Evaluation of Potentiality of different Mango Genotypes for flowering, fruiting and yield of fruits under the Red and Lateritic Zone of West Bengal

ABSTRACT

The present investigation was carried out at mango orchard of Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva-Bharati, West Bengal, during the period of 2014- 2015 to study the potentiality of different cultivars of mango with regards to flowering, fruiting and yield of fruits. Total nine mango cultivars namely, Amrapali, Mallika, Kohitur, Ranipasand, Golabkhas, Bombai, Kohinoor, Enayat pasand and Safdar pasand were selected. One mango tree represents a single replication and each treatment or a cultivar was replicated three times. 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). Amongst all the evaluated Cv. Mallika, Golabkhas and Kohinor was found to be superior under the red and lateritic zone of West Bengal. As per the result found these identified cultivar may be considered as a good donor for hybridization programme to evolve the superior varieties and can be recommend for commercial multiplication and production specially under the red and lateritic zone of West Bengal.

Keyword: *mango, yield, variety, mallika and lateritic*

Introduction

Mango (*Mangifera indica* L.) is one of the most preferred, widely distributed fruit crop which belonging to the family Anacardiaceae and recognized as “King of Fruits” [1].

It 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 [2, 3]. It is the national fruit of India generally known for its special features like high nutritive value, delicious taste, high productivity, processing potential and suitability in widely ecological amplitude which placed them in a popular position as a source of income to farmers, trader and economic status of country in a large scale through their local and international markets [4]. The composition, in general, differs with the cultivar, stage of maturity, environmental conditions and culture practices. 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. In India, Mango is distributed throughout the length and breadth of the country except in the hills. Mango is the imperative fruit of West Bengal state occupying about 80.90 thousand hectares which is more than 41 per cent of total area under fruits [5]. The major mango growing districts in West Bengal are Malda, Murshidabad, Nadia, Burdwan, Jalpaiguri and CoochBehar. A variety which is grown in West Bengal is Bombai, Langra, Fazil, Himsagar, Gulbakhas, Gopalbhog, Nawab pasand, Sultan pasand and Rani pasand 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. The tree is hardy in nature, can be grown in a variety of soils and requires comparatively low maintenance costs. Mango has specific problem of alternate bearing habit which many times leads to low yields or no yield. Most of the north Indian varieties, viz. Dashehari, Langra, Chausa and Bombay Green are alternate bearer while, the South Indian varieties are regular bearer [6]. Generally Low productivity in mango is due to the effect of alternate bearing, inadequate fruit set followed by heavy fruit drop. The initial fruit set in mango is directly related to the proportion of perfect flowers [7].

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. However, irregularity of flowering in mango varies with time and intensity of flowering from year to year to almost complete alternate flowering habit, is not an uncommon phenomenon. Accordingly, the unscrambling the nature of flower triggering and signalling elements is of

utmost importance [8]. Mango tree generally have 200-3000 panicles with a potentiality to produce tremendous number of flowers [9]. 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 inductions, it depends on climatic conditions and previous crop productivity [10]. Cool temperature regulates the flowering in mango. Though, in case of high temperature, induction of flowering occurs in response to water stress [11]. Temperature ranges for mango cultivation is 24-27 °C but also can tolerate temperature as high as 48°C. The requirements of water depend on the type of soil and climate, planting distance, cultivar, age of plants, developmental stages, NPK applications and weather conditions [12, 13, 14, 15]. In mango, flowering is influenced by weather conditions and varietal genotypes and is the most important trait as it finally influences the yield. 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 been conducted so far in this area on the potentiality of different mango cultivars. Therefore, it is necessary to identify the suitable cultivars for particular agro-ecological condition which in turn may boost up the production with scientific management practices and also may be incorporated in future improvement programme.

Material and Method

The present investigation 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. The experiment site is semi-arid subtropical, lateritic belt in west Bengal. The average maximum and minimum mean temperature during the period of the study was 34.59^oC to 15.17^oC. The soil of the experiment field was sandy loam in texture, well-drained with a Ph of 6.4. 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. Design of experiment was randomized block design with three replications and each individual cultivar was considered as the treatments. 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).

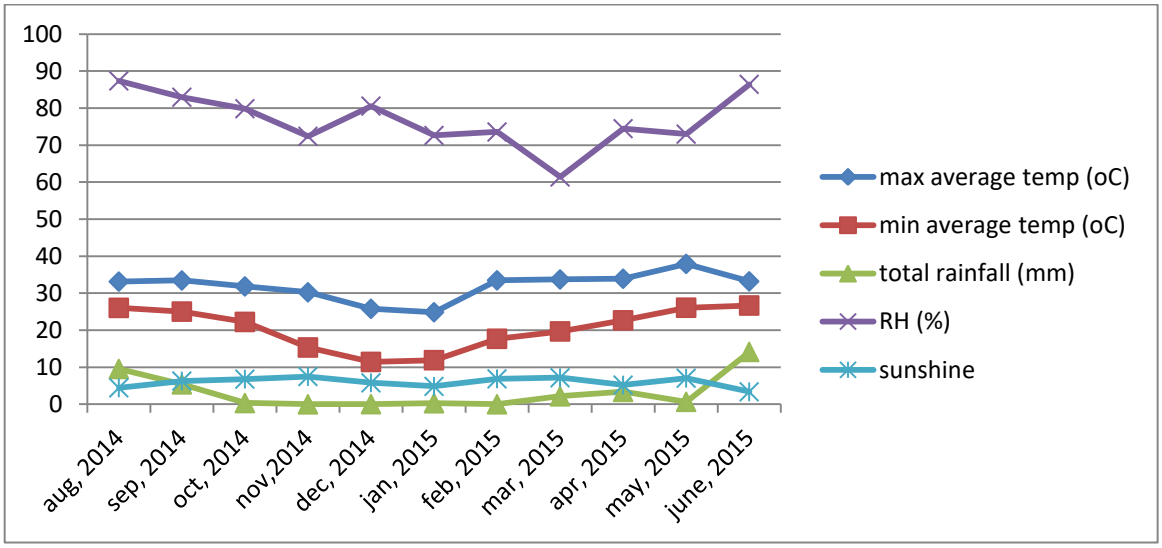

Fig. 1. Graphical representation of temperature, RH, rainfall and sunshine

Result and Discussion

Plant canopy architecture

As depicted in 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 represented in Fig. 2. showed 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. As per data presented in Fig 3. 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 conformity with the research findings that maximum yield reported in mango cv. Langra [16, 17]. Similar results in different agro climatic region of India have also reported [18]. [19] Found some comparable report on Mango plant architectures like tree height, trunk girth, spread of the tree shoot length and shoot girth is may be due to the varietal nature and environmental influence. Both the environment and genotype interaction are considered as responsible for the variation in plant architectures [20]. Equivalent finding have also been reported while evaluating the mango verities in India [21, 22, 23].

Table 1. Average tree height, girth and spreading of different cultivars 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**

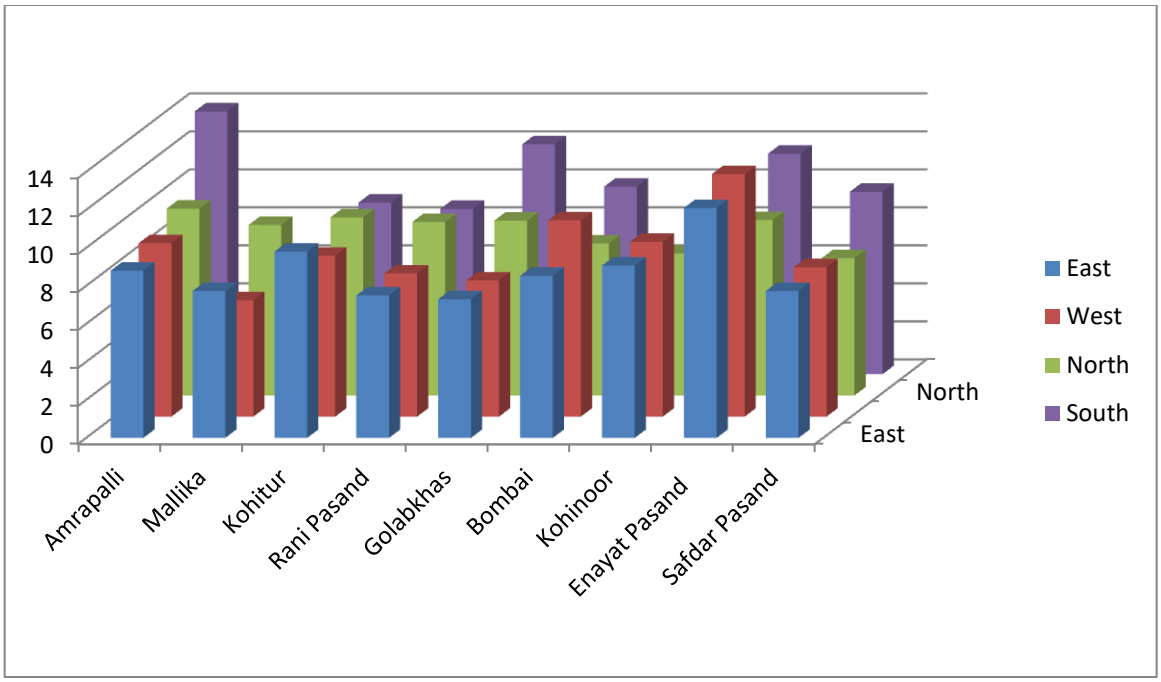

Fig. 2. Average of shoot length of different cultivars of mango

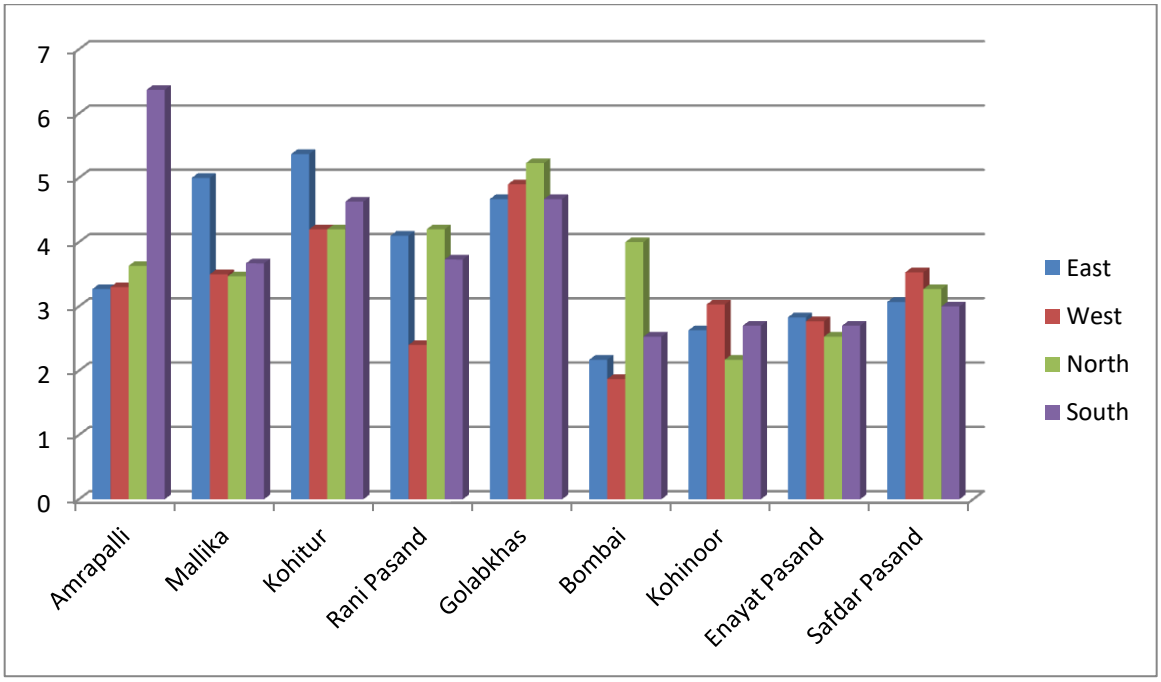

Fig. 3. Average of shoot girth of different cultivars of mango

Flowering and fruiting characters

Scrutiny of data from table 2. 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. [24] Distinct variation in no of panicles was reported. 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 findings was reported and thought 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. [25, 26, 27, 28]

Table 2. Flowering and fruiting characters of different cultivars 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**

Conclusion

The investigation conclude that out of all nine varieties grown under the red and lateritic zone of West Bengal, Birbhum District, Cv. Mallika, Golabkhas and Kohinor has found to be superior with respect to physical attributes and yield of Mango. These identified cultivars can be good donor for hybridization programme to evolve the superior varieties under Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva- Bharati, West Bengal.

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