

Original Research Article

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Study on Morpho-Physical Characters of Mango Flower Varieties / Hybrids in Kodur Agro-Climatic Conditions

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ABSTRACT

Keywords

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Inflorescence characteristics of 30 mango genotypes were studied during the period 2013 to 2014. There were distinct variations among the findings of the germplasm on inflorescence characters. Wide variations were observed in relation to the length of the inflorescence, width of the inflorescence, total number of flowers per inflorescence, number of male flowers per inflorescence, % perfect flower, % fruit set per panicle ranging from 13.17 cm to 43.17 cm, 10.03 cm to 32.23 cm, 887.33 to 4242.00, 840.00 to 3655.33, 3.53 % to 37.33 and 3.35 % to 35.07, respectively. The mango cv. Bangalora was top of the list in case of the length of the inflorescence (43.17 cm), width of the inflorescence (32.23 cm), total number of flowers per inflorescence (4242.00), number of male flowers per inflorescence (3655.33). The maximum % of perfect flower (37.33 %) and percentage of fruit set per panicle (35.07 %) was noted in mango cv. Neelum.

Introduction

Mango (*Mangifera indica* L.), a member of the family Anacardiaceae, is one of the choicest fruits in the world (De Candolle, 1904 and Popenoe, 1927). It has medium calorific and high nutritional values. Mango exhibits wide variations in flowering and fruiting due to its strong dependency on environment. Flowering of mango is an important physiological event that sets the start of fruit production. Flowering is decisive factor in the productivity of mango. The process associated with mango involves shoot

initiation followed by floral differentiation of apical bud, and panicle emergence (Murti and Upreti, 2000). Variability of mango flowering depends upon cultivar, tree age, environmental condition and growth conditions in the dry or humid tropics (Singh, 1960). Mango grows in almost all parts of Andhra Pradesh but the commercial and good quality grafted mangoes with known varietal identity are mostly confined in Rayalaseema districts. Moreover, studies relating to the performance of such varieties grown in those areas are scanty. So, the need exists to assess the performance of elite varieties under that area. Again,

characterization is an important aspect for documentation of the performance of the studied cultivars, which would help to introduce, select and improve the existing mango varieties. Therefore, an attempt was made to study the physio-morphology of inflorescences characters of 30 germplasm in the mango orchard of Horticulture College and Research Institute, Anantharajupet, Kodur, YSR (dist.).

Materials and Methods

The present experiment was conducted in a pre-established orchard of Horticulture College and Research Institute, Anantharajupet, Kodur, YSR (dist.), Andhra Pradesh during 2013 to September 2014.

The experiment was conducted on 30 mango germplasm. The experiment was laid out in a CRBD with three replications, where a single uniform tree constituted the unit of replication. Panicles from full bloomed tree were collected randomly from the selected plants. Twelve inflorescences from each of the selected germplasm were tagged for reading their physical characteristics like length of the inflorescence, width of the inflorescence, total number of flowers per inflorescence, number of male flowers per inflorescence, Percentage of hermaphrodite flowers per inflorescence, sex ratio (male flower to hermaphrodite flowers) and percentage of fruit set per inflorescence.

Data on different morphological parameters from 30 mango genotypes were recorded according to the descriptors for mango (IPGRI, 2006). The length of the inflorescences was measured from the base to tip and the width of the inflorescences was measured at the broadest part of the base of the inflorescences. Total numbers of male and hermaphrodite flowers are counted with the help of hand lens.

The percentage of hermaphrodite flowers was calculated by using the following formula.

$$\text{Per cent of hermaphrodite flowers} = \frac{\text{Number of hermaphrodite flowers}}{\text{Total number of flowers}} \times 100$$

The ratio of male flowers to hermaphrodite flowers was calculated as follows:

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

Fruit set was recorded at marble stage in twelve selected tagged panicles in a tree and the mean values were expressed in percentage.

$$\text{Percentage of fruit set per inflorescence} = \frac{\text{Number of fruits at marble stage}}{\text{Total number of flowers}} \times 100$$

Results and Discussion

Inflorescence characteristics

A wide variation was noticed in colour and shape of the inflorescence among the varieties/hybrids and all the varieties/hybrids produced pentamerous type of flowers at terminal position. The inflorescence colour in most of the varieties varied from light green to light green with red patch. Khader, Bangalora, Royal special, Suvarnarekha, Swarna Jehangir exhibited crimson colour of inflorescence, Dashehari, Neeluddin and Himampasand showed light green colour inflorescence, Neelum, Yelamanda, Cherukurasam, Peddarasam, Allipasand, K.O.15, Mallika expressed yellowish green coloured inflorescence (Fig. 1).

Table.1 Morphological characters of flowers of various mango varieties and hybrids

Varieties	Inflorescence colour	Inflorescence shape	Inflorescence position	Type of flower
T₁: Khader	Crimson	Broadly pyramidal	Terminal	Pentamerous
T₂: Bangalora	Crimson	Pyramidal	Terminal	Pentamerous
T₃: Dashehari	Light green	Conical	Terminal	Pentamerous
T₄: Himampasand	Light green	Broadly pyramidal	Terminal	Pentamerous
T₅: Neelum	Yellowish green	Broadly pyramidal	Terminal	Pentamerous
T₆: Kesar	Light red	Broadly pyramidal	Terminal	Pentamerous
T₇: Royal special	Crimson	Broadly pyramidal	Terminal	Pentamerous
T₈: Mulgoa	Green with red patch	Broadly pyramidal	Terminal	Pentamerous
T₉: Athimadhuram	Light red	Pyramidal	Terminal	Pentamerous
T₁₀: Yelamanda	Yellowish green	Broadly pyramidal	Terminal	Pentamerous
T₁₁: Dilpasand	Dark red	Pyramidal	Terminal	Pentamerous
T₁₂: Pulihora	Dark red	Conical	Terminal	Pentamerous
T₁₃: Cherukurasam	Yellowish green	Broadly pyramidal	Terminal	Pentamerous
T₁₄: Chinnarasam	Pink	Conical	Terminal	Pentamerous
T₁₅: Baneshan	Green with red patch	Broadly pyramidal	Terminal	Pentamerous
T₁₆: Peddarasam	Yellowish green	Broadly pyramidal	Terminal	Pentamerous
T₁₇: Allipasand	Yellowish green	Broadly pyramidal	Terminal	Pentamerous
T₁₈: Prodduturiavakai	Green with red patch	Broadly pyramidal	Terminal	Pentamerous
T₁₉: Kalepad	Green with red patch	Pyramidal	Terminal	Pentamerous
T₂₀: Panchadarakalasa	Green with red patch	Pyramidal	Terminal	Pentamerous
T₂₁: Suvarnarekha	Crimson	Pyramidal	Terminal	Pentamerous
T₂₂: Jehangir	Dark red	Conical	Terminal	Pentamerous
T₂₃: K.O.5	Light red	Pyramidal	Terminal	Pentamerous
T₂₄: K.O.15	Yellowish green	Pyramidal	Terminal	Pentamerous
T₂₅: Neeleshan	Dark red	Conical	Terminal	Pentamerous
T₂₆: Neeluddin	Light green	Conical	Terminal	Pentamerous
T₂₇: KMH-1	Light red	Pyramidal	Terminal	Pentamerous
T₂₈: SwarnaJehangir	Crimson	Pyramidal	Terminal	Pentamerous
T₂₉: A.U.Rumani	Green with red patch	Conical	Terminal	Pentamerous
T₃₀: Mallika	Yellowish green	Broadly pyramidal	Terminal	Pentamerous

Table.2 Inflorescence length (cm), width (cm), total number of flowers and total number of male flowers per inflorescence of different varieties and hybrids of mango

Varieties	Length of the inflorescence (cm)	Width of the inflorescence (cm)	Total number of flowers per inflorescence	Number of male flowers per inflorescence
T₁: Khader	28.00	21.00	3443.33	3018.33
T₂: Bangalora	43.17	32.23	4242.00	3655.33
T₃: Dashehari	29.73	25.93	2314.00	2160.00
T₄: Himampasand	25.27	16.77	2406.00	2096.00
T₅: Neelum	22.67	19.53	1631.67	1020.33
T₆: Kesar	28.37	26.40	3095.00	2936.00
T₇: Royal special	20.00	14.30	2475.33	2254.00
T₈: Mulgoa	21.00	18.67	2013.33	1886.33
T₉: Athimadhuram	17.64	14.20	2023.33	1864.00
T₁₀: Yelamanda	24.10	22.53	1559.67	1327.67
T₁₁: Dilipasand	13.90	11.10	1219.00	1159.67
T₁₂: Pulihora	30.33	26.67	3464.33	3079.33
T₁₃: Cherukurasam	21.43	17.23	2017.00	1505.67
T₁₄: Chinnarasam	22.23	20.00	1652.33	1500.00
T₁₅: Baneshan	36.17	28.80	3530.00	3406.33
T₁₆: Peddarasam	32.00	24.83	3491.67	3086.00
T₁₇: Allipasand	23.87	20.77	3353.67	3025.00
T₁₈: Prodduturiavakai	27.67	22.00	2886.33	2717.00
T₁₉: Kalepad	13.66	11.47	1146.67	857.00
T₂₀: Panchadarakalasa	13.23	11.33	1139.67	850.67
T₂₁: Suvarnarekha	27.74	23.64	1925.67	1837.33
T₂₂: Jehangir	13.17	10.03	887.33	840.00
T₂₃: K.O.5	13.83	11.73	1204.33	1105.00
T₂₄: K.O.15	14.83	12.47	1244.00	1139.67
Hybrids				
T₂₅: Neeleshan	17.47	12.13	1576.00	1447.67
T₂₆: Neeluddin	18.30	14.57	1299.33	1167.67
T₂₇: KMH-1	40.00	30.63	3969.33	3526.00
T₂₈: SwarnaJehangir	25.73	15.67	2374.00	2241.00
T₂₉: A.U.Rumani	24.37	21.33	1565.00	1446.00
T₃₀: Mallika	31.40	25.40	3504.33	3097.00
S.Em±	0.33	0.31	27.33	23.03
CD(P=0.05)	0.78	0.75	64.59	52.07

Table.3 Percentage of hermaphrodite flowers per inflorescence (%), sex ratio (male to hermaphrodite flowers) and percentage of fruit set per inflorescence at marble stage of different varieties and hybrids of mango

Varieties	Percentage of hermaphrodite flowers per inflorescence (%)	Sex ratio (male to hermaphrodite flowers)	Percentage of fruit set per inflorescence at marble stage
T ₁ : Khader	12.20	7.72	11.46
T ₂ : Bangalora	13.87	6.21	13.03
T ₃ : Dashehari	6.67	14.00	6.27
T ₄ : Himampasand	11.45	6.74	10.76
T ₅ : Neelum	37.33	1.68	35.07
T ₆ : Kesar	5.15	18.85	4.83
T ₇ : Royal special	9.11	10.27	8.56
T ₈ : Mulgoa	6.29	15.01	5.91
T ₉ : Athimadhuram	6.62	15.11	6.22
T ₁₀ : Yelamanda	14.90	5.73	14.00
T ₁₁ : Dilipasand	4.88	19.87	4.58
T ₁₂ : Pulihora	10.91	8.27	10.25
T ₁₃ : Cherukurasam	25.33	2.97	23.78
T ₁₄ : Chinnarasam	9.18	9.89	8.63
T ₁₅ : Baneshan	3.53	27.54	3.35
T ₁₆ : Peddarasam	11.56	7.61	10.86
T ₁₇ : Allipasand	9.77	9.26	9.37
T ₁₈ : Prodduturiavakai	5.88	16.07	5.52
T ₁₉ : Kalepad	25.34	3.02	23.82
T ₂₀ : Panchadarakalasa	23.40	3.20	21.99
T ₂₁ : Suvarnarekha	4.60	20.97	4.32
T ₂₂ : Jehangir	5.26	31.05	4.94
T ₂₃ : K.O.5	7.89	21.75	7.41
T ₂₄ : K.O.15	11.90	7.42	11.18
Hybrids			
T ₂₅ : Neeleshan	8.15	11.31	7.66
T ₂₆ : Neeluddin	10.14	9.03	9.52
T ₂₇ : KMH-1	11.87	7.95	11.15
T ₂₈ : SwarnaJehangir	5.57	17.01	6.23
T ₂₉ : A.U.Rumani	8.30	11.63	7.80
T ₃₀ : Mallika	13.33	7.60	12.53
S.Em±	0.33	0.80	0.31
CD(P=0.05)	0.78	1.90	0.74



Fig. 1(a): Different inflorescence of mango varieties selected for the study

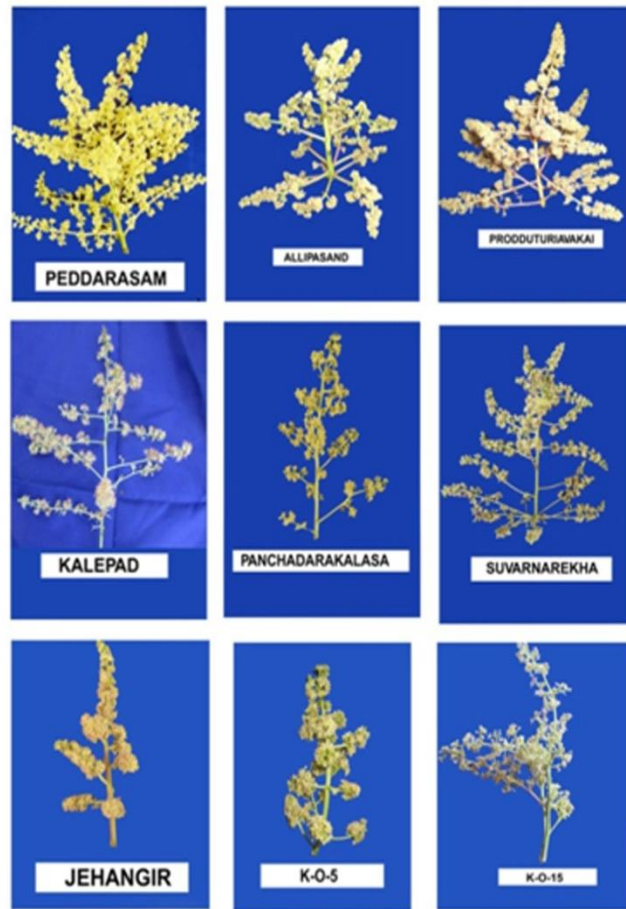


Fig. 1(b): Different inflorescence of mango varieties selected for the study

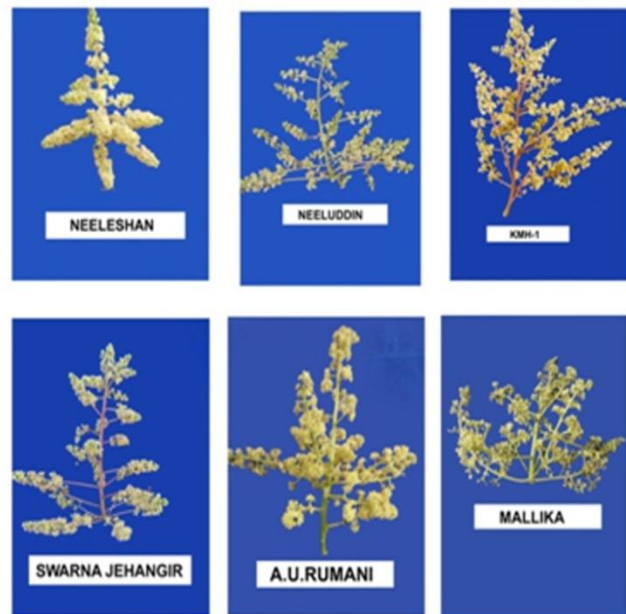


Fig. 1(c): Different inflorescence of mango hybrids selected for the study



Conical inflorescence shape in cv. Neeleshan



Broadly pyramidal inflorescence shape in cv. Peddarasam



Pyramidal inflorescence shape in cv. Dashehari

Fig.2 : Variability for mango varieties/hybrids inflorescence shape

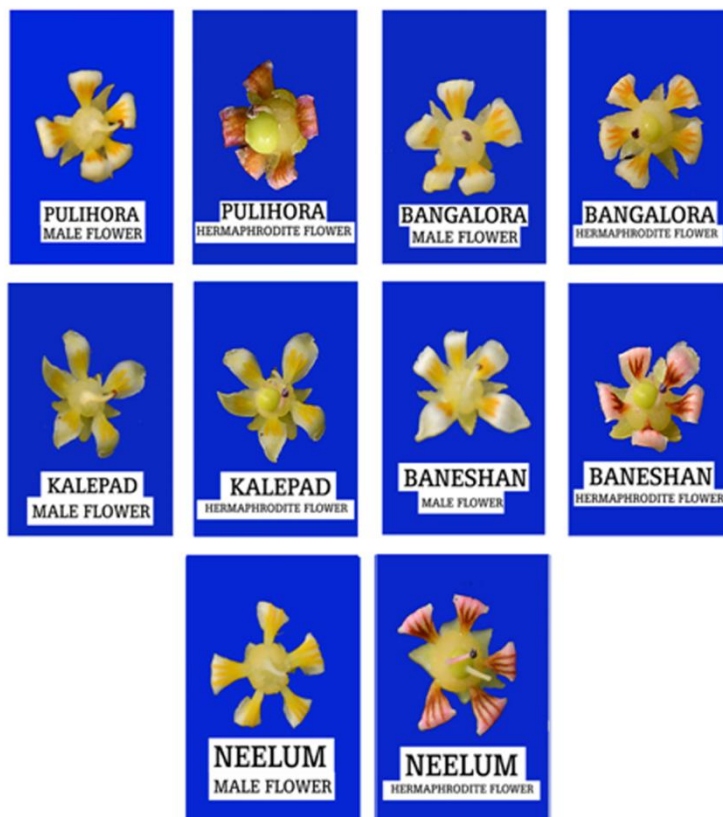


Fig.3 :male and hermaphrodite flowers in different cultivars of mango inflorescence



Fig.4 :per centage of fruit set per inflorescence in different cultivars of mango

Three varieties viz., Kesar, K.O.5, KMH-1 and Athimadhuram recorded light red coloured inflorescence, Mulgoa, Baneshan, Prodduturiavakai, Kalepad, A.U. Rumani and Panchadara Kalasa had inflorescence colour of green with red patches, one variety chinnarasam showed pink colour and Dilpasand, Pulihora, Jehangir and Neeleshan had dark red colour inflorescence (Table 1). Similar findings also reported by Naik *et al.*, (1950). Majumder and Sharma (1990)

reported that the flowering color varied with the growing locations (Fig. 2 and 3).

From the table 1 it was observed that, among 30 mango genotypes Khader, Himampasand, Neelum, Kesar, Royal special, Baneshan, Mulgoa, Yelamanda, Cherukurasam, Peddarasam, Allipasand, Prodduturiavakai and Mallika exhibited broadly pyramidal shaped inflorescence, Bangalora, Athimadhuram, Panchadarakalasa, Dilpasand,

Suvarnarekha, K.O.5, Kalepad, K.O.15, KMH-1, Swarna Jehangir showed pyramidal shaped inflorescences and Dashehari, Pulihora, Chinnarasam, Jehangir, Neeleshan, Neeluddin, A.U. Rumani recorded conical shaped inflorescences.

The results indicated that maximum length (43.17 cm), width (32.23 cm) of the inflorescence and more number of flowers (4242.00) and more number of male flowers per inflorescence (3655.33) were recorded in mango cv. Bangalora, whereas minimum length (13.17 cm) and width (10.03 cm) of the inflorescence and less number of flowers (887.33) and less number of male flowers per inflorescence (840.00) were recorded in mango cv. Jehangir (Table 2), however among all varieties / hybrids maximum sex ratio (31.05) (male flower to hermaphrodite flower) was found in cv. Jehangir followed by cv. Baneshan (27.54), while it was minimum in cv. Neelum (1.68). Mukherjee (1997) reported that the ratio of male to perfect flower was strongly influenced by environmental and cultural factors.

The maximum percentage of hermaphrodite flowers and maximum percentage of fruit set per inflorescence (37.33 % and 35.07 %) was observed in mango cv. Neelum followed by cv. Kalepad (25.34 % and 23.82 %), Cherukurasam (25.33 % and 23.78 %) and Panchadarakalasa (23.40 % and 21.99 %), whereas it was minimum in mango cv. Baneshan (3.53 %) and (3.35 %) (Table 3 and Fig. 4). These results are in agreement with the findings of Kumar *et al.*, (2014) Kalyanasundaram (1976), Thimmappaiah and Suman (1987) who recorded highest percentage of hermaphrodite flowers per inflorescence in mango cv. Neelum.

In conclusion, the development of mango variety through the selection is important. The study on physio-morphological floral

characteristics of mango showed that there have variations among the germplasm. This gives the opportunity to select germplasm on the basis of desirable characters. The improved variety of mango may be developed using the variability of collected genotypes.

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References

- De Candolle, A. 1904. *Origin of Cultivated Plants*. Kegan Paul, Trench, London.
- IPGRI. 2006. Descriptor for mango (*Mangifera indica*). *International Plant Genetic Resources Institute*. Rome, Italy.
- Kalyanasundaram, P. 1976. Studies on floral biology in mango (*Mangifera indica* L.), *AUARA*. 6: 36-48.
- Kumar, M, Ponnuswami, V, Kumar, P and Saraswathy, S. 2014. Influence of season affecting flowering and physiological parameters in mango. *Scientific Research and Essays*. 9 (1): 1-6. 31 ref.
- Majumdar, P. K and Sharma, D. K. 1990. Mango. *Fruits Tropical and Subtropical*.
- Mukherjee, S. K. 1997. Introduction; Botany and importance. In: *The mango Botany, Production and Uses* 1st edition (R. E. Litz Ed.), *CAB International*, Wallingford, UK. pp. 1-19.
- Murti GSR, Upreti KK. 2000. Plant hormones. In: *Advances in Plant Physiology*, (ed. A. Hemantaranjan), *Scientific Publishers*. Jodhpur (India). 2000; 3: 109-148.
- Naik, K.C and Gangolly, S. R. 1950. A

monograph on Classification and Nomenclature of South Indian mangoes. Superintendent, Government Press, Madras.

Popenoe, W. 1927. *Manual of tropical and sub-tropical fruits.* Macmillan, New York, USA.

Singh RN. 1960. Studies on the differentiation and development of fruit

buds in mango (*Mangifera indica* L.) Periodical changes in the chemical composition of shoots and their relation with flower bud differentiation. *Horticulture Advances*.4:48-59.

Thimmappaiah, CL and Suman, D. 1987. Sex in relation to fruit set and fruit yield in mango *Punjab Horticultural Journal*. 27: 8-11.

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