Original Research Article

Varietal Evaluation of Mango for flowering, fruiting and yield under the Red and Lateritic Zone of West Bengal

ABSTRACT

The present investigation ~~entitled "Varietal Evaluation of Mango for flowering, fruiting and yield under the Red and Lateritic Zone of West Bengal"~~ was carried out at mango orchard in Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva- Bharati, West Bengal, during period of 2014- 2015. Total nine mango cultivars namely, Amrapali, Mallika, Kohitur, Ranipasand, Golabkhas, Bombai, Kohinoor, Enayatpasand and Safdarpasand were selected. Each treatment was replicated three times and each tree represents a single replication. The observations were recorded as tree height(cm), tree spread(cm), trunk girth shoot length(cm), shoot girth (cm), primary shoot girth (cm), number of panicles per branch, length of panicle at anthesis, full bloom period (days), number of fruits per panicle at maturity, number of fruits per tree and fruit yield (kg/tree). The evaluated varieties 'Mallika' ranked first in respect of yield per tree that is 21.41 kg /tree. These identified varieties can be good donor in hybridization programme to evolve the superior varieties under Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva-Bharati, West Bengal.

Keyword: mango, yield, variety, mallika and Lateritic

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Introduction

Mango (*Mangifera indica* L.) is one of the most preferred, widely distributed, and broadly grown tropical fruit in the world. Mangoes are increasingly of commercial importance all over the world and assume a leading position in among fruits (Reference) . Their flavour, attractive fragrance and high nutritional value has placed them in a popular position as a source of income to farmers, traders and countries at large, through their local and international markets (Rodriguez. *et al*., 2012). The mango is indigenous to north-east India and north Myanmar in the foot hills of Himalayas and is said to have originated in the Indo-Myanmar region (De Candolle, 1884, Popenoe, 1920). The composition, in general, differs with the cultivar, stage of maturity, environmental conditions and culture practices. Mango is one of the most highly priced desert fruits of the tropics. It has rich luscious, aromatic flavour and a delicious taste in which sweetness and acidity is delightfully blended. Mangoes are grown throughout the tropical and subtropical regions of the world (Reference) . In India, Mango is distributed throughout the length and breadth of the country except in the hills. The major mango growing districts in West Bengal are Malda, Murshidabad, Nadia, Burdwan, Jalpaiguri and CoochBehar. The important mango varieties of West Bengal are Bombai, Langra, Fazil, Himsagar, Gulbakhas, Gopalbhog, Nawabpasand, Sultanpasand and Ranipasand etc. The intensity and distribution of rainfall is more important than its amount. The range of rainfall varies humidity during flowering period for mango cultivation. Mango cannot withstand low temperature and frost.

The flowering of mango in eastern parts of India takes place from January to February, but it is entirely dependent on genotype and climatic condition (Reference) . The blooming period of mango is short and continues for 2-3 weeks. Among the mango trees phenophases, the flowering is a complex phenomenon as long as its duration and it may be extended earlier by natural conditions or artificial in-ductions, it depends on climatic conditions and previous crop productivity (Galli *et al*., 2011). The agro-climate condition of Birbhum district appears to be congenial for mango cultivation. There is generally no occurrence of high humidity, rain or frost during January to March and high temperature prevails from end of March to June. Bright sunny days occur from January to May in the district. No systematic works has so far been conducted in this area on the performance of different mango cultivars. It therefore, seems necessary to identify the suitable cultivars for particular agro-ecological condition. Through systematic

evaluation of cultivars, which in turn may boost up production with scientific management practices and also may be incorporated in future improvement programme.

Material and Method

The present investigation ~~entitled "Varietal Evaluation of Mango for flowering, fruiting and yield under the Red and Lateritic Zone of West Bengal"~~ was carried out at mango orchard in Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva- Bharati, West Bengal, during period of 2014- 2015. The experimental field is situated at 23^0 42` N latitude and $87^0$ 47`30`` E longitudes with an average altitude of 40 meters above the mean sea level. Vigorously growing, healthy, disease free, grafted trees (7-years-old) of 9 mango cultivars namely, Amrapali, Mallika, Kohitur, Rani Pasand, Golabkhas, Bombai, Kohinoor, Enayat Pasand and Safdar Pasand were selected. Trees were planted at a distance of 5×5 m in square system. Tree volume and yield per tree were the parameters recorded at the orchard. Using randomized block design, the varieties were considered as the treatments. ~~Each treatment was replicated three times and each tree represents a single replication. Analyses of variance were carried out using PROC GLM procedure of SAS software (SAS/STAT 2009)~~. The observations were recorded as tree height(cm), tree spread(cm), trunk girth shoot length(cm), shoot girth (cm), primary shoot girth (cm), number of panicles per branch, length of panicle at anthesis, full bloom period (days), number of fruits per panicle at maturity, number of fruits per tree and fruit yield (kg/tree). Each treatment was replicated three times and each tree represents a single replication. Analyses of variance were carried out using PROC GLM procedure of SAS software (SAS/STAT 2009)

Result and Discussion

Plant canopy architecture

According to the table 1. the minimum tree height were recorded in Safdar Pasand (267cm) and maximum in Golabkhas (443cm) and followed by Enayat Pasand (405cm) The least and utmost trunk girth were recorded in treatment Rani Pasand (36.67cm) and Kohinoor (46.33cm) respectively which was followed by Enayat Pasand (45.67cm). In East-West direction greatest tree spread was observed in Bombai (323cm) and in North-South direction

utmost tree spread was recorded in Safdar Pasand (373cm). Data depicted in table 2. that the highest increase in shoot length was observed in Amrapalli to the direction of north (9.83cm), south (13.83cm), and in Enayat Pasand toward the direction of east (12.10) and west (12.77) whereas lowest increase in shoot length was found in the Safdar Pasand toward north (7.23) Kohinoor to the south (5.53), Golabkhas to east (7.30), and Mallika to the west (6.13%) direction. According to the table 3. the maximum increase in shoot girth were recorded in Kohinoor in the east (5.37) and west (4.20) whereas, Golabkhas found in the north (5.23) and Amrapalli in the south (6.37) direction. These results are in agreement with those obtained by (Hammam, 2000, Mohamed, 2002) on?? , Bakshi *et al.,* (2012), Desai and Dhandor, (2000), Singh *et al.,* (2002) who have found similar result in different agro climatic region of India. Similar finding have also been reported by Singh and Chadha (1981), Majumdar *et al.* (1982), Shrivastava *et al.* (1987), while evaluating the mango varities in india.

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Flowering and fruiting characters

Scrutiny of data from table 4. clearly indicates that the different mango varieties differ significantly with respect to number of panicles per tree. The maximum length of panicles at anthesis was recorded in Kohinoor (27.10cm) which is at par with treatment Amrapalli (23.27cm) and Safdar Pasand (20.03cm). The minimum length of panicles at anthesis was recorded in treatment Mallika (16.31). The highest no. of fruits per panicles at maturity was recorded in varieties Kohinoor (4.27) and lowest no. of fruits per panicles at maturity were recorded in varieties Amrapalli (1.33). It may be due to maximum nutrient content in cluster planting. where, full bloom period (days) was maximum in double hedge row it may be due to large number of plants and low spacing which resulted in low light penetrance resulted in delaying the full bloom period (Sharma *et al.*,2006). The maximum number of fruits per tree was recorded in treatment Golabkhas (95.00) followed by Kohinoor (83.00) and Bombai (82.00). The highest fruit yield was counted in Mallika (21.41kg/tree). The lowest fruit yield was recorded in Rani Pasand (12.64). Similar result was found by Shafqat *et al.,* 1992, Hamman, 2000, Mouftah, 2007. Majumdar *et al*. (2001) reported that the yield is a highly variable factor depending upon the cultivars and age of plants, climate conditions, incidence of the pest and diseases, etc.

Conclusion

From the results and discussion made so far, from the results in this study ~~and discussion made so far~~i, it can be inferred that different varieties can be used for different purposes. Tree height was maximum in Golabkhas, trunk girth was maximum in Kohinoor however, tree spread was recorded maximum in Safdar Pasand. Maximum shoot girth was registered in kohinoor and minimum in Bombai by. Maximum fruit weight was exhibited by Mallika. The evaluated varieties 'Mallika' ranked first in respect of yield per tree that is 21.41 kg /tree. These identified varieties can be good donor in hybridization programme to evolve the superior varieties under Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva- Bharati, West Bengal.

Table 1. Average tree height, girth and spreading of different varieties of mango.

Cultivars	Tree Character		Tree Spread	
	Tree height (cm)	Trunk girth(cm)	East-West(cm)	North-South(cm)
Amrapalli	317	38.00	233	282
Mallika	392	38.67	280	292
Kohitur	392	41.67	290	363
Rani Pasand	328	36.67	167	233
Golabkhas	443	42.00	267	355
Bombai	364	42.33	323	327
Kohinoor	383	46.33	300	327
Enayat Pasand	405	45.67	207	363
Safdar Pasand	267	37.00	267	373
GM	**3.66**	**40.93**	**2.59**	**3.4**
SE(m)	**0.33**	**3.05**	**0.29**	**0.37**
CD	**0.96**	**8.85**	**0.86**	**1.07**
CV	**15.58**	**12.89**	**19.66**	**19.70**

Table 2. Average of shoot length of different varieties of mango.

Cultivars	Shoot length (cm)			
	East	West	North	South
Amrapalli	8.80	9.13	9.83	13.83
Mallika	7.73	6.13	8.97	6.03
Kohitur	9.80	8.47	9.37	9.03
Rani Pasand	7.50	7.53	9.13	8.70
Golabkhas	7.30	7.17	9.20	12.10
Bombai	8.53	10.33	8.00	9.87
Kohinoor	9.07	9.20	7.47	5.53
Enayat Pasand	12.10	12.77	9.23	11.60
Safdar Pasand	7.73	7.87	7.23	9.60
GM	**8.73**	**8.73**	**8.71**	**9.59**
SE(m)	**0.98**	**0.84**	**0.39**	**1.05**
CD	**2.85**	**2.44**	**1.14**	**3.05**
CV	**19.45**	**16.33**	**7.80**	**18.95**

Table 3. Average of shoot girth of different varieties of mango.

Cultivars	Shoot girth (cm)			
	East	West	North	South
Amrapalli	3.27	3.30	3.63	6.37
Mallika	5.00	3.50	3.47	3.67
Kohitur	5.37	4.20	4.20	4.63
Rani Pasand	4.10	2.40	4.20	3.73
Golabkhas	4.67	4.90	5.23	4.67
Bombai	2.17	1.87	4.00	2.53
Kohinoor	2.63	3.03	2.17	2.70
Enayat Pasand	2.83	2.77	2.53	2.70
Safdar Pasand	3.07	3.53	3.27	3.00
GM	**3.68**	**3.28**	**3.63**	**3.78**
SE(m)	**0.38**	**0.27**	**0.32**	**0.31**
CD	**1.11**	**0.80**	**0.92**	**0.90**
CV	**17.98**	**14.49**	**15.12**	**14.12**

Table 4. Flowering and fruiting characters of different varieties of mango.

Cultivars	Length of panicle at anthesis (cm)	No. of fruit/ panicle at maturity	No. of fruits/tree	Fruit yield /tree (kg)
Amrapalli	23.27	1.33	68.00	13.99
Mallika	17.63	3.00	31.33	21.41
Kohitur	27.10	4.27	71.00	17.84
Rani Pasand	19.11	1.40	78.00	12.64
Golabkhas	19.93	1.67	95.00	13.80
Bombai	17.54	3.53	82.00	16.07
Kohinoor	16.31	2.47	83 .0	21.03
Enayat Pasand	18.37	2.33	49.33	12.50
Safdar Pasand	20.03	1.97	78.00	14.18
GM	**19.92**	**2.43**	**70.63**	**15.94**
SE(m)	**1.68**	**0.21**	**2.48**	**0.82**
CD	**4.88**	**0.62**	**7.23**	**2.38**
CV	**14.59**	**15.19**	**6.09**	**8.91**

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