



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(5): 1939-1942

© 2018 IJCS

Received: 21-07-2018

Accepted: 24-08-2018

**RC Gajbhiye**

Horticulturist, Regional Fruit  
Research Station, Vengurle,  
Dist. Sindhudurg, Maharashtra,  
India

**SN Pawar**

JRA, Regional Fruit Research  
Station, Vengurle, Sindhudurg,  
Maharashtra, India

**SP Salvi**

JRA, Regional Fruit Research  
Station, Vengurle, Sindhudurg  
(MS)

**VK Zote**

J r. Entomologist and Regional  
Fruit Research Station,  
Vengurle, Sindhudurg,  
Maharashtra, India

**PC Haldavanekar**

Associate Director of Research,  
Regional Fruit Research Station,  
Vengurle, Sindhudurg,  
Maharashtra, India

**Correspondence****RC Gajbhiye**

Horticulturist, Regional Fruit  
Research Station, Vengurle,  
Sindhudurg, Maharashtra, India

## Performance of different cashew (*Anacardium occidentale* L.) genotypes under Konkan region of Maharashtra

RC Gajbhiye, SN Pawar, SP Salvi, VK Zote and PC Haldavanekar

**Abstract**

An experiment was conducted to study the performance of different cashew (*Anacardium occidentale* L.) genotypes under Konkan region of Maharashtra during 2008-09 to 2014-15 (6 years) under AICRP-Cashew Scheme at Regional Fruit Research Station, Vengurle - 416 516, Dist. Sindhudurg (M.S.). The trial was laid out with 12 accessions in Randomized Block Design and three replications. Grafts of all accessions of uniform in age and size were planted at 7m x 7m distance. The uniform package of practices including the recommended dose of fertilizers and plant protection schedule was followed during entire experimentation. Among the 12 types/hybrid tested, the maximum number of laterals (33.40/m<sup>2</sup>) and number of flowering panicle (24.29/m<sup>2</sup>) observed under M44/3. The highest nut weight (9.98 g) and apple weight (91.33 g) recorded under H-367. While, the maximum pooled yield (6 years) recorded in H-303 (7.24 kg/tree and 1.48 t/ha) with bold nut of 8.90 g. whereas, the maximum shelling percentage noted in 3/33 (31.15%) followed in H-255 (30.25%).

**Keywords:** genotypes, nut weight, apple weight and yield

**Introduction**

Cultivation of cashew in India confines mainly to the peninsular region. Presently, cashew is grown in Maharashtra, Goa, Karnataka and Kerala along the West coast; Tamil Nadu, Andhra Pradesh, Orissa and West Bengal on the East coast. To a limited extent, the crop is also seen growing in Chhattisgarh, Gujarat, Assam, Arunachal Pradesh, Meghalaya, Tripura, Manipur, Nagaland and Andaman and Nicobar Islands.

Cashew is one of the most important dollar earning crops of Konkan region of Maharashtra which is being widely cultivated on an area of about 1.86 lakh ha with production of 2.48 lakh MT. Maharashtra ranks first in both production and productivity (Anon., 2015) [1]. The productivity of cashew in the country is highest in Maharashtra. This is because of the fact that in Maharashtra, major plantations have been established with high yielding varieties.

In India more than 40 cashew varieties have been released so far, of which 14 are hybrids and 26 are selections. All these 40 cashew varieties are not presently recommended for commercial plantation because initially, achievement of high yield was only considered while releasing the variety; but due to high demand of bold export grade kernels both in international vis-à-vis in domestic market and there is more breakage of kernels while processing of small nuts. Therefore, presently only those varieties are recommended which are having medium to bold size nuts, high shelling percentage and high yield.

In view of the need for stepping up the production and maintain our permanent position in the global market, it is felt necessary to develop such varieties either through selection or breeding which could produce high yield per unit tree canopy, bold nut size with high shelling conforming the requirement of internal market (Rao, 1989) [2].

Performances of the cashew variety depend upon the environment condition. The variety which has been released for that state may perform better in that state, but when grown in another state; its performance may or may not be similar or better. On the contrary, the same variety performs poorly with lesser yield and of inferior quality. Hence the MLT-II of different types/hybrids was undertaken under AICRP-Cashew programme to check the performance of types/hybrids under certain environment.

## Materials and Methods

An experiment on performance of different cashew genotypes under Konkan region of Maharashtra conducted during 2008-09 to 2014-15 at RFRS, Vengurle under AICRP- Cashew Scheme with an objective to evaluate the growth and yield performance of new types/hybrids under Konkan region of Maharashtra. The type/hybrids which were found promising on the basis of their long term performance tested at various AICRP-Cashew research centres were included in Multi-location trial.

On the basis of performance of hybrid No. 255, 303, 320, and 367 with respect to nut yield, nut weight, apple weight, shelling percentage and export grade kernel; these hybrids were included in Multi-locational trial at AICRP-Cashew, Vengurla centre. In said trial, total 12 types/hybrids from four centres i.e. four promising hybrids (H-255, H-303, H-320 and H-367) from Vengurla, two types (NRCC Sel.1 &2) from DCR, Puttur, two types M (44/3 & M 15/4) from Vridhachalam and four types (T. No. 30/1, T. No. 3/33, T. No. 10/19 & T. No. 3/28) from Bapatla centre were included. The experiment was laid out under Randomized Block design with 12 treatments (type/hybrids) and 3 replications. A set of 12 types/hybrids grafts @ 4 grafts per treatment and per replication were planted at the spacing of 7m x 7m during 1998 at AICRP-Cashew, RFRS, Vengurle center use for present study during 2009-10 to 2014-15. The uniform fertilizer dose of 1000g N; 250g P<sub>2</sub>O<sub>5</sub> and 250g K<sub>2</sub>O per tree per year (1<sup>st</sup> year ¼<sup>th</sup>, 2<sup>nd</sup> year ½, 3<sup>rd</sup> year ¾<sup>th</sup> and 4<sup>th</sup> year and onwards full dose) was applied besides this, uniform package of practices including plant protection were followed during investigation period.

All the growth, flowering, fruiting and yield parameters of genotypes during the period under investigation (2008-09 to 2014-15) were recorded at appropriate stages. The data was statically pooled analysed as per procedure given by (Panse and Sukhatme, 1985) [3].

## Results and Discussion

### 1. Performance of cashew genotypes with respect to vegetative growth parameters

The various growth parameters such as height (m), girth (cm), spread (EW & NS) and mean spread (m) during the period under investigation (2008-09 to 2014-2015) was recorded. However, the data on vegetative growth parameters of various genotypes recorded during cashew season 2014-15 are presented in Table 1.

The data presented in Table 1 revealed that the various genotypes significantly influenced growth parameters viz., height (m), spread (EW& NS) and mean spread (m) except the girth (cm). 30/1 recorded significantly maximum height (7.8 m) and on par with 3/28 (7.45 m), 10/19 (7.3 m), H-320 (6.9 m) and H-255 (6.8 m). While, trunk girth of genotypes ranged from 82.4 cm (H-367) to 114.4 cm (10/19). Genotype 30/1 recorded significantly maximum EW (10.8 m), NS (10.7 m) and mean spread (10.8 m) and found at par with H-255, 3/28, 10/19, H-320, NRCC Sel. 2 and NRCC Sel. 1.

**Table 1:** Performance of cashew genotypes with respect to vegetative growth parameters

Sr. No.	Variety /type	Height (m)	Girth (cm)	Spread (m)		Mean spread (m)
				EW	NS	
1.	30/1	7.8	111.8	10.8	10.7	10.8
2.	3/33	5.8	88.3	8.2	8.0	8.1
3.	10/19	7.3	114.4	9.6	9.1	9.3
4.	3/28	7.5	107.4	9.0	9.7	9.3
5.	H-255	6.8	101.1	10.4	9.2	9.8
6.	H-303	5.8	88.1	7.2	7.9	7.6
7.	H-320	6.9	111.0	9.5	9.0	9.3
8.	H-367	4.5	82.4	8.6	7.7	8.2
9.	M-15/4	5.8	88.2	8.2	7.9	8.0
10.	M-44/3	5.3	85.7	6.6	7.4	7.0
11.	NRCC Sel.1	6.6	111.6	9.2	8.8	9.0
12.	NRCC Sel.2	6.1	86.3	8.9	9.5	9.2
	SEm ±	0.35	8.58	0.70	0.62	0.61
	CD at 5%	1.03	N.S.	2.05	1.83	1.79

### 2. Performance of cashew genotypes with respect to flowering and fruiting parameters

The various flowering and fruiting attributes during the year 2008-09 to 2014-15 were recorded, statistically pooled analysed and presented in Table 2.

**Table 2:** Performance of cashew genotypes with respect to flowering and fruiting parameters (pooled 6 years)

Sr. No.	Variety / type	Pooled number of laterals/m <sup>2</sup>	Pooled number of panicles/m <sup>2</sup>	Pooled fruit set/m <sup>2</sup>	Pooled No. of nuts/ panicles	Pooled flowering duration (days)	Pooled nut wt. (g)	Pooled apple wt. (g)
1.	30/1	30.01	19.08	30.02	5.09	108.48	6.33	61.78
2.	3/33	30.05	19.90	31.68	4.92	107.38	6.90	50.75
3.	10/19	30.08	19.07	29.68	4.71	110.38	6.25	52.95
4.	3/28	22.94	13.19	19.78	3.30	78.31	5.10	49.64
5.	H-255	29.54	19.06	30.08	4.87	107.89	9.37	68.74
6.	H-303	30.25	19.01	42.56	6.24	109.98	8.90	72.90
7.	H-320	29.38	18.70	33.02	4.72	108.29	8.37	69.31
8.	H-367	31.32	21.64	30.48	4.86	110.92	9.98	91.33
9.	M-15/4	30.54	20.30	24.13	3.78	107.04	6.91	59.39
10.	M-44/3	33.40	24.29	25.52	4.01	98.57	4.76	42.02
11.	NRCC Sel.1	29.42	17.46	31.88	4.80	107.05	8.03	61.32
12.	NRCC Sel.2	30.47	18.65	31.4	4.41	107.68	7.13	58.10
	SEm ±	0.75	0.77	1.80	0.37	1.02	0.20	1.98
	CD at 5%	2.11	2.15	NS	NS	NS	0.47	5.55

It can be evident from the data that the different genotypes significantly affect production of laterals per m<sup>2</sup>, panicles per m<sup>2</sup>, nut weight (g) and apple weight (g) however, there was no significant difference among the genotypes with respect to fruit set per m<sup>2</sup>, number of nuts per panicle and flowering duration (days).

Cashew accession M44/3 recorded significantly the maximum number of laterals (30.40/m<sup>2</sup>) and panicles (24.29/m<sup>2</sup>) and superior over rest of genotypes however, it was found at par with H-367 in respect of laterals per m<sup>2</sup> (31.32/m<sup>2</sup>). Significantly the maximum nut weight 9.98 g and apple

weight of 91.33 g recorded under H-367 and superior over rest of genotypes.

Fruit set per sq. m. of genotypes was ranged between 19.78 (3/28) to 42.56 (H-303) while, number of nuts per panicle lowest under 3/28 (3.30) and highest in H-303 (6.24). Whereas, flowering duration of genotypes ranged from 78.31 days (3/28) to 110.92 days (H-367).

The present results are in conformity with the findings of (Anon., 1975) [4] reported that first set in cashew under Vengurla conditions was observed to be 4.8 to 8.6 fruits per panicle in different hybrid trees. Sapkal *et al.*, 1994 [5] determined the highest percentage of fruit set with 1/61 Alagudi Madras (21.83) under Karnataka conditions (Subramanian, 1996) [6] reported that duration of flowering varied considerably from 52-88 days in different cashew types. The likewise Lenka *et al.*, 1999 [7] observed that, the flowering period continued up to 14<sup>th</sup> week in BPP 30/1 and H-303 while, Samal *et al.*, 2006 [8] reported maximum of 95 days flowering duration in BPP-3 to a minimum of 40 days in Jhargram-1.

Haldankar *et al.*, 1986 [9] noted that the apple of variety Vengurla-3 exhibited maximum weight (75.22 g) followed by Vengurla-1 (56.81 g) at Dapoli condition, (Reddy *et al.*, 1986) [10] confirmed that the maximum apple weight (62.1 g) was recorded in 6/21 Mudabidri and minimum in 1/63 Chrompet

(17.8 g), while maximum nut weight (7.0 g) was recorded in 6/21 Mudabidri and minimum (2.5 g) in 9/62 Alangudi at Chintamani condition. Nalini *et al.*, 1991 [11] reported that the variety K-16-1 produced heaviest apple (80 g) and nut (8.9 g) at Anakayam, Kerala conditions. Sapkal *et al.*, 1992 [12] observed that the variety 9/78 Ullal-Mysore produced apples of maximum weight (68.32 g) whereas the apple weight was the minimum in 1/61 Alangudi-Madras (26.82 g) at Dharwad condition. Hallad *et al.*, 1993 [13] obtained maximum apple weight in 9/78 Ullal-Mysore (35.49 g) and it was least in 1/63 Chrompet-Madras (10.88 g) at Dharwad condition. Mahesha *et al.*, 2005 [14] recognized that the variety Selection-2 produced heaviest nut (9.76 g) followed by Vengurla-6 (8.57 g) and Selection-1 (8.48 g). The least weight of nut (4.69 g) was recorded in Vengurla-2 at hill zone of Karnataka. The results with respect to nut weight and apple weight are in conformity with the present findings.

### 3. Performance of cashew genotypes with respect to yield and yield attributing parameters

The yield of different genotypes during the period under investigation during last 6 years (2008-09 to 2014-15) was recorded was statistically pooled analysed and presented in Table 3.

**Table 3:** Performance of cashew genotypes with respect to yield and yield attributing parameters

Sr. No.	Variety /type	Pooled yield (kg/tree) 6 years	Pooled yield (t/ha) 6 years	Pooled shelling (%)
1.	30/1	4.18	1.09	29.21
2.	3/33	3.06	0.62	<b>31.15</b>
3.	10/19	3.92	0.79	28.69
4.	3/28	2.04	0.75	20.72
5.	H-255	5.41	1.10	30.25
6.	H-303	7.24	1.48	29.05
7.	H-320	5.37	1.09	29.32
8.	H-367	4.69	0.91	28.64
9.	M-15/4	2.70	0.55	27.24
10.	M-44/3	1.17	0.57	27.47
11.	NRCC Sel.1	4.59	0.93	29.57
12.	NRCC Sel.2	3.40	0.72	28.82
	SEm ±	1.05	0.21	0.41
	CD at 5%	2.47	0.54	1.14

The yield attributes such as yield (kg/tree and t/ha) and shelling (%) were significantly influenced by various genotypes tested under MLT-II. The significantly maximum pooled yield for last 6 years recorded in H-303 (7.24 kg/tree) and found at par with H-255 (5.41 kg/tree) and H-320 (5.37 kg/tree). Similarly, H-303 recorded significantly maximum yield of 1.48 t/ha and at par with H-255 (1.10t/ha), H-320 (1.09 t/ha) and 30/1 (1.09 t/ha) while, the maximum cumulative yield for 12 harvests was recorded in H-303 (47.13 kg/tree). 3/33 recorded significantly maximum shelling percent of 31.15 and was at par with H-255 (30.25%). The results suggest that the performance of the variety depends on the environment.

The present results are in conformity with the findings of Solanki, 2010 [15] reported significantly highest yield of cashew nut in Vengurla-4 (14.75 kg/tree) under South Gujarat condition. The likewise at Bhubaneswar conditions in BPP-8 (11.60 kg/tree) by Samal *et al.*, 2006 [8] at hill zone of Karnataka in Vengurla-3 (4.60 kg/tree) by Mahesha *et al.*, 2005 [14] and Anakayam, Kerala condition in BLA-139-1 (29.29 kg/tree/year) by Nalini *et al.*, 1991 [11] at Eastern dry zone of Karnataka in selection 8/46 Taliparamba (842.38

kg/ha) by Krishnappa *et al.*, 1989 [16] and under Karnataka condition, Selection 1/61 Alangudi Madras recorded highest yield of 4.032 kg/tree (Sapkal *et al.*, 1991) [17]. It may be due to the age of tree and difference in agro-climatic conditions.

The present results are in also agreements with Salam, 1998 [18] and Salam, 2000 [19] who studied the performance of 18 varieties at CRS, Madakkathara during 1987 to 1999 and found that the varieties Vridhachalam-3, Kanaka, Vengurla-5, Vridhachalam-2, Dhana, Anakkayam-1, H-1600 and Vengurla-3 are the best in terms of nut yield under Kerala conditions.

### Conclusion

Among the 12 types/hybrids tested, the maximum number of laterals (33.40/m<sup>2</sup>) and number of flowering panicle (24.29/m<sup>2</sup>) observed under M44/3. The highest nut weight (9.98 g) and apple weight (91.33 g) recorded under H-367. While, the maximum pooled yield (6 years) recorded in H-303 (7.24 kg/tree and 1.48 t/ha) with bold nut of 8.90 g whereas, the maximum shelling percentage noted in 3/33 (31.15%) followed by H-255 (30.25%).

**Acknowledgements**

The authors are grateful to the Director and Project Co-ordinators, Directorate of Cashew Research, Puttur, Karnataka and Director of Research, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli for providing necessary fund, facilities and support for conducting the trial on cashew.

**References**

1. Anonymous. Indian Horticulture Database 2015, National Horticulture Board, Gurgaon, New Delhi, 2015, 14.
2. Rao EVVB. Cashew Research-Programmes, Achievements and Thrust, The Cashew. 1989; 2(4):15-20.
3. Panse VG, Sukhatme PV. Statistical Method for Agricultural Workers. 4<sup>th</sup> edition, ICAR Pub., New Delhi, 1985.
4. Anonymous. Project Report, All India Co-ordinated Spices and Cashewnut Improvement Project 1973-1975, Central plantation crops Research Institute, Kasargod, Kerala (India), 1975.
5. Sapkal BB, Hulamani NC and Nalawadi UG. Flowering and sex ratio in some cashew selections. The Cashew. 1994; 8(1):7-10.
6. Subramanian S, Shah HA, Thangavelu S. Studies on flowering behaviours and sex ratio yield in different cashew types at regional research station Vridhachalam. The Cashew. 1996; 10(4):20-22.
7. Lenka PC, Mohapatra, KC and Mishra NK. Studies on floral characters and sex ratio in various Cashew (*Anacardium occidentale* L.) types. The Cashew. 1999; 12(1):23-30.
8. Samal S, Lenka PC and Rout GR. Evaluation of cashew varieties under Bhubaneswar condition for major plant characters and nut yield. The Cashew. 2006; 20(2):8-13.
9. Haldankar PM, Joshi GD, Salvi MJ, Ingawale MT. Physico-chemical characteristics of cashew apple. J Maharashtra Agric. Uni. 1986; 11(2):249-50.
10. Narayana Reddy MA, Shivanandam VN, Gowda MC and Shankaranarayana V. Physico-chemical characteristics of cashew (*Anacardium occidentale* L.) selections under Chintamani conditions. Indian Cashew J. 1986; 18:17-9.
11. Nalini PV, Santhakumari S. Study on performance of selected types of cashew at Cashew Research Station Anakayam, Kerala. The Cashew. 1991; 5(3):3-6.
12. Sapkal BB, Hulamani NC and Nalwadi UG. Studies on some qualitative aspects of cashew apple. The Cashew. 1992; 6(2):8-10.
13. Hallad JS, Sulikeri GS and Hulamani NC. Physico-chemical properties of cashew (*Anacardium occidentale* L.) apples of different cultivars. The Cashew. 1993; 7(1):10-11.
14. Mahesha US, Hanamashetti SI and Hegde NK. Performance of Cashew (*Anacardium occidentale* L.) varieties under hill zone of Karnataka. The Cashew. 2005; 19(3):5-7.
15. Solanki PD. Studies on flowering and fruiting behaviour of different varieties of Cashew (*Anacardium occidentale* Linn.) in South Gujarat. M.Sc. Thesis submitted to Navsari Agriculture University, Navsari (Gujarat), 2010.
16. Krishnappa, KS, Gowda MC, Reddy MAN and Raju GTT. Initial evaluation of certain cashew (*Anacardium occidentale* L.) selections under eastern dry zone of Karnataka. Indian Cashew J. 1989; 19: 19-21.
17. Sapkal BB, Hulamani NC, Nalwadi UG, Sulikeri GS. Some cashew selections for transitional belt of Karnataka. South Indian Hort. 1991; 39(6):379-80.
18. Salam MA. Processing characteristics and production potential of cashew (*Anacardium occidentale* L.) varieties. The Cashew. 1998; 12(1):27-37.
19. Salam MA. Performance of cashew (*Anacardium occidentale* L.) genotypes under Kerala condition. J. Plantation Crops. 2000; 28(3):185-190.