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Short communication

Variability in markingnut (*Semecarpus anacardium* L.) accessions from Marathwada region of Maharashtra State

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ABSTRACT

A survey was conducted in markingnut growing area (Aurangabad, Beed, Hingoli, Nanded and Parbhani districts) of Marathwada region in Maharashtra (India) during 2005-07 to assess existing natural variability for superior genotypes and good fruit-quality among 264 markingnut seedling trees and 27 superior clones. All the genotypes showed considerable variability with respect to physico-chemical characters. Fruit weight varied from 5.0 (PD-2) to 15.88 g (HD-5) and hypocarp weight from 3.37 (AD-2 and PD-1) to 10.67g (HD-5). Individual pericarp weight ranged from 1.59 (PD-2) to 5.21 g (HD-5) and kernel weight ranged from 0.16 (PD-2) to 1.07 g (HD-5). There was wide variation in chemical characteristics. Also, T.S.S. varied from 5.67 (BD-3) to 13.10^{0}B (ND-3) and titratable acidity from 0.22 (AD-1) to 1.93% (BD-3). Kernel protein content ranged from 13.22 (AD-2) to 25.75% (HD-5), carbohydrate content from 17.92 (PD-3) to 26.91% (AD-3), fat content from 31.57 (HD-3) to 40.59% (PD-4) and pericarp oil (B.S.L) content from 27.80 (BD-4) to 41.74% (HD-2). On the basis of physico-chemical characters assessed, genotypes HD-5 and ND-3 were found to be most promising.

Keywords : Markingnut, elite seedlings, variability

Markingnut (*Semecarpus anacardium* L.) of family Anacardiaceae is an important but under-utilized fruit crop of India. It is a native of Indio-Malaysian region and is commonly grown in the hotter parts of India. The tree has edible fruit (hypocarp) and kernel. The pericarp contains Bhilawan Shell Liquid (B.S.L.) which is a rich source of phenols (Chopra *et al*, 1956). Inside the pericarp, protected by a hard shell, is a white kernel which is sweet and is as nutritious as the almond. The kernel is a rich source of protein (26.4%), fats (36.4%), carbohydrates (28.4%) and minerals (3.6%) (Steinmetz, 1966).

The kernels are sold from Rs.120 to 210 per kg, depending upon quality. In view of the importance of this fruit and its high price, demand for its planting material is increasing. However, no specific/recommended variety is available, although wide variability exists throughout the length and breadth of India. Attempts made to collect locally available germplasm in Marathwada (M.S) by Naikwade *et al* (1989), Nanapure (1999) and Dahiwade (2000) are worth mentioning. The existing trees, scattered in hilly areas of the region, exhibit wide variation in fruit characters. Therefore, a study was conducted to assess variation in physico-chemical characteristics of markingnut fruits and to identify superior clones and elite seedlings in Marathwada region of Maharashtra state.

A survey was conducted in markingnut growing areas of Aurangabad (AD), Beed (BD), Hingoli (HD), Nanded (ND) and Parbhani (PD) of Marathwada region of Maharashtra state (India) during 2005-06 and 2006-07 to identify elite germplasm and to assess natural variability existing among populations. The survey was undertaken as suggested by Gupta and Rai (1996). The 1extent of variation in physico-chemical traits of fruits collected from different locations was estimated. Twenty fruits from selected trees were randomly taken for measuring physical attributes such as weight, length, breadth and hypocarp to pericarp ratio, following standard procedure. T.S.S. was estimated in terms of ^{0}Brix with the help of hand refractometer. Titratable acidity was estimated by titrating 10 ml. juice against 0.1 N NaOH using phenolphathalene as indicator (A.O.A.C,

1980). Protein content (N x 6.25) was estimated by conventional Micro-kjeldhal method. Crude fats and pericarp oil (B.S.L) were estimated with Soxhlet apparatus using petroleum ether as the solvent (Ranganna, 1997). Data were analysed using Randomized Block Design (R.B.D.) as per Panse and Sukhatme (1985).

Data pertaining to physical and chemical quality attributes of markingnut fruits showed significant difference and a high degree of variability for all the characters studied. (Tables 1 and 2). Fruit weight varied from 5g in PD-2 to 15.88g in HD-5 genotypes. Higher fruit weight is a preferred character in markingnut. Average weight per fruit in ND-3 (14.22g) was at par with HD-5. Maximum hypocarp weight was observed in HD-5 (10.67g) followed by ND-3 (9.74g) genotypes which were on par with each other, whereas, minimum hypocarp weight was seen in AD-2 and PD-1 (3.37g each). Hypocarp length and diameter was found to be maximum in HD-5 (2.69 cm and 3.01 cm, respectively), followed by ND-3 genotypes. Minimum hypocarp length and diameter was recorded in PD-2 (1.51cm and 2.03cm). Variation in markingnut genotypes for the above characters was earlier reported by Naikwade *et al,* 1989; Nanapure, 1999 and Dahiwade, 2000.

Pericarp weight, kernel weight, pericarp length and breadth, and, hypocarp to pericarp ratio also varied significantly (Table 1). Maximum pericarp weight was recorded in HD-5 (5.21 g). Pericarp weight in ND-3 (4.48 g, ND-2 (4.13 g), HD-3 (4.03 g) and AD-4 (3.99 g) was at par, while, minimum pericarp weight was recorded in PD-2 (1.59 g). Highest kernel weight was recorded in HD-5 (1.07 g) followed by ND-3 (0.96 g) whereas, lowest kernel weight was observed in PD-2 (0.16 g). High kernel weight is a preferred character in markingnut. Pericarp length was found to be maximum in ND-3 (2.89 cm) followed by HD-1 (2.85 cm), HD-3 (2.83 cm), HD-5 (2.80 cm), ND-2 (2.79 cm) and AD-5 (2.72 cm) genotypes, while, PD-1 (1.75 cm) showed minimum pericarp length. Pericarp breadth recorded highest in ND-3 (2.91 cm), followed by HD-5 (2.86 cm)

Table 1. Physical attributes of some superior markingnut genotypes collected from Marathwada region

Sl. No.	Genotypes	Fruit weight (g)	Hypocarp weight (g)	Hypocarp length (cm)	Hypocarp breadth (cm)	Pericarp weight (g)	Kernel weight (g)	Pericarp length (cm)	Pericarp breadth (cm)
1	AD-1	9.15	5.71	2.30	2.71	3.44	0.59	2.44	2.17
2	AD-2	5.06	3.37	1.75	2.09	1.69	0.32	1.95	2.03
3	AD-3	8.36	5.50	1.54	2.14	2.87	0.43	2.01	2.07
4	AD-4	11.55	7.57	2.02	2.58	3.99	0.52	2.48	2.38
5	AD-5	12.74	8.84	2.20	2.31	3.90	0.86	2.71	2.78
6	AD-6	7.90	4.94	2.14	2.44	2.96	0.32	2.39	2.10
7	BD-1	7.46	4.89	2.05	2.37	2.57	0.23	2.13	2.00
8	BD-2	12.26	8.33	2.29	2.52	3.93	0.60	2.42	2.37
9	BD-3	9.06	6.24	2.25	2.66	2.82	0.38	2.52	2.29
10	BD-4	5.60	3.60	1.78	2.46	2.00	0.36	2.23	2.36
11	BD-5	7.40	4.93	2.11	2.53	2.47	0.32	2.20	2.38
12	HD-1	11.04	7.49	2.27	2.56	3.55	0.78	2.85	2.27
13	HD-2	9.75	6.27	2.38	2.67	3.48	0.45	2.52	2.62
14	HD-3	10.40	6.37	2.41	2.71	4.03	0.76	2.83	2.64
15	HD-4	12.19	8.25	2.17	2.53	3.94	0.61	2.61	2.45
16	HD-5	15.88	10.67	2.69	3.01	5.21	1.07	2.80	2.86
17	ND-1	7.67	4.86	1.97	2.25	2.82	0.31	2.11	1.99
18	ND-2	12.46	8.33	2.17	2.59	4.13	0.75	2.79	2.53
19	ND-3	14.22	9.74	2.48	2.83	4.48	0.96	2.89	2.91
20	ND-4	8.23	5.10	1.95	2.06	3.13	0.45	2.10	2.03
21	ND-5	11.58	7.68	2.30	2.67	3.90	0.53	2.50	2.43
22	ND-6	9.27	5.38	2.40	2.73	3.89	0.62	2.56	2.32
23	PD-1	5.28	3.37	1.66	2.24	1.92	0.23	1.75	1.89
24	PD-2	5.00	3.41	1.51	2.03	1.59	0.16	1.82	1.72
25	PD-3	7.21	4.25	2.09	2.43	2.96	0.37	2.23	2.12
26	PD-4	10.45	7.39	2.22	2.70	3.06	0.57	2.39	2.17
27	PD-5	6.97	4.76	1.89	2.36	2.21	0.41	2.45	2.27
	Mean	9.41	6.19	2.11	2.49	3.22	0.52	2.40	2.30
	CD (*P=0.05)*	1.89	0.95	0.25	0.27	0.54	0.11	0.18	0.17

Table 2. Chemical attributes of some superior markingnut genotypes collected from Marathwada region

Sl. No.	Genotypes	T.S.S(^{0}B)	Acidity(%)	Protein(%)	Total carbohydrate content(%)	Fat content(%)	Oil content (B.S.L)(%)
1	AD-1	10.69	0.22	17.86	20.99	34.34	33.18
2	AD-2	6.51	1.77	13.22	18.11	32.83	31.49
3	AD-3	9.88	0.26	20.31	26.91	35.48	32.38
4	AD-4	6.39	1.60	22.22	22.52	31.76	30.66
5	AD-5	11.25	1.06	25.01	24.45	34.03	39.38
6	AD-6	10.57	0.27	22.25	22.25	33.68	36.04
7	BD-1	9.66	1.80	16.73	19.91	32.24	32.60
8	BD-2	7.64	0.34	23.73	26.53	37.72	41.47
9	BD-3	5.67	1.93	19.35	20.70	32.24	35.91
10	BD-4	12.07	0.54	14.67	25.39	38.48	27.80
11	BD-5	8.67	0.32	14.09	22.73	39.43	34.02
12	HD-1	12.30	1.15	24.99	19.93	40.44	34.31
13	HD-2	8.75	1.68	20.21	21.88	35.42	41.74
14	HD-3	10.42	1.09	13.90	21.32	31.57	31.74
15	HD-4	11.47	0.95	23.54	23.97	33.55	36.66
16	HD-5	12.00	0.55	25.75	26.46	35.88	38.92
17	ND-1	8.81	1.60	24.02	24.56	35.04	39.59
18	ND-2	12.28	0.28	16.06	22.60	31.82	35.99
19	ND-3	13.10	0.80	24.13	25.61	34.63	36.44
20	ND-4	12.06	0.29	23.15	25.77	38.41	32.59
21	ND-5	6.67	0.54	22.79	23.65	34.44	31.29
22	ND-6	8.24	0.69	17.61	20.77	35.93	39.63
23	PD-1	12.42	1.88	14.63	23.63	32.06	39.31
24	PD-2	6.55	0.63	20.70	25.81	32.36	34.71
25	PD-3	9.43	1.27	22.54	17.92	32.24	31.85
26	PD-4	10.56	0.75	17.06	19.18	40.59	30.41
27	PD-5	11.95	0.30	24.81	22.27	39.78	39.65
Mean		9.78	0.91	20.20	22.81	35.05	35.18
CD (*P=0.05)*		0.42	0.22	0.81	0.55	0.39	0.6

and AD-5 (2.78 cm), whereas, minimum pericarp breadth was recorded in PD-2 (1.72 cm) genotype, which shows a wide range of variability.

Data revealed (Table 2) wide variations in chemical composition in all the 27 superior genotypes. T.S.S. content varied from 5.67^{0}B in BD-3 to 13.10^{0}B in ND-3. Genotypes PD-1 (12.42^{0}B) and ND-2 (12.28^{0}B) showed high T.S.S. content. Titratable acidity was found to be minimum in AD-1 (0.22%) and maximum in BD-3 (1.93%).

Kernel protein content was found to be maximum in HD-5 (25.75%) followed by AD-5 (25.01%) and HD-1 (24.99%) and minimum in AD-2 (13.22%). Total carbohydrate content was estimated to be highest in AD-3 (26.91%), followed by BD-2 (26.53%) and HD-5 (26.46%), while, lowest was seen in PD-3 (17.92%). Fat content ranged from 31.57% in HD-3 to 40.59% in PD-4. Fat content in HD-1 (40.44%) was at par with that in PD-4. Pericarp content oil (B.S.L.) also showed considerable variability among the genotypes tested. The genotype HD-2 (41.74%) showed highest pericarp (B.S.L.) oil content, followed by BD-2 (41.47%), while, lowest pericarp (B.S.L.) oil content was seen in BD-4 (27.80%).

Based on physico-chemical studies conducted for two consecutive years, it may be inferred that genotypes HD-5 and ND-3 were promising. These genotypes had highest fruit and kernel weights and the selection was based on their performance in farmers' fields where soil, climate and cultural practices vary from farmer to farmer. Seedling and clonal selections have been the most suitable methods for fruit crop improvement. Selection has resulted in development of better cultivars in various fruit crops (Bagade and Patil, 1989 and Keskar *et al,* 1990). Present work shows that, in markingnut too, there is scope for selecting better genotypes from the naturally-existing variability.

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