Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

J P P Journal of Pharmacognosy and Phytochemistry

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(1): 1029-1032
Received: 08-11-2017
Accepted: 09-12-2017

PM Ghawade
Ph.D. Scholar, Mahatma Phule Krushi Vidyapeeth, Rahuri (MS), India

VS Supe
Associate Director of Research, NARP, Ganeshkhind, Pune (MS), India

LV Pimpalpalle
Ph.D. Scholar, Vasantrao Naik Marathawada Krushi Vidyapeeth, Parbhani (MS), India

SA Tayade
Ph.D. Scholar, Mahatma Phule Krushi Vidyapeeth, Rahuri (MS), India

Correspondence
PM Ghawade
Ph.D. Scholar, Mahatma Phule Krushi Vidyapeeth, Rahuri (MS), India

Morphological charecterization of custard apple genotypes

PM Ghawade, VS Supe, LV Pimpalpalle and SA Tayade

Abstract
The present investigation was undertaken morphological characterization of custard apple (*Annona squamosa* L.) during year 2014 - 17 at All India Coordinated Research Project on Arid Zone Fruit Crops, MPKV, Rahuri and AICRP on Custard apple and Fig, Jadhavwadi, Dist. Pune. The experiment was laid out in Randomized block design with 29 selected genotypes as the treatments with three replications. The experimental results showed that the large variability was present in custard apple genotypes for morphological traits. The leaf length ranged from 6.87 to 13.57 cm, leaf width varied from 2.50 to 6.90 cm and petiole length varied from 0.50 to 1.53 cm. Maximum genotypes showed lanceolate leaf blade shape, petal length varied from 1.23 to 3.80 cm and petal width ranged from 0.40 to 0.97 cm. In fruit quantitative characters length, breadth, weight and rind percent was recorded and it varied largely among the genotypes. In all genotypes Bullock Heart, Atemoya, Atemoya Chance Seedling, Mammoth and Arka Sahan recorded highest desirable characters.

Keywords: Custard apple, variability, morphological characters.

Introduction
Custard apple (*Annona squamosa* L.) is one of the most important dry arid land fruit crop in India. It belongs to family Annonaceae and originated in tropical region of America. (Popenoe, 1974). It is popularly called as sitaphal in the South and Sharifa in the North India. It is widely distributed throughout the tropical and sub-tropical regions. It has several synonymous names such as sugar apple, sweet sop, sharifa, sitaphal *etc*. It has hardy in nature and commercially grown on marginal soils as well as degraded lands.
Custard apple being a cross pollinated crop have wide variation in form and size of fruit as well as colour of pulp. This natural variability available within the species is often exploited to identify superior genotypes which are usually named after the place of collection or selection and fruit colour. There are a few recognized varieties of custard apple with majority of these in India and their names give some idea of their origin as Balanagar, Purandar Selection, Barbadose, British Guinea, Washington, Red Sitaphal, Hyderabad Selection, APK 1 and Salem Selection. Most of the morphological traits are highly influenced by environmental conditions or vary with developmental stage of plants. The basic objective of present research was identification of morphological variation of *Annona squamosa* genotypes in homeground in AICRP on Arid Zone Fruits, MPKV, Rahuri and AICRP on Custard apple and Fig, Jadhavwadi, Dist. Pune.

Material and Methods
The present study was conducted to study the variability of custard apple genotypes at AICRP on Arid Zone Fruit Crops, MPKV, Rahuri and AICRP on Custard apple and Fig, Jadhavwadi, Dist. Pune, during the subsequent year from 2014 to 2017. The experiment was based on five year old custard apple genotypes. The experiment was laid out in randomized block design with 29 selected genotypes as the treatments with three replications. Since descriptor list of *A. squamosa* is not available, the descriptor list of *A. cherimola* Mill. (Cherimoya) compiled by International Plant Genetic Resource Institute (IPGRI, 2008) was used in this study. The total twenty nine (29) genotypes for morphological descriptor were measured and used to analyze in this study.

SN	Genotypes	SN	Genotypes
1	Virdhunagar	16	Chittorgarh
2	Crida	17	A x W
3	Bullock Heart	18	Salem Selection
4	Red Sitaphal	19	Pink Mammoth
5	Atemoya chance seedling	20	British Guinea
6	Atemoya	21	Washington
7	Courtallum	22	Arka Sahan
8	Island Gem	23	Mola Kalmur 9
9	Mammoth	24	Mola Kalmur 8
10	Ballary	25	Balanagar
11	Yellow Sitaphal	26	APK 1
12	Pythota 1	27	Raidurg
13	Pythota 6	28	TP 7
14	Madanpalli	29	Phule Purandar
15	Hydrabad Selection		

Among, 4 morphological characters did not show any variance in 29 genotypes. Suckering tendency, pubescence on upper surface, pubescence on lower surface. From each tree ten fully expanded and developed healthy leaves, ten flowers and five well developed and matured fruits were randomly selected for measurement of characters.

Methune Handbook of Colour 3rd edn. Eyer London (Kornerup and Wanscher, 2001) [3] was used to identify parameters such as trunk colour, colour of young branches. Leaf colour, exocarp colour and seed colour.

Data analysis

The data collected on individual characters were tabulated and subjected to statistical analysis by using randomized block design with 29 selected genotypes as the treatments with three replications (Panse and Sukhatme, 1985).

The observations are taken on plant basis as per descriptor's list of A. cherimola published by IPGRI, 2008 which included quantitative and visual characters both. Non parametric data were converted to scales as proposed by IPGRI in descriptor for *A.* cherimola (IPGRI, 2008).

Result and discussion

A wide range of variability in respect of various leaf, fruit and tree characters *viz*. leaf colour, leaf shape, fruit length, fruit shape, fruit weight. The data regarding to leaf characters such as leaf blade shape, leaf length, width and petiole length have been presented in Table 1. Maximum genotypes showed lanceolate leaf blade shape In leaf characters leaf length ranged from 6.87 to 13.57 cm, leaf width varied from 2.50 to 6.90 cm and petiole length varied from 0.50 to 1.53 cm. In general, Atemoya, Mammoth, Bullock Heart, Pink Mammoth and Crida recorded highest leaf length and Bullock Heart, Atemoya, Arka Sahan, Atemoya Chance Seedling and Pink Mammoth recorded more leaf width. The petal length varied from 1.23 to 3.80 cm and petal width ranged from 0.40 to 0.97 cm. The result of leaf size in term of length and width ware found in agreement with previous research finding of Thakur and Singh (1967) [6].

Table 1: Morphological characterization in custard apple genotype for leaf and inflorescence characters

SN	Genotypes	Leaf blade shape	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Petal length (cm)	Petal width (cm)
1	Virdhunagar	Lanceolate	11.10	3.30	1.03	2.20	0.70
2	Crida	Lanceolate	11.40	5.40	1.47	2.10	0.77
3	Bullock Heart	Elliptic	12.10	6.90	1.10	2.37	0.90
4	Red Sitaphal	Lanceolate	6.87	2.97	0.53	2.47	0.80
5	Ate. Chance Seedling	Elliptic	11.07	5.53	1.53	2.53	0.97
6	Atemoya	Elliptic	13.57	6.07	1.17	2.80	0.87
7	Courtallam	Obovate	8.00	3.07	0.50	2.00	0.60
8	Island Gem	Obovate	9.23	4.80	1.03	2.60	0.87
9	Mammoth	Ovate	12.57	5.40	1.13	2.57	0.47
10	Ballary	Lanceolate	10.40	3.23	1.07	2.43	0.77
11	Yellow Sitaphal	Lanceolate	9.30	3.47	0.67	2.17	0.55
12	Pythota 1	Lanceolate	9.30	3.03	0.63	2.27	0.90
13	Pythota 6	Obovate	8.27	3.20	0.87	2.47	0.80
14	Madanpalli	Ovate	8.87	3.10	1.10	2.33	0.77
15	Hyd. Selection	Lanceolate	8.87	4.23	1.37	2.57	0.60
16	Chittorgarh	Ovate	9.57	5.30	1.33	1.93	0.40
17	A x W	Obovate	8.77	4.97	1.03	2.80	0.53
18	Salem Sel.	Lanceolate	9.73	2.67	1.13	2.20	0.60
19	Pink Mammoth	Elliptic	12.00	5.43	1.30	3.00	0.57
20	British Guinea	Lanceolate	10.20	3.90	1.20	2.80	0.67
21	Washington	Lanceolate	10.00	3.40	1.00	3.03	0.90
22	Arka Sahan	Obovate	10.77	5.57	1.07	3.80	0.70
23	Mola Kalmur 9	Obovate	8.40	3.07	1.07	2.73	0.63
24	Mola Kalmur 8	Obovate	8.80	2.97	1.10	1.23	0.53
25	Balanagar	Ovate	10.47	4.17	1.07	2.60	0.67
26	APK 1	Lanceolate	8.70	3.70	1.10	2.50	0.67
27	Raidurg	Ovate	8.80	2.60	0.70	2.20	0.70
28	TP 7	Ovate	9.40	2.50	1.00	2.53	0.60
29	Phule Purandar	Ovate	8.67	3.00	1.03	2.30	0.57
		Range	6.87 -13.57	2.50 – 6.90	0.50 – 1.53	1.23- 3.80	0.40- 0.97
		CD 5%	1.89	1.07	0.36	0.39	0.16
		CV (%)	11.08	15.36	20.20	9.23	13.61

Table 2: Mean analysis in custard apple for fruit characters.

SN	Genotypes	Fruit weight (g)	Length (cm)	Breadth (cm)	Rind (%)	Exocarp type	Exocarp colour
1	Virdhunagar	217.67	10.68	11.13	37.03	Impressa	Green
2	Crida	246.67	9.37	9.57	50.88	Umbonata	Green
3	Bullock Heart	344.67	21.11	17.61	32.02	Mamillata	Light green
4	Red Sitaphal	247.67	14.70	12.52	58.31	Impressa	Brown
5	Ate Chance Seedling	234.67	6.08	5.99	28.08	Laevis	Green
6	Atemoya	428.00	16.34	14.17	34.02	Umbonata	Light green
7	Courtallam	244.67	8.40	9.45	42.14	Tuberculata	Yellow green
8	Island Gem	267.67	14.68	11.48	55.55	Mamillata	Yellow green
9	Mammoth	271.00	14.98	14.36	54.27	Umbonata	Green
10	Ballary	196.00	8.91	9.29	50.89	Impressa	Dark green
11	Yellow Sitaphal	187.33	8.01	7.96	50.16	Impressa	Yellow
12	Pythota 1	224.33	9.23	10.10	50.34	Umbonata	Yellow green
13	Pythota 6	167.33	7.69	9.06	53.32	Impressa	Yellow green
14	Madanpalli	231.67	9.55	10.41	45.03	Impressa	Dark green
15	Hyderabad Selection	230.33	7.27	6.88	54.58	Impressa	Green
16	Chittorgarh	211.00	11.66	12.76	56.38	Umbonata	Green
17	A x W	198.67	7.23	7.26	35.60	Umbonata	Light green
18	Salem Selection	244.00	8.82	9.26	54.19	Impressa	Dark green
19	Pink Mammoth	255.00	11.37	10.03	42.78	Mamillata	Green
20	British Guinea	191.00	8.57	10.06	55.27	Impressa	Light green
21	Washington	207.00	9.40	8.42	57.94	Umbonata	Light green
22	Arka Sahan	269.33	9.50	9.36	38.37	Umbonata	Yellow green
23	Mola Kalmur 9	236.67	9.67	12.53	52.49	Impressa	Green
24	Mola Kalmur 8	234.33	8.06	8.78	38.19	Impressa	Yellow green
25	Balanagar	252.33	7.22	8.93	53.45	Laevis	Yellow green
26	APK 1	244.33	12.85	13.13	51.78	Umbonata	Green
27	Raidurg	267.00	8.39	9.15	40.60	Tuberculata	Yellow green
28	TP 7	211.00	6.56	5.90	42.92	Umbonata	Yellow green
29	Phule Purandar	227.33	10.31	10.27	41.73	Umbonata	Light green
	Range	167.33 - 428	6.56 – 21.11	5.90 – 17.61	28.08 -58.31		
	CD 5%	23.07	2.10	1.86	12.25		
	CV (%)	5.51	11.82	10.50	15.05		

The data regarding fruit characters such as fruit weight, shape, length, breadth, girth, exocarp type and colour have been presented in Table 2. The fruit shape was recorded into five different groups. The broadly cordate shape recorded in 09 genotypes, cordate in 12 genotypes, cordate irregular shape observed in 05 genotypes, round shaped in 02 genotypes (Atemoya Chance Seedling and Phytota- 6) and oval shape recorded in Ballary. The fruit length ranged from 6.56 to 21.11 cm. The maximum fruit length was recorded in Bullock Heart (21.11 cm) and minimum in TP 7 (6.57 cm) (Table 2). The fruit breadth ranged from 5.90 to 17.61 cm. The maximum fruit breadth was recorded in Bullock Heart (17.61 cm) and minimum in TP-7 (5.90 cm). The fruit girth ranged from 22.01 to 55.01 cm. The maximum fruit breadth was recorded in Bullock Heart (55.01 cm) and minimum in TP 7 (22.01cm). The fruit weight ranged from 167.33 to 428.00 g. The highest weight of fruit was recorded in Atemoya (428.00 g) and lowest fruit weight in Pythota 6 (167.33g). The four genotypes (Virdhunagar, Hydrabad Selection, Balanagar and Phule Purandar recorded uniformed fruits, while 25 genotypes were non-uniform. The five genotypes (Virdhunagar, Courtallum, Ballary, Hydrabad Selection and Mola Kalmur 8 recorded symmetrical and rest of 24 genotypes were asymmetric. The exocarp was observed and categorized in five types as laevis, impressa, umbonata, tuberculata and mamillata. The 11 genotypes recorded Impressa, 11 genotypes were umbonata, 02 genotypes laevis again 02 genotypes were tuberculata and 03 genotypes were mamillata type exocarp. The exocarp colour was recorded into 6 different groups. In all, 06 genotypes were recorded light green in colour, 09 genotypes green colour, 03 genotypes dark green, 09 genotypes yellowish green colour, Yellow Sitaphal were recorded yellow colour and Red Sitaphal recorded brown colour exocarp. The result presented in Table 2 are in agreement with Agustin *et al*. (2006) [1], Dikshit *et al*. (2008) and Rao and Subramanyam (2011) [5].

Seed percentage ranged between 4.13 to 10.95%. The lowest was recorded in TP 7(4.13%) the highest seed per cent was recorded in Virdhunagar (10.95%). Similar result of seed per cent in *Annona muricata* and *Annona cherimoya* by Da Silva *et al*. (1999) and Scheldeman *et al.* (1999). The seed length and width recorded in between 1.07- 1.80 cm and 0.50 – 1.31 cm. The significantly highest seed length was observed in Ballary and Yellow Sitaphal (1.80 cm) which was at par with Chittorgarh (1.67 cm), Atemoya Chance Seedling, Mola Kalmur 8 (1.57 cm) and Washington (1.53 cm) and lowest seed length observed in Red Sitaphal. The seed width varied from 0.50 to 1.37 cm. Bullock Heart recorded maximum seed width (1.37 cm) and Balanagar (0.50 cm) minimum seed width. Similar result of seed length and width were reported by Agustin *et al*. (2006) [1].

Table 3: Mean analysis in custard apple and seed characters

SN	Genotypes	Seed (%)	Seed length (cm)	Seed width(cm)
1	Virdhunagar	10.95	1.33	0.87
2	Crida	6.15	1.43	0.80
3	Bullock Heart	5.96	1.27	1.37
4	Red Sitaphal	10.66	1.07	0.67
5	Ate.Chance Seedling	4.70	1.57	1.03
6	Atemoya	6.48	1.60	1.27
7	Courtallam	8.51	1.33	0.67
8	Island Gem	6.35	1.40	0.77
9	Mammoth	8.51	1.40	1.07
10	Ballary	10.83	1.80	1.07
11	Yellow Sitaphal	5.17	1.80	0.67
12	Pythota 1	9.43	1.47	0.83
13	Pythota 6	6.52	1.43	0.77
14	Madanpalli	6.40	1.10	0.77
15	Hyd. Selection	5.08	1.33	0.70
16	Chittorgarh	10.59	1.67	0.79
17	A x W	10.22	1.43	0.93
18	Salem Selection	5.73	1.27	0.73
19	Pink Mammoth	5.43	1.47	0.80
20	British Guinea	9.29	1.43	0.93
21	Washington	6.40	1.53	0.77
22	Arka Sahan	7.39	1.47	0.83
23	Mola Kalmur 9	8.17	1.43	0.63
24	Mola Kalmur 8	8.98	1.57	0.83
25	Balanagar	5.28	1.13	0.50
26	APK 1	10.31	1.40	0.67
27	Raidurg	4.92	1.47	0.77
28	TP 7	4.13	1.40	0.67
29	Phule Purandar	6.61	1.27	0.80
	Range	4.13-10.95	1.07 – 1.80	0.50 – 1.37
	CD 5%	2.75	0.28	0.08
	CV (%)	21.46	11.69	6.18

Conclusion

In essence, the present study is the footstep for morphological characterization of custard apple genotypes as well as estimation of genetic diversity among them. According to the observations of the present study, there is significant variability in custard apple genotypes under the study of morphological traits. The desirable fruit characters *viz.* low seed percent with minimum number of seed were recorded in genotypes Bullock Heart, Atemoya, Atemoya Chance Seedling, Mammoth and Arka Sahan. These identified genotypes may be good in future for developing new varieties of custard apple.

Reference

1. Agustın JA, Gonzalez-Andres F, Nieto-Angel, Barrientos-Priego. Morphometry of the organs of cherimoya (*Annona cherimola* Mill.) and analysis of fruit parameters for the characterization of cultivars, and Mexican germplasm selections. Scientia Hort., 2006; 107:337-346.
2. Bioversity International And Cherla. Descriptors for Cherimoya (*Annona cherimola* Mill.). Bioverasity International, Rome, Italy; CHERLA Project, Malaga, Spain, 2008.
3. Kornerup A, Wanscher JH. Methun Handbook Colour. 3rd edn. Eyre London, 2001.
4. Popenoe J. Status of Annona Culture in South Florida. Proc. Florida State Hort. Soc. 1974; 87:342-344.
5. Rao Dhanumjaya K, Subramanyam K. Growth and yield performance of custard apple germplasm under scarce rainfall zone. Indian J. Agric. Res. 2011; 45(2):156-160.
6. Thakur DR, Singh RN. Pomological description and classification of some annonas. Indian J. Hort. 1967; 24(1-2):11-19.