yellow, reddish yellow, reddish green and reddish. The colour of the inflorescence was observed and recorded as green, light green, yellow, reddish yellow, reddish green and reddish. (Anon., 2006)

Number of flowers, number of hermaphrodite flowers and number of male flowers were counted from North, South, East and West directions of plant canopy from randomly tagged panicles and averaged for each direction.

Sex ratio was calculated by dividing number of hermaphrodite flowers with number of male flowers by using following formula.

$$\text{Sex ratio} = \frac{\text{Number of hermaphrodite flowers}}{\text{Number of male flowers}}$$

RESULT AND DISCUSSION :

A. Leaf characters

The result concerning the leaf characters of studied genotypes as presented in Table 1 the simple type of leaves was recorded which align with Litz (2003) and non-waxy appearance was noticed on the leaves. Leaf colour observed was dark green, green and light green for the leaves which is associated with Ali (2013). The leaf length varied from 14.70 to 35.50 cm where the maximum leaf length was recorded in RHRMH-16 (35.50 cm) and the minimum is recorded in RHRMH -73 (14.70 cm). The leaf breadth, it varied from 3.10 to 8.70 cm where the maximum leaf breadth was recorded in RHRMH-16 (8.70 cm) and the minimum is recorded in RHRHM-73 (3.10 cm). Sinha *et al* (2018) studied results showed the similar findings in their investigation.

B. Flowering characters

Among studied genotypes the RHRMH-73 and Vanraj (13th January) flowered earlier

while RHRMH-52, RHRMH-4, RHRMH-5, RHRMH-6 (28th February) were the late bloomed as presented in Table 2. The colour of panicle found be varied from yellow, yellowish green, yellowish pink, reddish yellow as per descriptor and similar results were given by Rajwana *et al.* (2011). Two flushes were seen in the most genotypes during the experiment. Table 2 also showed the data of colour of flush which found to reddish, reddish yellow, yellowish red and light green as mentioned in descriptor.

Table 3 also presented data regarding the flower of mango in which hermaphrodite flowers varied from 80.80 to 240.30. In which the highest hermaphrodite flowers were observed in RHRMH-52 (240.30) while the least hermaphrodite flowers were seen in RHRMH-85 (80.80) which align with result of Anila and Radha (2003). Number of male flowers presented which was varied from 303.00 to 850.70 having the highest male flowers in Alphonso (850.70) while RHRMH-85 (303.00) showed the least male flowers, these finding had close association with Ubale and Banik (2015). number of flowers between 383.80 to 1026.40 with the highest flowers in RHRMH-52 (1026.40) the least flowers in RHRMH-85 (383.80). The results were in close conformity with findings of Rathor *et al.* (2009). Sex ratio varied from 0.18 to 0.38 with RHRMH-16 (0.38) had the highest value while the lowest sex ratio was recorded in RHRMH-107 (0.18), these observations were close associate with Kanpure *et al*. (2009).

Table 1. Morphological characterization in mango genotypes for leaf characters

Sr. No.	Genotype	Leaf size		Leaf type	Leaf colour	Leaf waxiness
		Length (cm)	Breadth (cm)			
1	RHRMH - 5	19.50	5.60	Simple	Dark Green	Nonwaxy
2	RHRMH - 6	23.00	4.10	Simple	Dark Green	Nonwaxy
3	RHRMH - 7	25.20	5.53	Simple	Dark Green	Nonwaxy
4	RHRMH - 16	35.50	8.70	Simple	Dark Green	Nonwaxy
5	RHRMH - 30	31.50	7.10	Simple	Dark Green	Nonwaxy
6	RHRMH - 38	30.50	4.10	Simple	Dark Green	Nonwaxy
7	RHRMH - 39	25.50	4.20	Simple	Light Green	Nonwaxy
8	RHRMH - 44	20.95	5.85	Simple	Dark Green	Nonwaxy
9	RHRMH - 52	18.10	4.00	Simple	Dark Green	Nonwaxy
10	RHRMH - 55	26.15	5.30	Simple	Light Green	Nonwaxy

11	RHRMH - 57	15.90	3.80	Simple	Light Green	Nonwaxy
12	RHRMH - 72	22.67	5.13	Simple	Dark Green	Nonwaxy
13	RHRMH - 73	14.70	3.10	Simple	Dark Green	Nonwaxy
14	RHRMH - 83	23.60	5.10	Simple	Dark Green	Nonwaxy
15	RHRMH - 84	24.30	5.90	Simple	Dark Green	Nonwaxy
16	RHRMH - 85	22.50	5.70	Simple	Dark Green	Nonwaxy
17	RHRMH - 93	22.70	4.80	Simple	Dark Green	Nonwaxy
18	RHRMH - 96	26.60	5.47	Simple	Dark Green	Nonwaxy
19	RHRMH - 98	27.68	5.55	Simple	Light Green	Nonwaxy
20	RHRMH - 104	26.30	5.50	Simple	Dark Green	Nonwaxy
21	RHRMH - 107	28.10	5.95	Simple	Dark Green	Nonwaxy
22	RHRMG - 1	22.00	4.80	Simple	Light Green	Nonwaxy
23	RHRMG - 2	24.30	5.50	Simple	Dark Green	Nonwaxy
24	RHRMG - 3	22.30	4.70	Simple	Dark Green	Nonwaxy
25	RHRMG - 4	22.50	4.80	Simple	Dark Green	Nonwaxy
26	RHRMG - 5	21.70	4.60	Simple	Dark Green	Nonwaxy
27	RHRMG - 6	22.30	4.90	Simple	Dark Green	Nonwaxy
28	Sai Sugandh	18.70	3.45	Simple	Light Green	Nonwaxy
29	Vanraj	20.80	4.76	Simple	Dark Green	Nonwaxy
30	Kesar	34.57	5.30	Simple	Dark Green	Nonwaxy
31	Alphonso	28.40	5.60	Simple	Dark Green	Nonwaxy
32	Mulgoa	20.60	3.86	Simple	Green	Nonwaxy
33	Sindhu	20.30	4.12	Simple	Dark Green	Nonwaxy
	Range	14.70 - 35.50	3.10 -8.70			
	Mean	23.92	5.06			
	S.D	4.73	1.07			
	CV (%)	19.78	21.08			

Table 2. Morphological characterization in mango genotypes for flowering characters

Sr. No.	Genotype	Date of Flowering	Colour of Panicle	Number of Flushes	Colour of Flush
1	RHRMH - 5	15-01-2023	Yellowish pink	2	Reddish
2	RHRMH - 6	15-01-2023	Yellow	2	Reddish
3	RHRMH - 7	23-01-2023	Yellow	2	Reddish
4	RHRMH - 16	17-01-2023	Yellowish pink	2	Reddish
5	RHRMH - 30	16-01-2023	Yellowish pink	2	Reddish
6	RHRMH - 38	17-01-2023	Yellowish pink	2	Reddish
7	RHRMH - 39	15-01-2023	Reddish yellow	2	Reddish yellow
8	RHRMH - 44	20-02-2023	Yellow	0	–
9	RHRMH - 52	28-02-2023	Yellow	2	Reddish
10	RHRMH - 55	05-02-2023	Yellow	0	–
11	RHRMH - 57	04-02-2023	Yellow	0	–
12	RHRMH - 72	16-01-2023	Reddish yellow	2	Reddish
13	RHRMH - 73	13-01-2023	Reddish yellow	2	Reddish yellow
14	RHRMH - 83	23-02-2023	Yellow	2	Reddish yellow
15	RHRMH - 84	15-02-2023	Yellow	2	Reddish yellow
16	RHRMH - 85	08-02-2023	Yellow	2	Reddish yellow
17	RHRMH - 93	23-01-2023	Yellow	2	Light green
18	RHRMH - 96	21-02-2023	Yellow	2	Reddish yellow

19	RHRMH - 98	14-01-2023	Yellowish green	2	Reddish yellow
20	RHRMH - 104	24-01-2023	Yellowish green	2	Reddish yellow
21	RHRMH - 107	15-01-2023	Yellowish green	2	Reddish yellow
22	RHRMG - 1	25-02-2023	Yellow	2	Reddish yellow
23	RHRMG - 2	25-02-2023	Yellow	2	Reddish
24	RHRMG - 3	23-02-2023	Yellowish pink	2	Reddish
25	RHRMG - 4	28-02-2023	Yellowish green	1	Light green
26	RHRMG - 5	28-02-2023	Yellow	2	Reddish yellow
27	RHRMG - 6	28-02-2023	Yellow	2	Reddish yellow
28	Sai Sugandh	15-01-2023	Reddish yellow	2	Reddish
29	Vanraj	13-01-2023	Yellowish green	2	Reddish
30	Kesar	16-02-2023	Yellow	2	Reddish
31	Alphonso	15-01-2023	Reddish yellow	2	Light green
32	Mulgoa	25-02-2023	Yellowish green	2	Reddish
33	Sindhu	27-02-2023	Yellow	2	Reddish

Table 3. Morphological characterization in mango genotypes for flowering characters

Sr. No.	Genotype	Number of Hermaphrodite flowers per panicle	Number of Male flowers per panicle	Number of Flowers per panicle	Sex Ratio
1	RHRMH - 5	139.75	648.75	788.50	0.22
2	RHRMH - 6	240.10	697.70	937.80	0.34
3	RHRMH - 7	180.30	780.60	960.90	0.23
4	RHRMH - 16	150.75	397.25	548.00	0.38
5	RHRMH - 30	110.23	528.10	638.33	0.21
6	RHRMH - 38	113.20	329.20	442.40	0.34
7	RHRMH - 39	159.10	580.20	739.30	0.27
8	RHRMH - 44	124.10	387.50	511.60	0.32
9	RHRMH - 52	240.30	786.10	1026.40	0.31
10	RHRMH - 55	157.20	520.10	677.30	0.30
11	RHRMH - 57	148.30	496.70	645.00	0.30
12	RHRMH - 72	177.37	501.00	678.37	0.35
13	RHRMH - 73	140.36	638.43	778.79	0.22
14	RHRMH - 83	124.40	435.40	559.80	0.29
15	RHRMH - 84	154.80	619.20	774.00	0.25
16	RHRMH - 85	80.80	303.00	383.80	0.27
17	RHRMH - 93	157.20	569.20	726.40	0.28
18	RHRMH - 96	118.80	475.20	594.00	0.25
19	RHRMH - 98	173.60	518.40	692.00	0.33
20	RHRMH - 104	196.80	787.20	984.00	0.25
21	RHRMH - 107	136.50	772.50	909.00	0.18
22	RHRMG - 1	186.10	744.40	930.50	0.25
23	RHRMG - 2	128.80	418.60	547.40	0.31
24	RHRMG - 3	138.20	528.20	666.40	0.26
25	RHRMG - 4	158.40	581.60	740.00	0.27
26	RHRMG - 5	145.30	552.10	697.40	0.26
27	RHRMG - 6	106.20	471.20	577.40	0.23

28	Sai Sugandh	114.80	545.30	660.10	0.21
29	Vanraj	144.80	651.60	796.40	0.22
30	Kesar	180.50	770.20	950.70	0.23
31	Alphonso	160.60	850.70	1011.30	0.19
32	Mulgoa	138.70	485.20	623.90	0.29
33	Sindhu	143.20	619.30	762.50	0.23
	Range	80.80-240.30	303.00-850.70	383.80-1026.40	0.18-0.38
	Mean	150.59	575.46	726.05	0.27
	S. D.	34.31	142.04	167.06	0.05
	CV (%)	22.79	24.68	23.01	18.67

CONCLUSION :

Based on the study of morphological characterization of mango genotypes it indicates that there is variation among the genotypes in leaf characters and flowering characters. In sometimes before, the morphological characters for identification of genotypes were consider as simple and easy method. But now-a-days it considers as the first step for the evaluation.

FUTURE SCOPE :

By evaluating these genotypes for further research in might be helpful for farmers, researcher and scientist for the new variety with the desirable character and it might also use for genetic improvement in the near future.

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