

Short Communication

Growth, Flowering and Yield Variability in Custard Apple Selections

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The custard apple (*Annona squamosa* L.) is an important fruit crop with its delicious and perishable fruits. The fruit has delightful sweet taste, flavor with high nutritional value. The custard apple has vast potential and wide adaptability to grow in variable soil and climatic conditions. However, traditionally custard apple was cultivated in the Saurashtra region of Gujarat. The varietal stability in custard apple is very low due to cross pollination and propagation through seeds instead through vegetative means. However, no specific recommended variety is available in the custard apple growing belts of Gujarat. There is only one local variety known as Sindhan in the region. There is considerable variation in growth, flowering and yield in existing genotypes. Due to lack of information on genetical inheritance in different selections the present investigation was undertaken to identify the selections having better growth, yield and quality.

The experiment was conducted on 15-year-old trees of 29 selections with variety Sindhan as a check, at Fruit Research Station, Madhadibag Farm, Junagadh Agricultural University, Junagadh, during the years 2005-2008. The experiment had 3 replications in randomized block design (RBD). Local selections were collected from Saurashtra region. Four branches with uniform age in four directions were selected and tagged. The observations were recorded on important qualitative and quantitative traits. Three reproductive flushes were recorded during March-April (1st flush), May-June (2nd flush) and June-July (3rd flush) at full bloom stage. Third reproductive flush is commercially important. Days to fruit setting and fruit maturity were recorded. The tree height and tree spread (both N-S & E-W) were recorded at end of the season. The fruit length and fruit girth were recorded at maturity using Vernier callipers on 5 randomly selected fruits. The fruit weight; number of fruits per tree and fruit yield per tree were recorded. The data were analyzed statistically.

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Analysis of variance revealed highly significant genotypic differences for all characters depicting greater diversity among different selections with Sindhan as a check (Table 1). The variations in height and spread were significant and maximum height (4.61 m) was recorded in Selection-18, but was at par with Selection-7, 19 and 22. Tree height was lowest in selection-29. Maximum plant spreads, N-S and E-W (5.11 and 5.22 m, respectively) were also recorded in Selection-18 and were at par with Selection-7, 21 and 22. Higher tree height and tree spread are the favorable characters which increase the fruit yield. Such variations in tree growth have also been reported by George and Nissen (1986), which might be due to the specific genetic constitution, inherent character and vigor of specific selection.

Among the selections and check, the earliest flowering was observed in Selection-6 during 1st and 2nd reproductive flushes (21.17 and 87.33 days, respectively) and 127.08 days in Selection-1 during 3rd (Table 1) reproductive flush. Significantly earliest fruit setting (18.42 days) was recorded in Selection-11, but was found to be at par with selection-1, 6 and 7. Days to fruit maturity was observed to be non-significant. Selection-6 and 1 were found earlier than all other selections for flowering and fruit setting.

A large of variation was recorded on fruit growth characters at marketable stage viz., fruit weight, fruit length and width (Table 2). Maximum fruit weight (159.93 g) was noted in Selection-19, but was at par with Selection-18, 20, 1, 3 and Sindhan (check). Similarly, highest fruit length and girth were registered in Sindhan, and was at par with Selection-18, 19, 20 and 21. The variation in fruit weight is correlated with variation in fruit length and girth. The result is also in conformity with those of Jagtap and Kokate (1991), Shete *et al.* (1991) and Lima-e-Silva *et al.* (2007) in custard apple.

The differences in number of fruit were significant and maximum fruit number was in

Table 1. Variability in custard apple selections for plant height, plant spread (N-S & E-W) and 1st, 2nd and 3rd reproductive flushes (pooled)

Selections	Plant height (m)	Plant spread (m)		Reproductive flush (days)		
		(N-S)	(E-W)	1 st	2 nd	3 rd
Sel.-1	4.22	4.14	5.22	26.4	89.0	127.1
Sel.-2	4.10	4.28	4.48	26.6	95.9	134.1
Sel.-3	3.91	4.36	4.71	21.8	92.0	132.7
Sel.-4	3.70	3.92	3.93	24.0	94.7	134.0
Sel.-5	3.40	3.55	3.75	27.2	91.0	133.9
Sel.-6	3.55	3.60	3.84	21.2	87.3	131.9
Sel.-7	4.32	4.58	5.05	30.6	91.1	132.7
Sel.-8	4.17	4.41	4.47	35.8	101.2	135.5
Sel.-9	3.83	4.02	3.90	36.9	107.7	130.2
Sel.-10	4.16	4.78	4.65	33.4	104.0	132.2
Sel.-11	4.26	4.43	4.57	36.0	105.0	138.1
Sel.-12	3.89	4.43	4.35	32.2	89.9	131.2
Sel.-13	4.02	4.45	4.47	42.0	97.0	130.5
Sel.-14	3.83	4.92	4.71	47.6	98.2	136.8
Sel.-15	3.79	5.06	5.21	45.5	107.3	137.6
Sel.-16	4.14	4.76	4.56	49.6	112.4	136.4
Sel.-17	3.76	4.51	4.98	53.3	112.6	136.2
Sel.-18	4.61	5.11	5.22	46.7	98.7	134.2
Sel.-19	4.46	4.37	4.56	36.0	94.4	135.2
Sel.-20	4.14	4.49	4.30	36.5	101.2	133.2
Sel.-21	4.30	4.61	4.73	37.0	109.7	135.6
Sel.-22	4.52	4.67	4.78	45.7	108.2	133.7
Sel.-23	3.59	4.83	4.84	46.2	111.8	137.5
Sel.-24	3.81	4.68	4.65	40.3	106.2	137.3
Sel.-25	4.11	4.65	5.00	26.0	100.1	137.2
Sel.-26	4.11	4.45	4.83	26.3	101.8	133.0
Sel.-27	4.21	4.80	4.59	27.7	108.2	138.5
Sel.-28	3.30	4.04	3.98	30.3	105.8	137.6
Sel.-29	3.23	3.68	3.87	39.0	111.3	142.3
Sindhani	3.90	4.38	4.33	33.7	92.7	139.1
S.Em ±	0.111	0.157	0.177	3.7	2.5	1.7
C.D. at 5%	0.31	0.44	0.50	10.4	6.9	4.9

Selection-18 and was at par with Selection-12 and 15. Similarly, lowest number of fruit was recorded in Selection-5. The variation in number of fruits per tree might be due to genetic diversity amongst number of shoot, shoot length, number of flower per shoot, fruit set percentage and fruit retention percentage. The fruit yield per tree was maximum in Selection-18, but found to be at par with

Selection-11 and 12. The yield per tree was low in Selection-29, Selection-4 and Selection-5. The significant variation in yield per tree might be due to fruit set percentage, fruit retention percentage, fruit length and girth, fruit weight and number of fruit per tree. These findings are supported by George and Nissen (1986), Shete *et al.* (1991) and Lima-e-Silva *et al.* (2007) in custard apple.

Table 2. Variability in custard apple selections for days to fruit setting, days to maturity, fruit weight, fruit length and fruit girth, number of fruit per tree and fruit yield (pooled)

Selections	Fruit setting days	Maturity days	Fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	Number of fruit per tree	Yield (kg/tree)
Sel.-1	19.9	67.3	142.2	6.7	7.3	129.3	17.2
Sel.-2	26.2	67.6	138.7	6.7	7.2	98.8	12.8
Sel.-3	27.0	67.0	140.1	6.5	7.1	114.4	14.4
Sel.-4	29.8	62.9	130.9	6.6	7.2	88.4	11.1
Sel.-5	35.2	66.5	137.4	6.8	7.0	86.0	11.2
Sel.-6	20.7	66.5	130.6	6.6	7.1	154.8	18.1
Sel.-7	23.1	64.3	133.4	6.5	6.9	149.3	18.1
Sel.-8	27.6	60.2	121.8	6.5	7.0	140.9	15.7
Sel.-9	35.1	60.2	136.4	6.7	7.2	96.5	12.9
Sel.-10	30.4	62.7	139.1	6.5	7.1	136.0	18.0
Sel.-11	18.4	66.8	134.5	6.6	6.9	169.1	21.9
Sel.-12	25.8	68.3	133.4	6.6	6.9	180.1	21.8
Sel.-13	31.7	61.3	139.9	6.6	7.0	103.6	13.3
Sel.-14	27.0	61.9	133.4	6.4	7.0	126.6	16.7
Sel.-15	19.2	64.2	129.1	6.2	6.6	170.7	19.8
Sel.-16	27.2	61.0	130.1	6.5	6.8	114.7	14.0
Sel.-17	26.7	61.8	128.9	6.5	7.0	124.4	15.8
Sel.-18	24.8	62.9	139.9	6.8	7.1	214.9	26.8
Sel.-19	29.7	59.8	159.9	7.0	7.4	99.8	14.8
Sel.-20	29.7	63.5	147.0	6.9	7.1	110.8	14.4
Sel.-21	20.8	63.4	135.1	7.0	7.1	110.2	14.8
Sel.-22	27.1	62.5	128.0	6.6	7.1	135.9	16.7
Sel.-23	21.7	63.8	128.5	6.8	7.1	140.1	17.1
Sel.-24	21.1	64.0	110.3	6.7	6.9	166.8	19.2
Sel.-25	25.0	60.2	155.6	6.6	7.1	87.7	13.0
Sel.-26	27.9	63.4	132.3	6.4	6.7	134.5	16.3
Sel.-27	22.2	62.3	114.5	6.5	6.8	125.5	15.1
Sel.-28	20.7	60.0	122.6	6.4	6.6	104.9	12.4
Sel.-29	20.2	64.3	126.2	6.2	6.6	84.9	9.8
Sindhani	25.0	61.42	156.33	7.20	7.42	108.2	18.38
S.Em $\pm$	2.024	2.015	7.235	0.161	0.160	15.753	1.912
C.D. at 5%	5.7	NS	20.37	0.45	0.45	44.3	5.38

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