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COLLECTION OF GENETIC DIVERSITY OF MANGO (*MANGIFERA INDICA* LINN.) FROM UTTAR PRADESH

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Forty nine distinct genotypes of mango germplasm possessing wide range of diversity in agrobotanical and morphological traits of the fruits and maturity period were identified from 8 districts of western Uttar Pradesh. Positive and highly significant correlations were observed between average fruit weight with length and diameter; and between length and diameter of fruits. It provides ample scope for selection of donor germplasm for various traits. Most notable donor genotypes for various traits viz. maturity period (early, mid, late and extra late) sucking type, cluster bearing, pickle type, pleasant taste and aroma were collected.

Key words : Genotype, *Mangifera indica* Linn, genetic diversity, landraces of western Uttar Pradesh.

The mango a well-known fruit of Indian subcontinent for several centuries, was virtually unknown to any botanist until 1605 (Mukherjee, 1949). Besides the Indian subcontinent, mango is now grown in several countries of the tropical and sub-tropical world where it was introduced by Muslim rulers, missionaries, Spanish, voyagers and Portuguese explorers during the 15th to 18th century (Majumdar and Sharma, 1985). The genus *Mangifera* is reported to contain 41 species in all but almost all the edible cultivars of mango belong to single species *Mangifera indica* Linn. Most of the existing commercial varieties of mango in India have been developed through selection from the naturally cross-pollinated seedlings. Great variability exists throughout the country, however western Uttar Pradesh is extremely rich in mango germplasm. Efforts were made in the past to collect mango variability from western Uttar Pradesh which is being maintained at Horticulture Research Station, Saharanpur; IIHR Bangalore and Central Institute for Tropical and Sub-Tropical Horticulture, Lucknow. However, no systematic explorations were conducted to collect landraces/promising types. Hence during this exploration distinct genetic stocks of mango were identified and collected.

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MATERIALS AND METHODS

An exploration for identification of mango germplasm in western Uttar Pradesh was undertaken jointly by NBPGR, New Delhi and 'Central Institute for Tropical and Sub-Tropical Horticulture, Lucknow during June-July, 1991. Subsequently the bud sticks were collected and are being maintained at 'Central Institute for Tropical and Sub-tropical Horticulture, Lucknow. The area covered includes, Meerut, Muzaffarnagar, Saharanpur, Dehradun, Haridwar, Moradabad, Bijnor, and Ghaziabad district of Uttar Pradesh. State Government Officer's of Horticultural department of each district were contacted to get the first hand information about the genetic diversity and accordingly route was followed (Arora, 1981). The exploration was undertaken when fruits were physiologically matured and ripening initiated. Efforts were made to select the germplasm from seedling origin and also landraces/genotypes and primitive cultivars not yet collected by 'Central Institute for Tropical and Sub-Tropical Horticulture, Lucknow. Morphological observations of the fruits and pulp TSS were recorded from 5 randomly collected fruits in each genotypes. Based on the ripening period of the fruits, identified germplasm has been grouped in early, mid, late and very late (ripening in June, July, August and September respectively). Similarly the fruits weighing about 300g and above were grouped as extra large, between 201 g to 300g as large; 101 to 200g as medium and less than 100g as small. The identified germplasm has also been grouped in sucking type (highly juicy) 'table type' (fleshy with good taste and aroma), and pickle type (fleshy, acidic and less fibrous). Range, mean, S.E., Variance (Table 1) and character association analysis for quantitative characters (Table 2) were also studied.

RESULTS AND DISCUSSION

Forty nine distinct genotypes not existing in the collection of Lucknow were identified during June-July 1991 and bud sticks were collected during August-September 1992 from seven districts of western Uttar Pradesh. The range, mean and variance worked out for 4 quantitative characters is given in Table 1. Wide range of variation in fruit length (5.0-16.0 cm), diameter (4.5-11.0cm), average weight (50-509 g) and TSS (14.0-22.0%) was recorded.

Considerable variability were recorded in fruit morphological traits including fruits shape (round, oblong, ovate oblong, curved); base (roundish, medium, conical, narrow, broad); apex (narrowly round, roundish, sunken, conical round); colour at maturity (yellow, reddish, greenish, reddish yellow, greenish light-yellow etc.); taste and flesh character (Sour-sweet, acidic, sweet, Very sweet and aromatic. It was observed during the exploration that the ripening period of mango in western Uttar Pradesh differs with that of same varieties grown in the eastern Uttar Pradesh. In most of the commercial varieties, the ripening was observed to be late by 20-25 days in comparison

to those in eastern Uttar Pradesh. The Deshahari matures in mid-June around in east and central Uttar Pradesh as against with first fortnight of July in western Uttar Pradesh.

Table 1. Range, mean and variance for 4 characters in mango fruits, collected from western Uttar Pradesh

Collectors' No. (PNG/BL)	Fruit length (cm)	Fruit diameter (cm)	TSS (%)	Av. fruit weight (gms.)
1	5.0	5.0	14.5	50.0
2	6.0	5.0	14.0	80.0
3	6.0	7.0	16.0	125.0
4	6.5	5.0	20.0	60.0
5	7.0	5.5	18.5	135.0
6	8.0	6.0	19.0	75.0
7	6.0	5.0	18.0	105.0
8	8.0	5.0	21.0	80.0
9	7.0	5.0	15.5	75.0
10	10.0	8.5	15.0	310.0
11	10.0	7.0	19.0	220.0
12	12.0	9.0	17.5	340.0
13	7.0	6.0	18.0	160.0
14	9.0	7.0	16.0	175.0
15	15.0	11.0	17.5	500.0
16	11.0	8.0	20.0	350.0
17	16.0	7.0	16.5	300.0
18	10.0	7.0	19.5	175.0
19	10.0	8.0	18.5	190.0
20	9.0	7.0	19.0	150.0
21	8.0	5.5	19.0	80.0
22	8.5	9.0	19.5	180.0
23	11.0	7.0	19.0	150.0
24	12.0	8.0	18.5	190.0
25	12.0	7.0	18.5	160.0
26	6.5	6.0	18.0	100.0

(Cont. to next page)

Collectors' No. (PNG/BL)	Fruit length (cm)	Fruit diameter (cm)	TSS (%)	Av. fruit weight (gms.)
27	9.5	4.5	18.5	80.0
28	9.0	6.0	21.0	145.0
29	10.0	7.5	22.0	190.0
30	9.0	6.5	20.5	150.0
31	10.0	8.0	19.0	225.0
32	7.0	5.5	21.0	80.0
33	12.0	6.5	20.5	230.0
34	10.0	8.0	20.0	330.0
35	9.0	8.0	17.5	210.0
36	8.0	7.0	19.5	175.0
37	9.5	7.0	20.5	190.0
38	11.0	9.5	19.50	260.0
39	9.5	6.0	18.0	105.0
40	7.5	7.5	19.5	150.0
41	11.0	7.5	19.0	275.0
42	9.5	7.5	16.5	200.0
43	7.0	6.0	20.5	130.0
44	9.0	6.0	19.5	150.0
45	11.0	7.0	21.5	200.0
46	9.7	7.2	160.0	295.0
47	12.9	7.8	17.0	370.0
48	12.4	9.2	17.0	509.0
49	8.0	5.5	14.5	160.0
Range	5.0	4.5	14.0	50.0
	16.0	11.0	22.0	509.0
Mean	9.35	6.89	18.46	190.29
SE±	0.39	0.20	0.28	14.90
Variance	5.29	1.90	3.75	10880.87

The difference in maturity period of fruits is mainly due to geographical and climatic variation of the region. However, wide range in ripening period and prolonged availability of fruits (mid-June to late September) was observed in the identified germplasm.

The outstanding landraces/germplasm identified have been grouped based on their notable characteristics viz. utility and maturity period. The name of the landrace alongwith collector's number are listed below :

A. Time/season of ripening

Early : PNG/BL-13 (*Heer*), PNG/BL-27 (*Jalmorni*);

Mid : PNG/BL-28 (*Dil Pasand*), PNG/BL-31 (*Kakran*); PNG/BL-37 (*Sharbati Bagarain*) PNG/BL-45 (*Sahi Pasand*)

Late : PNG/BL-34 (*Langra Behat*); PNG/BL-11 (*Meenakshi*);

Very late : PNG/BL-46 (*Prakash*); PNG/BL-49 (*Kanchan*) PNG/BL-47 (*Kilba Durgilal*), PNG-BL-48 (*Pathar*).

B. Utility purpose

Sucking type : PNG/BL-5 (*Anphas*), PNG/BL-7 (*Larankoo*) PNG/BL-8 (*Gur se Meetha*) and PNG/BL-2 (*Angoor Amin*).

Table type : PNG/BL-12 (*Washim bhog*); PNG/BL-15 (*Mota Gola*), PNG/BL-16 (*Shakar-chini*) and PNG/BL-34 (*Langra Behat*)

Pickle type : PNG/BL-10 (*Ram Kela large*), and PNG/BL-9 (*William*)

C. Highly scented/aromatic : PNG/BL-45 (*Sahib pasand*) and PNG/BL-11 (Meenakshi)

D. Bunch type : PNG/BL-2 (*Angoor Amin.*)

The character association analysis of 4 quantitative characters showed positive and highly significant correlation between average weight with length and diameter (Table 2). Correlation between length and diameter of the fruits

Table 2. Correlation-Coefficient for 4 characters of mango germplasm

	1	2	3	4
1. Fruit length (cm)	1.000			
2. Fruit diameter (cm)	0.667**	1.000		
3. TSS (%)	0.092	0.026	1.000	
4. Av. fruit weight (gm)	0.767**	0.826**	0.090	1.000

**Significant at 1% level.

was also observed to be positive and highly significant. However, the correlation between TSS with length and diameter of the fruit was positive but not

significant. Therefore the genotype having higher average weight can be taken for improvement. The diversity existing can be utilised in selection and improvement programme.

OUTSTANDING COLLECTIONS

PNG/BL-2 : It is seedling tree of about 50 years locally known as *'Bulbul'* which is renamed as *'Angoor Amin'* due to its appearance like a grape bunch. It is located at 'Kaidi' Village in Muzafarpur District. It bears 25-40 fruits in a single compact bunch with single fruit weight of 60-100g. A bunch with 40 fruits had the total weight of 3200g. On an average, the fruit size is 6 × 5 cm, roundish-oblong; base flat-broad, mild depressed; apex roundish, beak absent; fruit skin yellow, lenticells white, submerged; taste slightly acidic. Fruit ripens in the second week of July. It is moderately regular in bearing. About 80 bunches were counted during this year. However, in the previous year the tree fruited more than 300 such bunches. Such bunch type mangoes can successfully be used in breeding heavy bearing, ornamental looking trees, suited for pickle industry, garden and parks as well as for rootstock purposes.

PNG/BL-45 : It is a chance seedling locally known as *'Sahib Pasand'*, growing in the orchard of Sri Kalimuddin S/o Mohd. Nasiruddin of Amroha. The tree with a height of about 4m. is spreading. The overage fruit weight ranges between 180 to 210g. Shape ovate elliptical; base medium-narrow, tapering, peduncle medium sized; apex roundish, tapering; beak absent; skin yellow; lenticles very few; skin thin; flesh dark-yellow, very sweet, very tasty, aromatic. This variety can be directly adopted for large scale cultivation.

Among sucking type the notable selections are PNG/BL-5 (*Anphas*), PNG/BL-7 (*Larankoo*) and PNG/BL-2 (*Angoor Amin*). These can replace old seedling types of mangoes in the entire western Uttar Pradesh. Among pickle types PNG/BL-10 (*Ram Kela Large*) and PNG/BL-9 (*William*) are outstanding. Since, these have thick flesh, small stone and highly acidic in taste. These two can be adopted on commercial scale for pickle industry.

Among table type remarkable variation existed in shape, size, weight, colour, taste, presence of aroma and ripening time. Landraces such as PNG/BL-12 (*Washim bhog*), PNG/BL-15 (*MotaGola*), PNG/BL-16 (*Shakar-chini*) and PNG/BL-34 (*Langra Behat*), exhibited bigger size fruits, having thick aromatic flesh and small size stone suitable for table purpose. These may find place alongwith the popular landrace *Rataul*. However, those interested in large size fruit may adopt *Rajawala* which bear fruits upto 4.0 kg.

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REFERENCES

Arora R.K. 1981. Plant Genetic Resources - Exploration and Collection, Planning and Logistic. *In*: Plant Exploration and collection, K.L. Mehra, R.K. Arora and S.R. Wadi (ed). National Bureau of Plant Genetic Resources, New Delhi pp 46-54

Majumdar P.K. and D.K. Sharma. 1985. Mango. *In*: Fruits of India. Tropical and Sub-tropical. T.K. Bose (Ed.) Naya Prakash, Calcutta, India

Mukherjee S.K. 1949. D.Sc. Thesis submitted to Calcutta University, Calcutta, India