

Tree Morphological Characterization of Mango Varieties (*Mangifera indica* L.) under Chhattisgarh Plain Condition

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ABSTRACT

An experiment titled “Tree morphological characterization of mango varieties (*Mangifera indica* L.) under Chhattisgarh plain condition” was carried out in during years 2019–20 and 2020–21 at the Horticulture Farm, Department of Fruit Science, IGKV, Raipur, Chhattisgarh. In experiment were ten varieties including RBD design with replicated thrice times. The results were recorded in terms of tree morphological characteristics viz., maximum height of mature plant (8.60 m), trunk diameter (1.48 m), crown diameter (0.86 m) and covering area (194.18 m²) were observed with Amarpali, Mallika, Mallika and Dashehari, respectively. In terms of tree growth habit in maximum number of varieties under (spraying shape) Chhattisgarh Pawan, Chhattisgarh Achar and Chhattisgarh Raj, canopy shape (broadly type) Chhattisgarh Gaurav, Chhattisgarh Nandiraj and Dahsehari, branch density Chhattisgarh Raj, Chhattisgarh Gaurav, Chhattisgarh Nandiraj, Dahehari and

Langra (dense type), foliage density (medium and dense type). Maximum height of mature plant (m) was Amarpali 8.60 m, trunk diameter Mallika 1.48 m, crown diameter (m) was 0.86 m Mallika and covering in larger crown area in variety Dashehari 194.18 m².

Keywords Plant, Characteristics, Morphology, Trunk, Crown.

INTRODUCTION

Mango (*Mangifera indica* L.) has become a significant tropical and subtropical fruit crop. It is renowned as the “King of Fruits” because of the wonderful quality of its vitamin and mineral-rich fruit. Mango fruits are the highest source of vitamin A (389 mcg RE**) and a good source of vitamin C, minerals, and other nutrients, with outstanding flavor, attractive scent, beautiful color, and delightful taste. Mango farming in India covered 2.291 million hectares, yielding roughly 20.444 million tonnes, with Uttar Pradesh generating 4.54 million tonnes from 265.82 thousand hectares. (Anonymous 2020). The mango is among the widely grown tropical and subtropical fruit of the world and is a diploid fruit tree with 2n=40 chromosomes (Kuhn *et al.* 2017).

New mango strains varieties develop in Department of Fruit Science, College of Agriculture, IGKV, Raipur, (CG). There is no scientific study in all these varieties yet, so its research is great importance, this study allowed us to characterize part of plant morphology and fill a gap in the literature, providing

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subsidies for future investigations. Mango's genetic diversity provides a variety of opportunities to manipulate desirable traits using genomic resources. For effective conservation and exploitation of genetic resources for crop improvement program, it is critical to assess genetic variation within natural populations and among breeding lines. Growers will be able to select the best suitable and high yielding variety for their region based on location specific evaluation of varieties. The evaluation of germplasm also aids in the selection of parents for breeding programmes to increase production (Singh *et al.* 2021).

MATERIALS AND METHODS

Experimental set up

The present study was carried out during (2019-20 and 2020-21) new strains of mango are namely Chhattisgarh Swarnprabha, Chhattisgarh Pawan, Chhattisgarh Achar, Chhattisgarh Raj and Chhattisgarh Gaurav, planted with spacing of 10m × 10m at Research Horticulture Farm, Department of Fruit Science, College of Agriculture, IGKV, Raipur (CG). Plants selected in the orchard were maintained under uniform cultural practices (disk harrow ploughing, check basin irrigation, use of Imidachloprid to control hopper and mealy bug). The trees growth habits were observed directly in the field, according to the previously proposed descriptors (Anonymous 2006).

Statistical analysis

The statistical analysis was carried out for each

observed character under the study using MS-Excel, OPSTAT. The data investigations were analyzed as help to book by Gomez and Gomez (1983) by applying Randomized Block Design.

Tree characters

Growth habit, canopy shape, branch density, leaf density, bark color, bark surface, bearing habits, mature plant height (m), trunk diameter (m), and crown number were the plant descriptors.

RESULTS AND DISCUSSION

It was discovered that the mango new strains varieties showed plant morphological characteristics recorded in each other based on the observations gathered recording to mango descriptor (IPGRI). Plants' morphological characteristics were recorded for years (2019-20 and 2020-21) of research and presented in (Table 1) described below. Observations revealed variation among the mango varieties.

Tree growth habit for five new strains of mango varieties was divided into three groups, viz., drooping, spreading, and erect. Chhattisgarh Swarnprabha is drooping; Chhattisgarh Gaurav upright and the remaining other varieties have to spread nature. The canopy shape is semi-circular was Chhattisgarh Swarnprabha and Chhattisgarh Achar, oblong is Chhattisgarh Pawan and Chhattisgarh raj, the remaining

Table 1. Studies on plant morphological characteristics like- tree growth habit, canopy shape, branch density, foliage density, bark color, bark surface, bearing habits, height of mature plant (m), trunk diameter (m) and number of crown of new strains mango varieties pooled data during both years 2020 and 2021.

Varieties	Tree growth habit	Canopy shape	Branch density	Foliage density	Bark color	Bark surface	Bearing habits	Height of mature plant (m)	Trunk diameter (m)	No. of crown
Chhattisgarh Swarnprabha	Drooping	Semi-circular	Medium	Medium	Brown	Fine grooves and ridge	Regular	5.93	0.65	2
Chhattisgarh Pawan	Spreading	Oblong	Medium	Medium	Brown	Coarse grooves and ridge	Biennial	6.23	0.75	2
Chhattisgarh Achar	Spreading	Semi-circular	Medium	Dence	Light brown	Fine grooves and ridge	Regular	6.16	0.81	3
Chhattisgarh Raj	Spreading	Oblong	Dence	Medium	Light brown	Fine grooves and ridge	Biennial	3.80	0.59	2
Chhattisgarh Gaurav	Erect	Broadliiy	Dence	Dence	Brown	Coarse grooves and ridge	Regular	7.36	1.04	2

variety broadly Chhattisgarh Gaurav. Branch density among ten varieties found in medium Chhattisgarh Swarnprabha, Chhattisgarh Pawan, Chhattisgarh Achar, Chhattisgarh Raj, and Chhattisgarh Gaurav are recorded in dense. Foliage density two classes in dense belong to Chhattisgarh Achar and Chhattisgarh Gaurav. The other remaining three varieties are medium foliage density.

Bark color observation is among five varieties in brown color is varieties Chhattisgarh Swarnprabha, Chhattisgarh Pawan and Chhattisgarh Gaurav and other remaining varieties is light brown color. Bark surface is fine grooves and ridge. Chhattisgarh Swarnprabha, Chhattisgarh Achar, and Chhattisgarh Raj their Chhattisgarh Pawan and Chhattisgarh Gaurav is coarse grooves and ridge. The variation in tree growth habit, canopy shape, and branch density amongst the mango varieties could be due to the variation in genetic make-up under the present set of environmental conditions and edaphic conditions (Kanpure *et al.* 2009). Similar results were determined by Majumder *et al.* (2011) and Joshi *et al.* (2013).

Plant bearing is recorded in both years in Chhattisgarh Swarnprabha, Chhattisgarh Gaurav, and Chhattisgarh Achar is regular bearing, and Chhattisgarh Pawan, Chhattisgarh Raj is shown in biennial bearing. Abdul Latheef *et al.* (2022) study on a tree's growth habit is a critical factor in determining whether a genotype is best suited for low or high-density planting.

Plant characteristics evolution like- height of mature plant (m), trunk diameter (m), and the number of crown was recorded has been both years pooled data of research and presented in (Table 1) describes below observations revealed variation among the mango varieties. The height of mature plant (m) is maximum height is observed in the variety Chhattisgarh Gaurav 7.36 m, and lower height in Chhattisgarh Raj 3.80 m type. Trunk diameter (m) was noticed in Chhattisgarh Gaurav 1.04 m, and Chhattisgarh Raj is the lowest 0.59 m. The number of crown in per plant is highest in the variety Chhattisgarh Achar 3, and other four varieties are observed in 2. Joshi *et al.* (2013) found that an experiment in the highest canopy spread was observed in cv Amrapali and Mallika. The variety Dashehari had the highest tree height to canopy

spread ratio and sparse foliage density, whereas in Amrapali, medium dense and dense foliage density was recorded in other cultivars. G. Indian *et al.* (2020) the average tree height 8.36 m, tree spread 8.99 m, and stem girth 103.97 cm was found to be observed maximum in Sundar Langra.

The highest frequency of tree habit was observed in spreading category with 60 % followed by sprading 20 % and drooping with 20 % is notices, maximum frequency canopy shape Semi-circular 60 % and broadly, oblong is 20 %. The highest branch density is medium 60 % and dense is 40 %, foliage density also same think as compare to branch density. Maximum frequency of bark color was observed in brown 60 %, and light brown 40 %, higher level of bark surface is notices in fine grooves and ridge 60 % and coarse grooves and ridge is 40 %. Plant bearing habits are more plant is belonging to regular 60 % and biennial is 40 %.

CONCLUSION

The plant morphological characteristic of new strains varieties easiest, shortest, and most easily adaptable approach for identifying at the field level is through morphological features, which is required for tree improvement programs for helpful to identification in this study we are use to simple protocol for the extraction of good quality DNA mango leaves of different ages.

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