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Study of Physico-Chemical Characters of Promising Hybrids of Mango (*Mangifera indica* L.)

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ABSTRACT

Quality attributing characters studied in ten important crosses of known mango cultivars viz. Langrawith Sepia, Rani Pasand, Taimuria, Mylepellian, Mithua,Amrapaliand Neelumas well as cultivar Sipia with Bombai and Langra. The Physical qualities like fruit size (cm), fruit weight (g), pulp (%), stone (%) and peel (%)) as well as the T.S.S. as chemical quality was also significantly varied among different crosses. Hybrid 118 (Langra x Mylepellian) mature earlieston 22nd June 2009 i.e., 7 days earlier than hybrid 112 (Langra x Mithua). Average fruit size (Length- 10.5 cmand width- 7.7 cm), fruit weight (295 g) and pulp percentage (74.0) was recorded with hybrid 148 (Langra x Neelum). Whereas the minimum peel (19.4 %) and stone (19.1 %) was notedunderthe crosses 124 (Sipia x Langra) and 118 (Langra x Mylepellian) respectively. The hybrid 85 (Langra x Rani Pasand) recorded maximum total soluble solids (24.2^{0}Brix)

Key words : Mango, hybrids and fruit quality.

Mango (*Mangifera indica* L.) is a very popular and choicest fruit crop widely cultivated in almost tropical and subtropical region of the world. It belongs to the family Anacardiaceae and originated in South-East Asia Tropical Regions (Purseglove, 1972). Most of the mango cultivar have biennial bearing with the poor percentage of crossing resulting low fruiting (Singh *et al*,1980) is a common problem for mango production and breeding. In view to overcoming the low fruit set problem, alternate bearing, lacking of attractive colour, smaller fruit size and lower pulp percentage and total soluble solids (majorly due to sugar) in both the fields of quality production and breeding, more knowledge on floral biology and reproductive physiology of the mango is important

Mango is highly cross-pollinated crop generally pollination takes place by insects (Ram,1992).In nature, more than 50% of the flowers do not receive any pollen and number of pollen grains per pollinated flower is also very low i.e. three per flower (Majumdar and Sharma,1990). Generally, in mango cultivation the flowering period starts from second fortnight of January and extended up to first fortnight of March in the climatic condition of Bihar depending upon the variety and climatic condition in the particular year. The fruit quality i.e., size with maximum pulp and acid blending sweetness (TSS) as well as attractive colour is highly desirable characters in mango lacking together in a cultivar.

Therefore, keeping in the view of these lacking in quality mango production, the present work of investigation was taken to incorporate these desirable characters through hybridization and assess the bearing behavior and fruit quality in promising crossing of different mango cultivar i.e. Langra, Sipia,Rani Pasand, Taimuria, Mylepellian, Mithua, Amrapali, Neelum, and Bombay.

MATERIALS AND METHODS

More than 150 mango accessions have been collected at Bihar Agricultural College, Sabour (Bhagalpur) from different parts of India. The works on varietal improvement is continuing here since long. The present investigation was carried out in All India Co-ordinated Research Project on subtropical fruits under Bihar Agricultural University, Sabour, Bhagalpur, Bihar on mango hybrids (crosses) of the respective region i.e. cv. Langra, Bombai, Zardalu, Bangalora and Hemsagar during the year 2009. The climate of Sabour is semi-arid, subtropical along with hot desiccating summer and cold frostless winter. In this study the selection of hybrid was done by using eye estimation and available statistical tools in physicochemical characteristics of all crossings. Trees under mango hybridization programme were 15 to 19 years old and maintained under uniform cultural practices during the course of the investigation. The experimental plot had well-drained alluvial soil of good fertility with the

Table-1 : Physico-chemical characters of promising hybrids of mango.

Sl. No	Hybrid No.	Parent	Date of harvesting	Size		Fruit Wt. (g)	Pulp (%)	Peel (%)	Stone (%)	T.S.S. (%)
				Length (cm)	Width (cm)					
1	85	Langra x Rani Pasand	18.06.2009	9.8	7.3	232	68.5	21.1	24.2	24.2
2	114	Langra x Taimuria	20.06.2009	8.0	7.1	202	64.0	22.0	21.6	21.6
3	117	Sipia x Mithua	18.06.2009	8.1	6.0	175	60.5	22.6	23.0	23.0
4	118	Langra x Mylepellian	15.06.2009	8.7	6.1	142	62.7	25.8	19.1	19.1
5	122	Langra x Mithua	22.06.2009	9.0	6.4	190	66.8	22.6	21.5	21.5
6	124	Sipia x Langra	18.06.2009	8.5	6.9	152	60.0	19.4	23.5	23.5
7	129	Bombay x Sipia	20.06.2009	9.6	6.2	205	58.2	22.8	22.2	22.2
8	137	Sipia x Langra	20.06.2009	8.9	6.8	216	63.8	20.3	19.5	19.5
9	144	Langra x Amrapali	20.06.2009	7.3	6.6	178	71.3	21.6	24.0	24.0
10	148	Langra x Neelum	20.06.2009	10.5	7.7	295	74.0	24.8	20.0	20.0

levelled surface. Trees were spaced at 08 x 08 m, irrigated via modified basin system.

The data on day of harvesting or maturity of the fruits was decided tree wise on the basis of 'Tapka' (when three or four ripen fruits fell down). The fruit quality parameters such as physical quality-fruit weight (gm), fruit length (cm), width (cm) were recorded upon the average of ten fruits of average size collected randomly from the tree. The average fruit weight (g) was measured of the same fruits during the fruit ripening period using an electronic weighing balance. The fruit length and width (cm) were measured on these sampled fruits using a 'digital vernier caliper'. The data on peel (%), pulp (%) and stone (%)of the same ten fruits were determined on weight basis (w/w) whereas the chemical quality- Total Soluble Solids (TSS) content was determined at the fruit ripening stage on same 10 mature fruits selected randomly for measuring fruit size and weight. The samples were selected following the sampling method of GB/T8855-2008 fresh fruits and vegetables (SAC, 2008). The Total soluble solid (majorly affected by sugar content) content was determined in mangoes fruit using a hand refractometer. The data presented in Table-1 are of the selected crossing, where selection was done individually by using basic statistical tools among all crossings.

RESULTS AND DISCUSSION

Fruit maturity : Hybrid 118 (Langra x Mylepellian) mature earliest on 15th June 2009 followed by hybrid 114 (Langra x Taimuria), 129 (Bombay x Sipia),137 (Sipia x Langra) 144 (Langra x Amrapali) and 148 (Langra x Neelum) on 20th June 2009 and hybrid 122 (Langra x Mithua) matured in the last on 22nd June 20009. Variation in fruit maturity in different crosses or varieties might be due to change in location or inherent genetic variation (Singh, 2002 and Hoda et al., 2003). Similar findings had also reported by Sardar et al. (1998).

Fruit length : Data regarding fruit length of ten mango hybrids showed significant differences. Hybrid 148 (Langra x Neelum) produced maximum fruit length of 10.5 cm followed by 9.8 cm and 9.6 cm respectively with the hybrid 85 (Langra x Rani Pasand) and 129 (Bombay x Sipia) whereas the minimum length of 7.3 cm noted under the hybrid 144 (Langra x Amrapali).

Fruit width : Differences among fruit width of ten mango hybrids were also found statistically significant (Table-1). Maximum fruit width(7.7 cm) was noted again with the hybrid 148 (Langra x Neelum) followed by hybrid 85 (Langra x Rani Pasand) and hybrid 114 (Langra x Taimuria) with 7.3 and 7.1 cm respectively and minimum width of 6.0 cm found to hybrid 117 (Sipia x Mithua). Several workers have studied the fruit size of mango and reported that mango cultivars differed in fruit length and width according to their genetic makeup.

Fruit weight : Highly significant differences in fruit weight were also noted among crosses of different mango cultivars (Table-1). Out of these selected 10 crossings maximum fruit weight (295 g) was recorded in hybrid 148 (Langra x Neelum) followed by hybrid 85 (Langra x Rani Pasand) with 232 g and hybrid 137 (Sipia x Langra) with 216g against minimum (142 g) for hybrid 118 (Langra x Mylepellian). The variation in fruit weight is due to attribute of different cultivars used in hybridization to multiply and enlarge the cells

membrane of the fruit to accumulate more sugar and water for expanding the cells which is greatly influenced by the genetic makeup of particular cultivar. These results are in agreement with the findings of Uthaiah et al. (1990), Dalal et al. (2005) Dhua (2004).

Pulp percentage : The data (Table-1) showed that mango hybrid148 (Langra x Neelum) had the highest pulp percentage (78.0) followed by hybrid 144 - Langra x Amrapali (71.3 %), hybrid 85 - Langra x Rani Pasand (68.5 %) and hybrid 122- Langra x Mithua (66.8%) whereas the minimum pulp (58.2 %) was noted with hybrid 129 - Bombay x Sipia out of these selected 10 crossings. Sarkar *et al.* (2001) reported upto 78.1 percent pulp in mango cultivars.

Peel Percent : For peel percent, the lowest values among all selected were found for hybrid 124 - Sipia x Langra (19.4%) followed by hybrid 137 – (Sipia x Langra) and hybrid 85 (Langra x Rani Pasand), with 20.3 and 21.4%, respectively Minimum peel (19.4) percent was exhibited by hybrid 124 (Sipia x Langra), followed by hybrid 137 (Sipia x Langra) with 20.3 % and hybrid 85 (Langra x Rani Pasand) with 21.4 % (Table 1). The maximum (25.8) peel percent recorded with hybrid 118 (Langra x Mylepellian). Mitra and Mitra (2001) evaluated 19 cultivars and reported different peel weight in these cultivars.

Seed/stone percent : Among all the selected crossings the stone weight for fruits in hybrid118 (Langra x Mylepellian) was the lowest (19.1 %) in comparison with the other selected cultivars, confirming a better relationship with the pulp. On the other hand, the percentages of seed contribution to the total fruit weight for hybrid 137 (Sipia x Langra) and hybrid 148 (Langra x Neelum) were acceptable (20.3 and 21.1 %, respectively). Hybrid 85 (Langra x Rani Pasand) and hybrid 144 (Langra x Amrapali) showed the highest percentages of seed to total fruit weight (24.2 and 24.0 %, respectively). Sarkar *et al.* (2001) reported that as the fruit Evaluation of physico chemical characteristics in mango weight and size in various cultivars differed, seed weight also varied within the cultivars.

CONCLUSION

On the basis of above-mentioned facts, it may be concluded that among ten mango hybrids, fruit of hybrid 118 (Langra x Mylepellian) matured earliest, whereas hybrid 122 (Langra x Mithua) matured late. Hybrid 148 (Langra x Neelum) had larger fruit with maximum fruit weight and pulp weight or pulp percentage. The minimum stone and peel percent shown by the fruits of hybrid 118 (Langra x Mylepellian) and 124 (Sipia x Langra). However, in TSS, hybrid (Langra x Rani Pasand) topped the list.

REFERENCES

1. Dalal SR, Jadhao BJ, Jogdande ND, Anjali Mohariya, 2005. Comparative performance of mango varieties under Vidarbha Region of Maharashtra. *Int. J. of Agric. Sci., 1(1):* 91-93.
2. Dutta P, Dhua RS. 2004. A study on physicochemical changes during growth, maturity and ripening In mango cv. Safdar Pasand. *South Indian Hort., 52(1/6):* 297-301.
3. Hoda, M.N., Singh, S., Singh, J., 2003. Evaluation of mango (*Mangifera indica* L.) cultivars for quality attributes. *Indian Journal of Agricultural Sciences, 73(9):* 504-506.
4. Kumar N, Jaiswal US 2003. Bearing behaviour of some west and south Indian mangoes. *Haryana J. of Hort. Sci., 32(3/4):* 154-158.
5. Majumdar PK, Sharma DK. Mango 1990. In: Fruits. Tropical and Subtropical. T.K. Bose and S.K. Mitra (ed), 62. Naya Prokash, Calcutta.
6. Mitra, S. and S.K. Mitra. 2001. Studies on physico-chemical characteristics of nineteen mango cultivars grown in west Bengal. *Indian Agriculturist. 45(3-4):* 295.
7. Sarkar, S.K., B. Gautham, G. Neeraja and N. Vijaya. 2001. Evaluation of mango hybrids under Telangana region Andhra Pradesh. *Hort. J. 14(1):* 13-21.
8. Purseglove J.W. 1972. Mangoes west of India. *Acta. Hort., 24:* 170-174.
9. Ram S. 1992. Naturally occurring hormones of mango and their role in growth and drop of fruit. *Acta Hort., 321:* 400-411.
10. SAC 2008. Fresh Fruits and Vegetables— Sampling; GB/T 8855-2008; The Standardization Administration of China: Beijing, China.
11. Sardar, P.K., Hossain, M.A., Islam, M.S., Khondaker, S.M.A.T., 1998. Studies on the physico-morphological characters of some popular mango cultivars. *Bangladesh Journal of Agricultural Sciences 25(1):* 1-4.
12. Singh RN, Sharma DK, Majumder PK 1980. An efficient technique of mango hybridization. *Scientia Hort., 12:* 299-301.
13. Singh, S., 2002. Evaluation of mango cultivars for their flowering, fruiting and fruit quality attributes. *Progressive Horticulture 34(2):* 240-243.
14. Uthaiah BC, Lingaiah HB, Indiresh KM, Hanumaiah H, Rao KB 1990. Fruit characters of some less popular mango varieties. *Mysore J. of Agric. Sci., 24(4):* 479-481.