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Studies on flowering behaviour and bio-chemical attributes of commercial mango cultivars with special reference to Ratol

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Abstract
Eight commercial cultivars of mango i.e. Ratol, Dashehari, Langra, Neelam, Mallika, Alphonso, Amrapali and Bombay Green were studied. The study was concentrated on the flowering behaviours and bio-chemical attributes. The earliest time of panicle initiation, date of completion of panicle emergence, date of flower initiations and date of full bloom was recorded in cv. Bombay Green. Mango cultivars also differed significantly for various chemical characters. The maximum level of TSS was recorded in cv. Alphonso (25.92 °brix). The level of titratable acidity was significantly lowest in cv. Ratol (0.11%) followed by Amrapalii. Maximum total sugars were recorded in cv. Amrapali (17.42%). Maximum storage life at ambient condition was observed in cv. Mallika (8.15 days) which was significantly higher than other cultivars. Minimum percent decay loss (21.40%). Organoleptic quality of cv. Ratol was found to be 'excellent', while Amrapali, Alphonso and Dashehari was found to be 'very good' and maximum incidence of floral malformation in cv. Amrapali (53.65%) followed by Ratol (51.63%). Such studies in commercial cultivars of mango will certainly be helpful in understanding its floral biology and chemical analysis to improve the fruit quality and yield.

Keywords: Flowering, bio-chemical, organoleptic quality, commercial mango, Ratol

Introduction
The mango (*Mangifera indica* L.) belongs to family Anacardiaceae, is one of the most important fruit crops of the world and is also acknowledged as the King of Fruits of India (Majumdar and Sharma, 1990) +. Since time immemorial the mangoes have been the favourite of kings and commoners alike in India for their luscious taste and captivating flavor. The mangoes are woody trees of the tropics, which can attain a height of 40 m or more with large canopy (Singh, 1990) [29]. They grow well on a well-drained alluvial or lateritic soil with a range of pH 5.5 to 7.5, and a water table below 180 cm around the year.

The mangoes have a natural distribution throughout South-East Asia. However, they are grown in all tropical and sub-tropical regions of the world (Litz *et al*., 1995) [18]. Polyembyronic cultivars are predominately grown mainly in South-East Asia, Central America, Haiti, and USA, Australia, and South Africa; whereas, monoembryonic cultivars are in India, South America, Africa and Florida (USA) (Mathews and Litz, 1992) [20]. Major mango producing countries are India, Mexico, Pakistan, Thailand, China, Brazil, Philippines and Indonesia.

Mango fruits have been an esteemed item of diet and are put to multifarious uses right from the first stage of development to maturity and ripening stage. The unripe mangoes are rich in vitamin C and the ripe fruits are rich in provitamin-A and contains moderate levels of vitamin C (Lakshminarayana, 1980) [17]. Besides fruits, various other parts of the tree e.g. wood, bark, dried flowers, leaves, etc. are also put to several domestic and industrial uses.

In north India the duration of flowering in mango is for about 20 to 25 days. Even within the state of Uttar Pradesh, the flowering in mango in eastern Uttar Pradesh occurs earlier than western Uttar Pradesh due to hotter climatic conditions and early onset of spring season in the former region of the state. In order to select suitable cultivar for a particular location which is of paramount importance for successful cultivation, the information on flower bud initiation, panicle emergence, flowering intensity and duration, bearing habit and fruit quality is essential.

Ratol which is one of the finest cultivars possesses most of these cited qualities. This cultivar originated in small village of RATOL in the district Baghpat (Western UP) which is 30 km, from New Delhi. First it was named as "Anwar Ratol" since its mother plants were grown in Mr.Anwar ul Haq's field. Later it came to be known as RATOL mango.

In Pakistan this finest cultivar is still known as Anwar Ratol. Since then he was known as the "Mango King". Pakistan has monopoly in the export of this important mango cultivar and the country earns handsome foreign exchange by exporting Ratol to European and gulf countries. Due to its delicious taste, luscious flavour and quality, the cv. Ratol has been recognized as 'King of mango'. The carrot flavour of the fruit is the unique characteristics of this delicious cultivar. Ratol trees are medium, maturity mid-season (July), fruits are small, peel thin, fruit quality excellent and flavour luscious delightful, fruits are sweet and delicious, and the keeping is quality fairly good. Stone is almost oblong.

Even though, it has excellent taste and flavour, due importance has not been given to this premium cultivar in the country. The complete knowledge of flowering and bio-chemical attributes of this cultivar is lacking which is the most important pre- requisite for successful orcharding. Scientific research work has not been made to study the growth, flowering and bio- chemical of the premium cultivar in the country. In view of above facts and considering the importance of this cultivar it was realised to Study on flowering behaviours and bio-chemical attributes of commercial mango cultivars with special reference to Ratol.

Materials and Methods

The field experiment was conducted at Horticultural Research Centre (HRC), old campus and also in the laboratory of Department of Horticulture of Sardar Vallabhbhai Patel University of Agriculture & Technology, Modipuram, Meerut, Uttar Pradesh a part of indo-Gangetic plain western Uttar Pradesh 2011-12 & 2012-13. The experiment was laid out in 3 replicates in a RBD (Randomized Block design). Study was conducted with eight mango cultivars namely, Ratol, Dahehari, Langra, Neelam, Mallika, Alphonso, Amrapali and Bombay Green. The experiment is carried out in the same orchard during both the years of investigation. During the study, observation were taken for flowering and chemical attributes like, the earliest time of panicle initiation, date of completion of panicle emergence, date of flower initiations and date of full bloom, Total soluble solids (TSS), titratable acidity, total sugars, storage life, decay loss percent, organoleptic quality and floral malformation. Total soluble solids (TSS) were recorded by using hand refractometer. Titratable acidity of mango pulp was determined by the method as described by Ranganna, 1979 [24]. Total sugar content of mango pulp was determined calorimetrically by the Anthrone method described by Jayaraman, 1981 [10]. The various treatments were evaluated by a panel consisted of trained panelists and evaluated the sample on the basis of colour, taste, aroma and by pressing the fruit and points were given as per hedonic scale procedure (Rangana, 1986) [25]. The data were analyzed by using the 'Analysis of Variance Technique' as per the procedures described by Panse and Sukhatme, 1985 [21]. The treatment means were compared at 5% level of significance. The data related to different traits of flowering of Ratol vis-à-vis commercial mango cultivars were recorded during the study as per the details given below.

Result and Discussion

Flowering attributes

Panicle emergence

In the present study the panicle emergence differed significantly among the cultivars. The earliest panicle was emerged in cv. Bombay Green closely followed by Mallika and Langra, while the latest panicle emergence was recorded in cv. Ratol. These findings are in line with the findings of Chandra *et al*. (2001) [6] who also reported earliest panicle emergence in cv. Bombay Green followed by Mallika under Sabour (Bihar) condition. Similar observations have also been made by various researchers (Singh, 2014 and Kadam, 2013) [30, 12]. The variation in time of panicle emergence among cultivars as reported in the present study was also reported by Kumar and Jaiswal (2003) [15] who observed variation in time of panicle emergence among different cultivars. The variation observed in terms of panicle initiation might be due to the differences in genetic composition of parental mango cultivars. Phenology pattern is strongly influenced by environmental factors as reported by Chacko *et al.*, 1971 [5].

Date of completion of panicle emergence

The date of completion of panicle emergence was found earliest in cv. Bombay Green (February 7) closely followed by Mallika (February 9) and Amrapali (February 9). Late completion of panicle emergence was observed in cv. Ratol (March 2) during both the year of investigation. The possible cause of difference in completion of panicle emergence among cultivars might be due to genetic constituent of cultivars and environmental conditions which varied from location to location (Kumar and Nagpal, 2003). Further, earliest completion of panicle emergence in cv. Bombay Green may also be due to the fact that being earliest maturity cultivar; Bombay Green had completed the panicle emergence at the earliest than other cultivars under north Indian conditions.

Flower initiation

The earliest flower initiation was occurred in cv. Bombay Green (March 8) closely followed by Dashehari (March 10) and Langra (March 10), while late flower initiation was observed in cv. Ratol (March 16). The results are in line with the findings of Singh (2009) [31] who stated that cv. Bombay Green being the earliest maturing cultivar flowered earliest in north Indian conditions among the commercial cultivars grown in the region. In the present study most of the commercial cultivars, namely, Dashehari, Langra and Bombay Green flowered between first weeks to third week of March. Similar, results were also observed by Sharma and Kher 2002 while evaluating mango cultivars for their performance under sub-tropical rain fed region of Jammu had also recorded flowering in cv. Dashehari in the 2nd week of March, whereas cv. Mallika reached full bloom during last week of March. The variability in relation to time of flowering as observed in the present study is also reported by Valmayor, 1962 [34] who observed that the variation in blooming period is mainly governed by the combination of environmental factors and the condition of the mango trees.

Date of full bloom

Of the eight cultivars studied, earliest blooming was observed in cv. Bombay Green (March 13 and March 15) closely followed by Neelam (March 16 and March 18), Dashehari (March 16 and March 19) and Langra (March 18 and March 20), while latest blooming was recorded in cv. Amrapali (March 22 and March 24) followed by Ratol (March 21 and March 22). Similar observation on blooming period was also made by Sharma and Kher 2002 who had reported blooming in commercial mango cultivars between 2nd weeks of March to 3rd week of March. The duration of flowering in the current study varied from 14 to 23 days among different mango cultivars. Kumar and Jaiswal 2003 [15] also reported duration

of flowering between 12 to 25 days in different mango cultivars. This variation in duration of flowering among cultivars might be due to local climatic conditions and orchard management practices besides varietal factor.

Malformation percent

The experimental findings of present study revealed maximum incidence of floral malformation in cv. Amrapali (53.65%) followed by Ratol (51.63%), Bombay Green (44.05%), while minimum was observed in cv. Neelam (16.00%) followed by Alphonso (22.20%). These results are in accordance with the findings of Badliya and Lakhanpal (1990) who also recorded highest floral malformation (57.12%) in cv. Amrapali. Cultivars Amrapali and Neelam were also found to be highly susceptible to floral malformation as observed in the present study (Krishnan *et al*., 2009) [14]. Higher incidence of floral malformation as recorded in cv. Ratol in the current study has also been reported by Khan and Khan 1960 [13] who found 50-56% incidence of floral malformation in cv. Ratol. The variation in the incidence of floral malformation amongst the hybrids may be due to genetic characters of cultivars and climate conditions of the particular region where orchards are established (Kumar and Nagpal, 1996) [16]. The findings of present study are also supported by Raheel *et al.,* 2011 [26] who reported floral malformation in different mango cultivars in the following orders: Amrapali (44.3%)> Dashehari & Bombay Green (20.1%)> Kesar (19.3%)> Langra & Chausa (17.8%)> Mallika (10.6%).

Chemical attributes

Total soluble solids

In the present investigation, highest TSS content among the cultivars was recorded in cv. Alphonso (25.92 °Brix) followed by Mallika (19.06 °Brix), Ratol (18.82°Brix), Amrapali (17.64 °Brix), while cv. Dashehari (13.74°Brix) had minimum level of TSS. Higher level of TSS (between 18 and 23 °Brix) in commercial mango cultivars (Dashehari, Langra, Mallika, Amrapali and Chausa) was also recorded by various mango researchers (Bains and Dhillan, 1999 and Hoda *et al*., 2003) [2, 9]. The results obtained by Prasad and Nalini (1977) [23] who reported that cv. Alphonso had the highest level of total soluble solids and sugar and lowest content of acid besides having excellent flavour. The variation in TSS level among mango cultivars depends upon the stage of maturity and ripening of fruit, genetics constitution of cultivars, orchard management practices, environmental conditions etc. Increase in TSS during ripening might be associated with the transformation of pectin substances, starch, ripening hemi-cellulose or other polysaccharides in soluble sugar and dehydration of fruit (Singh, 2003) [32].

Titrable Acidity

The level of titratable acidity in the present study was found significantly lower in cvs. Ratol and cv. Amrapali (0.11%) followed by Neelam (0.21%) and Dashehari (0.22%), while highest level of titrable acidity was recorded in cv. Bombay Green (0.31%) followed by Alphonso (0.31%) and Mallika (0.29). Variation in acid content in fruits of mango cultivars was also reported by Dhillon *et al*., 2004 [7]. They observed acidity between 0.12 and 0.46% in fruits of different cultivars. The lower level of acidity (0.11%) as reported in the present study was also observed by Dhillon *et al*., 2004 [7] in mango cultivars. Pawar 2011 [22] had also recorded titrable acidity in commercial cultivars in the same range (0.18 to 0.22%.) as reported in the present study. It clearly indicates that there are some other factors (other than environmental and cultural) which strongly influenced the level of acidity in fruit.

Total sugars

The level of total sugars in the present study ranged from 11.37 to 17.42 percent. Significantly maximum level of total sugars was estimated in cv. Amrapali (17.42%) followed by Neelam (17.25%), Mallika (16.66%) and Alphonso (16.12%), while cv. Dashehari (11.37%) contained minimum level of total sugars. Wide variation in total sugars in fruits of different cultivars was also recorded by mango researchers (Pawar, 2011 and Hoda *et al.,* 2003) [22, 9]. In the current study, the level of total sugars in cv. Mallika, Ratol, Dashehari, Neelum and Langra was found to be within the range of 11.37 to 17.42%. Similarly the level of total sugars in different mango cultivars in the same range (15-18%) was also reported by Bhowmick and Banik 2005 [4].

Storage-life and Decay loss

In the current study, significantly maximum storage life was recorded in cv. Mallika (8.15 days) followed by Ratol (5.17 days) and Amrapali (4.80 days), while minimum was observed in cv. Bombay Green (3.87 days). Further, lowest decay loss was found in cv. Mallika (21.40%) followed by Amrapali (26.40%) and Alphonso (31.85%), while the highest decay loss was recorded in cv. Bombay Green (56.70%) Reddy (2012) [27] also supported the findings of this study on decay loss and reported minimum decay loss (28.36%) in cv. Mallika, while cv. Langra had highest decay loss (52.67%). Similar observation on storage life was also made by Kadam (2013) [12] who reported maximum shelf-life 8.15 days in cv. Mallika, Another researcher, Bairangi (2013) [3] reported that the cv. Amrapali showed maximum shelf-life (7.0 days) at ambient temperature. Increase in rotting of fruit with the decline in acid content is at least imparted due to utilization of organic acids in energy production and alcoholic fermentation. Reddy (2012) [27] also supported the findings of this study on decay loss and reported minimum decay loss (28.36%) in cv. Mallika, while cv. Langra had highest decay loss (52.67%). In general, mango fruit takes about four to five days to ripe and becomes over ripe after seven or eight days under tropical conditions. So the storage life of most of the cultivars under study was found between 4 to 8 days. The shelf-life of mango fruit which is mainly a varietal character varied from cultivar to cultivar in the present study. The other factors which affect the storage-life of mango fruits include time of fruit maturity and harvesting, storage temperature, packaging etc.

Organoleptic quality

In the current study, the organoleptic quality of cv. Ratol was found to be 'excellent', while organoleptic quality of cvs. Amrapali, Alphonso, Dashehari was observed to be 'very Good'. Based on the data recorded on organoleptic quality for two year study cv. Ratol has been adjudged as excellent cultivar in respect of skin colour, texture and taste over other cultivars under study. Akhtar *et al.,* (2009) [1] also observed that cv. Ratol to be highly acceptable for taste and flavour as compared to rest of three cultivars i e. Dashehari, Chausa, Langra. The excellent organoleptic quality of Ratol in the present study was mainly because of its unique flavour and taste. The better organoleptic quality of mango fruit may be due to transformational changes in fatty acid profile especially from palmitic acid to palmitoleic acid of Ratol mango during

ripening may be correlated with the changes in aroma and flavour characteristics (Gholap & Bandyopadhyay, 1975) [8]. Results obtained on organoleptic quality in the present study are also in accordance with the findings of Uddin *et al.,* 2007 who recorded variable score in different mango genotypes. The significant variation in organoleptic quality as reported in the present study was also obtained by other mango researchers (Joshi 2010 and Pawar 2011) [11, 22].

Table 1: Time of panicle emergence in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13

Cultivars	Time of panicle emergence			Delay (+) or advancement (-) in days of panicle emergence over Ratol
	2011-12	2012-13	Mean	
Ratol	23 February	26 February	25 February	-
Dashehari	10 February	15 February	13 February	(-) 12
Langra	04 February	08 February	06 February	(-) 19
Neelam	06 February	11 February	09 February	(-) 16
Mallika	31 January	05 February	03 February	(-) 22
Alphonso	03 February	09 February	06 February	(-) 19
Amrapali	04 February	07 February	06 February	(-) 19
Bombay Green	31 January	02 February	01 February	(-) 24

Table 2: Date of completion of panicle emergence in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13

Cultivars	Date of completion of panicle emergence		
	2011-12	2012-13	Mean
Ratol	29 February	04 March	02 March
Dashehari	24 February	28 February	26 February
Langra	09 February	14 February	12 February
Neelam	11 February	17 February	14 February
Mallika	06 February	12 February	09 February
Alphonso	08 February	15 February	12 February
Amrapali	07 February	10 February	09 February
Bombay Green	05 February	08 February	07 February

Table 3: Date of flower initiation in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13

Cultivars	Date of flower initiation			Delay (+) or advancement (-) in days of flower initiation over Ratol
	2011-12	2012-13	Mean	
Ratol	15 March	17 March	16 March	-
Dashehari	09March	10 March	10 March	(-) 6
Langra	14 March	16 March	10 March	(-) 6
Neelam	12 March	14 March	13 March	(-) 3
Mallika	10 March	12 March	11 March	(-) 5
Alphonso	13 March	16 March	15 March	(-) 1
Amrapali	14 March	16 March	15 March	(-) 1
Bombay Green	07 March	09 March	08 March	(-) 8

Table 4: Date of full bloom in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13

Cultivars	Date of full bloom			Delay (+) or advancement (-) in days of full bloom over Ratol
	2011-12	2012-13	Mean	
Ratol	21 March	22 March	22 March	-
Dashehari	16 March	19 March	18 March	(-) 4
Langra	18 March	20 March	19 March	(-) 3
Neelam	16 March	18 March	17 March	(-) 5
Mallika	21 March	22 March	22 March	-
Alphonso	20 March	21 March	21 March	(-) 1
Amrapali	22 March	24 March	23 March	(+) 1
Bombay Green	13 March	15 March	14 March	(-) 8

Table 5: Incidence of floral malformation in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13

Cultivars	Floral malformation (%)			Increase or decrease in floral malformation over Ratol	Percent increase (+) or decrease (-) in floral malformation over Ratol
	2011-12	2012-13	Mean		
Ratol	50.60	52.66	51.63	-	-
Dashehari	30.15	35.20	32.68	(-) 18.95	(-) 36.70
Langra	32.28	34.20	33.24	(-) 18.39	(-) 35.61
Neelam	15.10	16.90	16.00	(-) 35.63	(-) 69.01
Mallika	39.40	45.20	42.30	(-) 09.33	(-) 18.07
Alphonso	21.50	22.90	22.20	(-) 29.43	(-) 57.00
Amrapali	52.30	55.01	53.65	(+) 02.02	(+) 03.91
Bombay Green	43.60	44.50	44.05	(-) 07.58	(-) 14.68
Mean	35.61	38.32	36.97	-	-
LSD (P<0.05%)	0.851	0.867	-	-	-
SE m ±	0.278	0.283	-	-	-

Table 6: Total soluble solids (TSS) content in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13.

Cultivars	Total soluble solids (°brix)			Increase or decrease in TSS over Ratol	Percent increase (+) or decrease (-) in TSS over Ratol
	2011-12	2012-13	Mean		
Ratol	18.43	19.20	18.82	-	-
Dashehari	13.50	13.98	13.74	(-) 05.08	(-) 26.99
Langra	13.91	14.79	14.35	(-) 04.47	(-) 23.75
Neelam	14.21	14.70	14.46	(-) 04.36	(-) 23.16
Mallika	18.81	19.30	19.06	(+) 00.24	(+) 01.27
Alphonso	25.48	26.36	25.92	(+) 07.10	(+) 37.72
Amrapali	17.15	18.13	17.64	(-) 01.18	(-) 06.26
Bombay Green	15.87	16.75	16.31	(-) 02.51	(-) 13.33
Mean	17.17	17.90	17.54	-	-
LSD (P<0.05%)	0.25	0.254	-	-	-
SE m ±	0.08	0.083	-	-	-

Table 7: Titratable acidity content in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13

S.N.	Cultivars	Acidity (%)			Increase or decrease in titrable acidity over Ratol	Percent increase (+) or decrease (-) in titrable acidity over Ratol
		2011-12	2012-13	Mean		
1.	Ratol	0.10	0.12	0.11	-	-
2.	Dashehari	0.21	0.24	0.22	(+) 0.11	(+) 100.00
3.	Langra	0.24	0.24	0.24	(+) 0.13	(+) 118.18
4.	Neelam	0.21	0.22	0.21	(+) 0.10	(+) 90.90
5.	Mallika	0.29	0.29	0.29	(+) 0.18	(+) 163.63
6.	Alphonso	0.29	0.31	0.31	(+) 0.20	(+) 181.81
7.	Amrapali	0.11	0.11	0.11	(+) 00.00	(+) 00.00
8.	Bombay Green	0.30	0.31	0.31	(+) 0.20	(+) 181.80
	Mean	0.22	0.23	0.23	(+) 0.26	(+)119.47
	LSD (P<0.05%)	0.005	0.005	-	-	-
	SE m ±	0.002	0.002	-	-	-

Table 8: Total sugars content in Ratol vis-à-vis commercial mango cultivars during 2011-12 and 2012-13.

S.N.	Cultivars	Total sugar (%)			Increase or decrease in total sugar over Ratol	Percent increase (+) or decrease (-) in total sugar over Ratol
		2011-12	2012-13	Mean		
1.	Ratol	12.30	12.63	12.47	-	-
2.	Dashehari	11.17	11.57	11.37	(-) 01.10	(-) 08.82
3.	Langra	14.21	14.50	14.36	(+) 01.89	(+) 15.15
4.	Neelam	17.05	17.44	17.25	(+) 04.78	(+) 38.33
5.	Mallika	16.56	16.76	16.66	(+) 04.19	(+) 33.60
6.	Alphonso	15.78	16.46	16.12	(+) 03.65	(+) 29.27
7.	Amrapali	17.10	17.74	17.42	(+) 04.95	(+) 39.69
8.	Bombay Green	16.07	16.56	15.25	(+) 02.78	(+) 22.29
	Mean	15.03	15.46	15.24	-	-
	LSD (P<0.05%)	0.15	0.146	-	-	-
	SE m ±	0.047	0.048	-	-	-

Table 9: Storage life of Ratol vis-à-vis commercial mango cultivars at ambient conditions during 2011-12 and 2012-13

Cultivars	Storage life at ambient conditions (days)			% increase (+) or decrease (-) in storage life over Ratol
	2011-12	2012-13	Mean	
Ratol	5.10	5.24	5.17	-
Dashehari	4.33	4.80	4.57	- 11.60
Langra	4.07	4.12	4.09	- 20.88
Neelam	4.41	4.80	4.61	- 10.83
Mallika	7.80	8.50	8.15	- 57.64
Alphonso	4.41	4.80	4.60	- 11.02
Amrapali	4.60	4.99	4.80	- 07.15
Bombay Green	3.75	4.00	3.87	- 25.14
Mean	4.81	5.15	4.98	- 13.42
LSD (P<0.05%)	0.03	0.04	-	-
SE m ±	0.01	0.01	-	-

Table 10: Decay loss in Ratol vis-à-vis commercial mango cultivars at ambient conditions during 2011-12 and 2012-13

Cultivars	Decay loss (%)			Increase or decrease in decay loss over Ratol	% increase (+) or decrease (-) in decay loss over Ratol
	2011-12	2012-13	Mean		
Ratol	51.67	54.45	53.06	-	-
Dashehari	37.67	38.33	38.00	(-) 15.06	(-) 28.38
Langra	52.40	53.60	53.00	(-) 00.06	(-) 00.11
Neelam	53.60	54.40	54.00	(-) 01.06	(-) 01.77
Mallika	20.60	22.20	21.40	(-) 31.66	(-) 59.66
Alphonso	30.60	33.10	31.85	(-) 21.21	(-) 39.97
Amrapali	25.20	27.60	26.40	(-) 26.66	(-) 50.24
Bombay Green	55.30	58.10	56.70	(-) 03.64	(-) 06.86
Mean	40.88	42.72	41.80	(-) 14.19	(-) 26.71
LSD (P<0.05%)	0.900	0.899	-	-	-
SE m ±	0.294	0.294	-	-	-

Table 11: Organoleptic fruit quality of Ratol vis-à-vis commercial mango cultivars at ambient conditions during 2011-12 and 2012-13

Cultivars	Organoleptic quality			Increase or decrease in organoleptic quality over Ratol	% increase (+) or decrease (-) in organoleptic quality Ratol
	2011-12	2012-13	Mean		
Ratol	4	5	4.5	-	-
Dashehari	4	4	4.0	(-) 0.50	(-) 11.11
Langra	3	4	3.5	(-) 1.00	(-) 22.22
Neelam	2	3	2.5	(-) 2.00	(-) 44.44
Mallika	3	3	3.0	(-) 1.50	(-) 33.33
Alphonso	4	4	4.0	(-) 0.50	(-) 11.11
Amrapali	4	4	4.0	(-) 0.50	(-) 11.11
Bombay Green	3	4	3.5	(-) 1.00	(-) 22.22
Mean	3.38	3.88	3.6	(-) 1.00	(-) 22.22
LSD (P<0.05%)	0.047	0.041	-	-	-
SE m ±	0.015	0.013	-	-	-

Conclusion

The study concludes that among eight mango cultivars, Ratol in comparison to commercial mango cultivars was found to be having the most late panicle initiation, flower emergence, had lowest acidity, moderate TSS, lowest titratable acidity, lower total sugars, higher floral malformation, good storage life and high decay loss. However, the cultivar has been found superior over commercial cultivars in respect to its organoleptic quality.

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