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Performance of mango (*Mangifera indica* L.) varieties for flowering and yield under high density planting

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Abstract

The present study entitled "Performance of mango (*Mangifera indica* L.) for flowering and yield under high density planting" was carried at Kittur Rani Channamma College of Horticulture, Arabhavi, Belagavi district, Karnataka during the year 2019-2020. The experiment was laid out in Randomized Block design with five treatments (Alphonso, Amrapali, Kesar, Mallika and Totapuri) and six replications. Among the treatment varieties, highest number of panicles per plant and panicle length was recorded in Kesar (65.70 and 38.30 cm). Maximum panicle width, number of hermaphrodite flowers and fruit set percentage per panicle was recorded in Totapuri (26.40 cm, 246 and 4.60 %). Highest number of fruits per plant was noticed in Kesar (35.20). Whereas fruit yield per plant and fruit yield per hectare on weight basis was maximum in Mallika (8.76 kg and 14.6 t/ha) compared to other evaluated varieties.

Keywords: high density planting, number of flowers per plant, fruits per plant, yield per plant

Introduction

Mango (*Mangifera indica* L.) is an important member of the family anacardiaceae in the order sapindales. By virtue of its excellent flavour, delicious taste, attractive colour along with various vitamins and minerals as well as availability and accessibility to common man, mango has been regarded as 'King of the fruits' in the tropical world and 'National fruit of India'. The demand for mango fruit is increasing rapidly and the present requirement is not met with the existing rate of production. The export of fresh fruit is limited to certain varieties which accounts to only 15 per cent (Anon., 2014)^[1]. In spite of the adoption of scientific production technology, the productivity of mango is still less than 7.5 tons per hectare, which may be due to low density plantation, irregularity in bearing, low yielding traditional varieties and poor orchard management. Hence, intensification of mango production system is the necessity in the country in the coming years.

Increasing productivity of mango will be possible by establishing high density orchards with intensive cultivation practices, hi-tech inputs like using drip irrigation and fertigation, training the young trees and pruning yearly to allow sufficient interception of light and canopy development within manageable height (Singh, 2005)^[10]. Keeping all these factors in consideration the present experiment was undertaken to study the performance of mango varieties under closer spacing during 2019-20 under Arabhavi condition.

Material & Methods

The investigation was carried out during May 2019 - June 2020 at Kittur Rani Channamma College of Horticulture, Arabhavi, UHS, Bagalkote, Karnataka, India which is located in the Northern dry zone of Karnataka state at 16°15' North latitude and 74°45' East longitude and has an altitude of 612.03 m above the MSL. Experimental site was established during the year 2013 consisted of five varieties of mango under high density spaced at a distance of 3 × 2 m and replicated six times under Randomized Block Design. The description of the varieties as follows.

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SL. No	Variety	Description
1.	Alphonso	Choicest variety of the country, Superior eating and keeping quality. Most preferred variety for export purpose. Average fruit weight is about 300-450 g., TSS: 22-24 °Brix.
2.	Amrapali	Dwarf, Regular bearing and late maturing hybrid most suited for HDP. The hybrid variety is cross between Dashehari x Neelum. Average fruit weight is about 112.30 to 143.00 g. TSS: 22.8 °Brix.
3.	Kesar	Leading cultivar of Gujarat with a red blush on the shoulders. Early maturing variety with good processing quality. TSS: 18-22 °Brix.
4.	Mallika	The hybrid variety derived from Neelum x Dashehari. Heavy yielding, Regular bearing and late season variety with good export potential. Fruit is medium to big size (307-600 g) cadmium yellow colour. TSS: 24 °Brix
5.	Totapuri	Commercial variety of south India. Fruits are medium to large (800-1000 g). TSS: 13.22 °Brix

Reproductive parameters include total number of panicles per plant, panicle length (cm), panicle width (cm) and hermaphrodite flowers/panicle were counted physically at full bloom stage in each treatment. Per cent fruit set was calculated by dividing number of fruit set at pea stage per panicle, by number of hermaphrodite flowers produced per panicle and expressed in per cent. The yield attributes *viz.*, number of fruits per plant, fruit yield per plant and fruit yield per hectare was recorded at the time of harvesting and the data was subjected to statistical analysis for meaningful conclusions.

Results and Discussion

Reproductive parameters

The data pertaining to reproductive parameters *viz.*, total number of panicles per plant, length of the panicle, width of the panicle, number of hermaphrodite flowers in each panicle and fruit set percentage are depicted in Table 1.

Among the varietal treatments, cv. Kesar registered maximum number of panicles plant⁻¹ and length of panicles (65.70 and 38.30 cm) which was followed by Mallika (61.40 and 33.10 cm) and are equivalent to each other, respectively. However, least number of panicles plant⁻¹ and panicle length was noticed in Amrapali (41.20 and 29.5 cm). Maximum panicle width, number of hermaphrodite flowers and fruit set percentage per panicle was recorded in Totapuri (26.40 cm, 246 and 4.60 %). Flowering is the decisive factor in the productivity and is more or less a varietal character mainly influenced by prevailing weather conditions (Davenport, 2003)^[2]. This variation in panicle characteristics might be due to genetic constitution of varieties as well as their interaction with the prevailing environmental conditions and more specifically the physiological conditions of the shoot on which the panicle arise. Similar findings were reported by Gunjate *et al.* (2004)^[3], Kalambe (2009)^[6], Yadhav *et al.* (2010)^[13], Mujumder *et al.* (2011)^[7], Pawan and Chatterjee

(2011)^[8], Singh *et al.* (2014)^[9] and Hada and Singh (2017)^[4]. The variation in the number of hermaphrodite flowers per panicle attributed to inherent genetic differences of the mango cultivars. Fruit set is a varietal character depends on many factors such as time of flowering, sex ratio, efficient cross pollination. The fruit set per cent per panicle at pea stage recorded maximum in Totapuri (6.80%) because this variety has higher number of hermaphrodite flowers. The findings are in accordance with the findings of Jatav (2014)^[5]. The minimum number of fruits set per cent at pea stage was recorded in Kesar (5.17 %) because it had the minimum hermaphrodite flowers.

Yield parameters

The observations on yield and its attributes were found significant among the evaluated varieties *viz.*, number of fruits plant⁻¹, fruit yield per plant and fruit yield (t/ha) are represented in Table 2.

Highest number of fruits per plant was noticed in Kesar (35.20) Whereas fruit yield per plant and fruit yield per hectare on weight basis was maximum in Mallika (8.76 kg/plant and 14.6 t/ha) compared to other evaluated varieties. Yield of the plant is one of the variable factor which depends on type of cultivar, age of the plant, per cent fruit set, fruit retention, prevailing weather condition and incidence of pest and diseases. Variation with reference to number of fruits may be due to higher number of fruiting branches per plant. Higher fruit yield per plant and per hectare on weight basis might be due to the phenomenon that the rate of photosynthesis is directly proportional to the size of the tree canopy. Higher photosynthesis in varieties resulted in higher production of photosynthetic materials which are translocated to the active sink including fruit and ultimately resulted in the increased of fruit size and fruit yield (Singh and Rajan, 2009 and Surendar *et al.*, 2013)^[11,12].

Table 1: Reproductive parameters of different mango varieties under high density planting

Treatments	Total number of panicles per plant at completion of flowering	Panicle length (cm)	Panicle width (cm)	No. of hermaphrodite flowers/panicle	Fruit set (%)
T ₁ – Alphonso	53.40	32.40	21.40	125	3.60
T ₂ – Amrapali	41.20	29.5	19.23	202	4.30
T ₃ – Kesar	65.70	38.30	21.10	105	3.42
T ₄ – Mallika	61.40	32.80	23.80	196	3.85
T ₅ – Totapuri	43.80	33.10	26.40	246	4.60
SEm ±	0.63	0.15	1.79	3.45	0.03
CD @ 5%	1.86	0.45	5.27	10.18	0.09
CV (%)	2.91	1.11	15.28	4.84	1.79

Table 2: Yield parameters of different mango varieties under high density planting system

Treatments	No of fruits/plant	Fruit yield (kg/plant)	Fruit yield (t/ha)
T ₁ – Alphonso	20.00	4.53	7.53
T ₂ – Amrapali	24.50	3.47	5.78
T ₃ – Kesar	35.20	7.35	12.25
T ₄ – Mallika	16.30	8.76	14.6
T ₅ – Totapuri	25.70	7.23	12.05
SEm ±	1.42	0.32	0.22
CD @ 5%	3.24	0.94	0.64
CV (%)	12.24	8.06	5.07

Conclusion

From the above findings, it was clear that among the different varieties evaluated, the variety Mallika is best suited for high density planting under present set of environmental condition as it is a semi vigorous, with consistent good yielding potential along with production of superior quality fruits which is highly acceptable by the consumers.

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