

Research Report

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Varietal Performance on Flowering of Different Varieties of Mango (*Mangifera indica*) at Sarlahi, Nepal

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Abstract Floral characteristics of 10 mango varieties were studied during February-June, 2023. Distinct variations were found among the studied varieties. Significant variation were observed in term of length of inflorescence, width of inflorescence, number of male flower per inflorescence, number of female flower per inflorescence, sex ratio, % male flower, % hermaphrodite flower ranging from 20.9 cm to 31.9 cm, 11.3 cm to 19.7 cm, 279 to 1,363, 59 to 230.7, 1.25 to 19.63, 50.8% to 94.1% and 5.93% to 49.24%, respectively. The result revealed in all varieties inflorescence position were found terminal and flowers were of pentamerous type. Jarda has the longest inflorescence (31.9 cm). Dasherri has the widest inflorescence (19.7 cm). Male flowers were more than hermaphrodite flowers across the varieties. Amrapali has the highest number of hermaphrodite flower (230.7). Bombay has the highest number of male flowers (1,363) and highest sex ratio (19.63). From this study, it can be inferred that Amrapali will have more fruit set as it has highest number of hermaphrodite flowers. The findings of the study will be beneficial for breeding purpose while developing new varieties of superior quality.

Keywords Mango (*Mangifera indica*); Inflorescence; Hermaphrodite; Sex ratio; Pentamerous

Introduction

Mango (*Mangifera indica* L.) is an important tropical fruit belonging to the family Anacardiaceae and is one of the choicest fruit in the world. The common habitats of Nepalese mango diversity are tropical plain home gardens, river gorge locations, and subtropical valley (Subedi et al., 2021). Among fruits mango is considered as the king of fruit due to its unique flavor, taste and scent.

Mango is mainly grown in the frost-free areas with very few rainfalls during the time of flowering (Humayun and Babu, 2002). Flowering of mango is crucial factor in the productivity of mango. In tropical fruits like mango, stems that have spent enough time in rest since the previous flush are able to induce flowers. The most important factor influencing flowering is the time since the last flush (Ramírez and Davenport, 2010). Initiation is the first step for mango to flower which involves cell division and elongation. Mango trees passes through four unique periods of flowering: Swelling of the apical bud, panicle elongation, panicle growth and flowering then fruit set (Lemos et al., 2018). Variability of flowering in mango depends upon variety, tree age, and environmental condition (Palanichamy et al., 2011).

Mango grows in almost all area of Madesh province but good quality grafted mangoes of known varietal identity are mostly grown in Sarlahi district. Moreover, research on the performance of those varieties grown in that area are rare. So, it is necessary to assess the performance of the superior varieties grown in that area. Therefore, an attempt was made to study the floral characters of 10 varieties in the mango orchard of Tropical Horticulture Center, Sarlahi district, Madesh province, Nepal.

1 Materials and Methods

1.1 Experiment material

The present experiment was conducted in a pre-established orchard of Tropical Horticulture Centre, Sarlahi district, Madesh Province during February-June, 2023. The experiment was conducted on 10 mango varieties viz- Amrapali, Bombay, Baramasi, Kalkatiya, Dasher, Nam Dok Mai, Jarda, Malda, Mallika and Neelam.

1.2 Experimental design

The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications, where a single tree represents a unit of replication. A total of 30 randomly selected trees three from each variety were tagged. One inflorescence from each selected full bloomed tree was taken for reading their physical characteristics like length of the inflorescence, width of the inflorescence, number of male flower per inflorescence, number of hermaphrodite flower per inflorescence, sex ratio.

1.3 Data collection

Floral data from 10 varieties of mango were recorded according to the Morpho-Physical characters of mango flower (Saheda et al., 2019). The length of the inflorescence was measured from the base to the tip while width of the inflorescence was measured at the broadest part of the base of the inflorescence. Male and hermaphrodite flowers were counted manually using forceps. Sex ratio, % of male flower and % of hermaphrodite flower were calculated as follows:

$$\text{Sex ratio} = \frac{\text{Number of male flowers}}{\text{No of hermaphrodite flowers}}$$

$$\% \text{ male flower} = \frac{\text{Number of male flower}}{\text{Total number of flower}} * 100$$

$$\% \text{ hermaphrodite flower} = \frac{\text{Number of hermaphrodite flower}}{\text{Total number of flower}} * 100$$

2 Results and Discussion

2.1 Inflorescence characteristics

In term of color and shape of the inflorescence, a wide variation was noticed among the varieties. All the varieties have pentamerous type of flower at terminal position. The inflorescence color of varieties varied from light green to crimson. Dasher, Jarda, Malda expressed light green color of inflorescence, Amrapali and Baramasi showed green colored inflorescence whereas Bombay, Kalkatiya, Mallika, Neelam exhibited crimson colored inflorescence and yellowish green colored inflorescence was seen in Nam Dok Mai (Figure 1).

Dasher and Neelam has broad pyramidal shaped inflorescence but Mallika exhibited pyramidal shaped inflorescence. Similar findings were also reported by (Saheda et al., 2019). It was observed that, among 10 mango varieties Amrapali, Bombay, Baramasi, Malda and Mallika showed pyramidal shaped inflorescence, Kalkatiya, Nam Dok Mai and Jarda exhibited conical shaped inflorescence and Dasher, Neelam recorded broad pyramidal shaped inflorescences (Table 1).

Results of this research showed that maximum length of the inflorescence (31.9 cm) was recorded in Jarda, Maximum width of the inflorescence (19.7 cm) was recorded in Dasher, maximum male flowers per inflorescence (1363) and maximum sex ratio (19.63) were seen in Bombay and maximum hermaphrodite flowers per inflorescence (230.7) was seen in Amrapali whereas minimum length (20.9 cm) and width (11.3) of the inflorescence (Figure 2), less number of male flowers per inflorescence (195) and minimum sex ratio (1.13) were recorded in Kalkatiya but minimum hermaphrodite flowers per inflorescence (59) was recorded in Neelam (Table 2).



Figure 1 Inflorescence of different varieties of mango

Table 1 Morphological characters of flower of various mango varieties

Varieties	Inflorescence color	Inflorescence arrangement	Inflorescence position	Type of flower
T1: Amrapali	Green	Pyramidal	Terminal	Pentamerous
T2: Bombay	Crimson	Pyramidal	Terminal	Pentamerous
T3: Baramasi	Green	Pyramidal	Terminal	Pentamerous
T4: Kalkatiya	Crimson	Conical	Terminal	Pentamerous
T5: Dasherri	Light green	Broad pyramidal	Terminal	Pentamerous
T6: Nam Dok Mai	Yellowish green	conical	Terminal	Pentamerous
T7: Jarda	Light green	Conical	Terminal	Pentamerous
T8: Malda	Light green	Pyramidal	Terminal	Pentamerous
T9: Mallika	Crimson	Pyramidal	Terminal	Pentamerous
T10: Neelam	Crimson	Broad pyramidal	Terminal	Pentamerous



Figure 2 Flower count of Amrapali

Maximum percentage of hermaphrodite flower per inflorescence (94.1%) was recorded in Bombay followed by Malda (83%) whereas it was minimum in Kalkatiya (50.8%). Maximum percentage of hermaphrodite flowers per inflorescence (49.24%) was recorded in Kalkatiya followed by Amrapali (44.85%) whereas it was minimum in Bombay (5.93%) (Table 3; Figure 3). These findings are similar with the findings of (Kumar et al., 2014) and (Sinha et al., 2018) who recorded highest percentage of hermaphrodite flowers per inflorescence in Amrapali (48.45%).

Table 2 Inflorescence length (cm), width (cm), Number of male and hermaphrodite flower per inflorescence and sex ratio of different varieties of mango

Varieties	Inflorescence Length (cm)	Inflorescence Width (cm)	Male flower (No./inflorescence)	Hermaphrodite flower (No./inflorescence)	Sex ratio
T1: Amrapali	26.6	17.6	279	230.7	1.25
T2: Bombay	26.7	15.1	1363	79.3	19.63
T3: Baramasi	27.9	14.5	462	69.7	7.76
T4: Kalkatiya	20.9	11.3	195	174	1.13
T5: Dasherri	27.2	19.7	927	193	4.21
T6: Nam Dok Mai	30.9	14.7	377	192.7	2.21
T7: Jarda	31.9	13.8	330	174	2.01
T8: Malda	27.9	12.7	633	124	6.02
T9: Mallika	30	19.2	705	168	8.63
T10: Neelam	25.5	13.9	614	59	13.29
f-probability	0.0861 ^{ns}	0.2221 ^{ns}	0.09109 ^{ns}	0.00996 ^{**}	0.0673 ^{ns}
CV %	14.4	26.3	24.8	15.6	27.9
S.Em±	0.81	0.77	28.96	13.82	1.46

Note: 'ns' represent the values are non-significant; *, **, *** represent significance at 5%, 1% and 0.1% respectively

Table 3 Percentage of male and hermaphrodite flower of different varieties of mango

Varieties	% male flowers per inflorescence	% hermaphrodite flowers per inflorescence
T1: Amrapali	55.2	44.85
T2: Bombay	94.1	5.93
T3: Baramasi	81.3	18.71
T4: Kalkatiya	50.8	49.24
T5: Dasherri	70.7	29.34
T6: Nam Dok Mai	66.3	33.71
T7: Jarda	62.5	37.52
T8: Malda	83	17.03
T9: Mallika	73.7	26.3
T10: Neelam	90.7	9.26
f-probability	0.01128*	0.01128*
CV %	18.2	23.7
S.Em±	3.25	3.15

Note: 'ns' represent the values are non-significant; *, **, *** represent significance at 5%, 1% and 0.1% respectively

3 Concluding Remarks

In conclusion, there is huge variation among the mango varieties in term of floral characters. This gives breeder the opportunity to develop improved varieties using the variability of desirable genotypes. Moreover farmer gets the opportunity to select varieties in term of desirable characters.



Figure 3 Male and hermaphrodite flowers in different varieties of mango

Authors' contributions

Kiran Thapa: Writing-original draft, Investigation, conceptualization, Methodology, Data collection and analysis. Rupesh Chaudhary: Investigation, conceptualization, Data collection. Pratiksha Sharma: Writing-review and editing, Methodology, validation. Sunil Kumar Chaudhary: Writing-review and editing, Methodology, validation. Poojan Adhikari: Writing-review and editing, Formal analysis. Pawan Pyakurel: Writing-review and editing, Methodology, Conceptualization. Arati Chapai: Writing-review and editing, to draft the manuscript. All authors read and approved the final manuscript.

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Conflict of Interest Disclosure

The authors affirm that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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