

## SHORT COMMUNICATION

**Diversity in Custard Apple Germplasm Collections from Maharashtra, India****N Dikshit, SG Bharad<sup>1</sup> and MP Badge***National Bureau of Plant Genetic Resources Regional Station, Dr. PDKV Campus, Akola-444104, Maharashtra, India*<sup>1</sup>*Department of Horticulture, Dr. PDKV, Akola-444104, Maharashtra, India*

Twenty one accessions of custard apple germplasm were collected during an exploration programme from six districts of Maharashtra. The physico-chemical characterization of the fruits revealed variation in average fruit weight (90.8-375 g), total soluble sugar (19-26 %), number of seeds per fruit (21.2-73), weight of pulp per fruit (44.4-188 g) and fruit/pulp ratio (37-54.2). Pockets of custard apple areas and physico-chemical traits are discussed in the paper.

**Key Words: Custard apple, Maharashtra, Exploration**

Custard apple (*Annona squamosa* L.) belongs to the family *Annonaceae* and is commonly known as *Sitaphal* in India. The centre of origin of custard apple is tropical America from where it has spread to different parts of the world (Rathore, 1990). In India, custard apple is grown in an area of 53,000 ha (Shanmughavelu, 1987) in Andhra Pradesh, Tamil Nadu, Maharashtra, Orissa and other states. Andhra Pradesh tops in area and production in the country. In Maharashtra, it is grown in an area of 3,896 ha with the production of 20,047 tonnes (Anon., 1996) and the predominant regions are Marathwada, western Maharashtra and Vidarbha. Custard apple trees are usually propagated by grafting a selected scion variety on to a rootstock and planted mostly in rainy season. In forest, it grows naturally through seeds. The species thrives well under dry conditions in marginal soil, wastelands and can tolerate light to gravelly soils. The fruit is mostly used as a dessert for its delicious taste and nutritive values. The pulp is creamy, custard like, granular with a good blend of sweetness and acidity. The pleasant flavour and mild aroma of the fruit have a universal liking. It is an excellent source of carbohydrates (23.5 %), protein (1.6 %), minerals (0.9 %), and vitamin C (37mg/100gm) (Gopalan, *et al*, 1987). The unripe fruits, seed, leaf and root are used to destroy insect and lice. The oven dried kernels of seeds are found to contain 30% of oil.

Five districts of Vidarbha and one district of Marathwada region of Maharashtra were explored for collection of custard apple germplasm during October 2003. The districts included Akola, Buldana, Amravati, Yavatmal, Washim (Vidarbha) and Nanded (Marathwada). The region is located between 19° 50.850' - 21° 09.808' latitude and 76° 42.785' - 78° 08.105' longitude. The topography of the area is mostly plain with some sporadic hillocks and undulating type areas. The

soil characteristic varies from loam, sandy loam to silt with various colours from black, medium black, yellow and red. The cropping pattern of the region is cotton based and major crops are sorghum, pigeon pea, pearl millet, niger, soybean, minor millets and sugar cane during *khari* season and wheat, chick pea, safflower, linseed during *rabi*. The major horticultural crops of the area include orange, sapota, papaya, banana, custard apple, citrus, guava and pomegranate. Recently the progressive farmers are planting elite types of custard apple in large areas including deforested and barren land to boost the economic conditions. The local custard apple varieties are facing a danger and may be wiped out in long run. Thus it is essential to collect and conserve the local types prevalent in the region for their effective utilization in crop improvement programmes.

During the exploration, six districts of Maharashtra covering Amravati, Buldana, Yavatmal, Nanded, Akola and Washim were surveyed for collecting maximum diversity of the crop. The fruit samples were collected from the orchards, forests and gardens after making an assessment of the fruit and important traits like growth habit and fruit bearing pattern of the morphotypes. The plants were labeled for future scion wood collection. Data were recorded on 21 accessions of custard apple. Ten fruits were collected from each accession in which observations on fruit and seed characteristics were recorded. Laboratory estimates were made on analysis of fruit weight, fruit length, fruit width, fruit girth, number of seeds per fruit, weight of seeds per fruit, weight of 100 seeds, weight of rind per fruit, weight of pulp/fruit, fruit pulp ratio and total soluble sugar A.O.A.C.(1965). The physico-chemical characteristics and IC number information is presented in Table 1.

Table 1. Physico-chemical characterization of custard apple germplasm from Maharashtra

S.No.	IC No.	Dist.	FR_WT	FR_LT	FR_BT	FR_GR	SED_FR	FR_SED_WT	SED_WT	RD_WT	PL_WT	FR_PL_RT	TSS
1	IC415724	Bul	246.2	8.26	7.46	25.3	48.3	18.62	38.55	94.9	103	41.83	24
2	IC415725	Bul	270.81	7.72	8.52	27.2	35.75	13.72	38.35	118.24	138.84	51.26	24.2
3	IC415726	Bul	150.69	6.12	6.1	21	62.7	12.23	34.03	60.16	78.3	51.96	23
4	IC415727	Bul	211.32	7.06	7.92	24.14	53	18.04	39.69	108.36	81.92	38.76	25
5	IC415728	Bul	189.61	7.16	7.16	23.8	52	16.7	32.11	67.33	70.28	37.06	21.3
6	IC415729	Bul	151.06	6.2	8.4	22.9	21.2	8.36	39.43	74.67	68.03	45.03	26
7	IC415730	Bul	229.76	6.27	6.22	25.8	52	20.54	39.5	74.76	103	44.82	21
8	IC415731	Bul	375	8.85	8.25	29	33	18.32	55.51	187.35	165.33	44.08	23.1
9	IC415732	Bul	346.6	8.8	8.5	27.7	56	30.9	37.32	137.7	188	54.24	24
10	IC415733	Akl	156	7	7	22	63.2	21.1	33.8	58.9	76	48.71	25
11	IC415734	Akl	230	8.1	7.1	23	45.12	17.5	38.78	112.5	101	43.91	24
12	IC415736	Amt	131.2	5.5	6.5	20	44	11.3	25.68	65.3	54.6	41.61	19
13	IC415740	Amt	154.26	6.24	6.4	22.5	73	22.2	30.4	64.33	68	44.08	22
14	IC415743	Amt	204	6.9	7.8	24	33	18.2	54.55	80.79	99.9	48.97	24
15	IC415744	Amt	123.38	5.4	6.2	20	54	16.04	31.85	50.51	56.23	45.57	21
16	IC415745	Amt	134	5.3	6.3	20.5	53.66	12.33	22.97	51.43	70.24	52.41	21
17	IC415747	Amt	90.82	6	6.3	18.3	22	11.25	51.13	30.68	48.89	53.83	24
18	IC415752	Yal	193.26	7.6	7	22.5	36	19.4	53.88	76.75	93.11	48.17	22.5
19	IC415753	Nad	138.7	5	4.5	17	23	10.5	45.62	69.2	59	42.53	22.5
20	IC415754	Nad	142.28	6.1	6.4	22.6	57	16.3	28.59	54.66	71.82	50.3	22
21	IC415760	Yal	90.98	5.1	6	19	26	12.55	48.26	34	44.43	48.83	20
	Range		90.8-375	5-8.8	4.5-8.5	17-29	21.2-73	8.3-30.9	22.9-55.5	30.6-187.3	44.4-188	37-54.2	19.026.0
	+Mean SE		+188.5 16.4	6.6+0.2	6.9+0.2	22.70.6	44.9+3.2	16.4+1.1	30+2	79.6+8	87.6+8.1	46.5+1	22.7+0.3
	CV %		39.9	17.7	14.7	13.7	33.0	30.8	24.1	46.0	42.4	10.4	7.9

FR\_WT - Average fruit weight (g), FR\_LT - Fruit length (cm), FR\_BT - Fruit breadth (cm), FR\_GR - Fruit girth (cm), SED\_FR - No. of seeds/fruit, FR\_SED\_WT - Weight of seeds/fruit (g), SED\_WT - 100 seed wt. (g), RD\_WT - Rind weight (g), PL\_WT - Pulp weight (g), FR\_PL\_RT - Fruit pulp ratio, TSS - ° B Bul - Buldana, Akl - Akola, Amt - Amravati, Yal - Yavatmal, Nad - Nanded

The predominant custard apple growing areas like Wadgaon, Aasegaon, Bhairam, Chandur, Shirasgaon, Chikhaldara and Wara areas of Amravati; Varud and Digras areas of Yavatmal; Manora area of Washim; Dongaon and Janephal areas of Buldana; Patur and Chani areas of Akola and Mahur area of Nanded district of Maharashtra were surveyed. In the Wadgaon forest areas of Paratwada, one accession having different plant type locally called as *Nar* was collected. The leaves are dark green in colour, small in size and fruits were green even after maturity.

The spectrum of variability was assessed by considering the parameters like range of variation, mean, standard error and coefficient of variation in eleven economic traits. Moderate to high variability was observed among all the traits. High coefficient of variation was observed in weight of rind (46.0%) followed by weight of pulp (42.4%) and average weight of fruit (39.9%). Considering the desirable traits, the highest fruit weight (375.0 g) was observed in IC415731, fruit length (8.85 cm) in IC415731, girth of fruit (29.0 cm) in IC415731, weight of pulp (188.0 g) in IC415732, fruit pulp ratio (54.24) in IC415732 and TSS ° B (26.0) in IC415729.

The results when compared with the entire collections, it was observed that the IC415724, IC415725, IC415731 and IC415732 were found to be superior over

the other collections. The accession-wise details are IC415731 for fruit weight (375.0 g), fruit girth (29.0 cm), pulp weight (165.33 g), average fruit pulp ratio (44.08) and TSS ° B (23.1); IC415732 for fruit weight (346.6g), fruit length (8.8 cm), weight of pulp (188.0 g), fruit pulp ratio (54.24) and TSS ° B (24.0); IC415725 for fruit weight (270.81g), pulp weight (138.84g), fruit pulp ratio (51.26) and TSS ° B (24.2) and IC415724 fruit weight (246.2 g), pulp weight (103.0 g), fruit pulp ratio (41.83) and TSS ° B (24.0). It can be inferred that significant variability exists among the local types for various physico-chemical traits and these accessions have been identified as promising for future crop improvement programmes.

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