

Performance of some cashew (*Anacardium occidentale* L) selections for nut yield

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ABSTRACT

Field experiment was conducted at Cashew Research Station of All India Coordinated Research Project on Cashew (ICAR) under OUAT, Bhubaneswar, Odisha to study the performance of different cashew selections for nut yield by adopting RBD replicated thrice having four plants per treatment. The treatments consisted of 11 entries viz BH 6 (Jagannatha), BH 85 (Balabhardra), H 1597 (Amrutha), H 662, H 675, H 32/4, K 22-1, H 11, H 14 and Goa 11/6 (Bhaskara) including BPP 8 as local check. The clonal planting material was planted at a spacing of 7.5 x 7.5 m during 2003 by uniformly adopting recommended package of practices to raise a good crop. The results revealed significant variations among the entries for various vegetative parameters, nut yield and yield attributing parameters. The results of present study on vegetative growth parameters revealed that the cashew selections K 22-1 and H 675 were identified as dwarf in growth habit hence were proved suitable for high density planting system in cashew. The overall results revealed significant superiority of BH 85, H 32/4, Goa 11/6 and BPP-8 for majority of nut yield attributing parameters such as flowering duration (85 to 104 days), number of panicles/m² (17.63 to 22.05), male-bisexual flower ratio (0.21 to 0.36), mean number of nuts/m² (27.91 to 42.59) and number of nuts/panicle (5.00 to 6.00) than rest of the cashew selections. Similarly significantly better performance of selections BH 6, BH 85, H 1597 and Goa 11/6 including BPP 8 as check was observed for mean nut weight (7.17 to 8.60 g), shelling percentage (28.17 to 31.33) and annual yield (6.06 to 7.97 kg/ha) as compared to other selections. It was concluded that the cashew selections BH 85 (Balabhardra), BH 6 (Jagannath), BPP 8, Goa 11/6 (Bhaskara) and H 1597 (Amruta) may be recommended not only for better growth but also for nut yield in a sustainable manner.

Keywords: Cashew varieties; nut yield; kernel; evaluation; shelling

INTRODUCTION

Cashew (*Anacardium occidentale* L) termed as 'Wonder nut of the world' is native to Brazil having about 75 genera and 700 species. Although cashew was introduced in India by Portuguese as a crop for afforestation and soil conservation purpose but later on the crop was exploited commercially due to its versatile uses. India ranks first in production, processing and export of kernel in the world but productivity of existing cashew plantation is very poor ie hardly 722 kg/ha as compared to the other countries. The leading states of cashew production in India include Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal etc. The state of Odisha contributes about 1.58 lakh hectares with a

production of 0.97 lakh MT and production share of 14 per cent. Among the several factors influencing the cashew productivity in the country as well as in the state, use of traditional varieties of low yield potential, lack of production and protection technologies etc are the major causes.

The low production and productivity problems of cashew can be addressed effectively by planting of superior cashew varieties with high yield potential under proper package of practices.

The present study was aimed at evaluating the potential yield of eleven cashew types developed at different research stations of the country, their shelling percentage and tree architecture (canopy

area) under the agro-climatic conditions of Odisha.

MATERIAL and METHODS

Field experiment was carried out at Cashew Research Station, Ransinghpur, Bhubaneswar, Odisha under All India Coordinated Research Project on Cashew under Orissa University of Agriculture and Technology, Odisha (latitude 20°45' N, longitude 86°10' E and altitude 60 m) during 2003 to 2014. The soil of the experimental plot was red lateritic in texture with 4.8 pH. Eleven cashew selections developed by different cashew research stations of the country were used in the study by adopting RBD replicated thrice having four plants per treatment. The grafted plants of desirable cashew varieties were transplanted during 2003 with a normal spacing of 7.5 x 7.5 m by adopting the recommended package of practices. The nut yield was recorded on individual tree basis commencing from last week of March to May. The vegetative growth parameters such as tree height, tree trunk girth and canopy coverage were recorded every year however are being presented only for 2014. Nut yield attributing parameters such as average nut weight, nuts per panicle, nuts per m² and flowering laterals per m were recorded and calculated by adopting standard procedures. Canopy area was estimated by computing the average of the radius of the canopy (measuring from both N-S and E-W direction) in the formula:

$$\pi r^2 \text{ where } \pi = 3.142, r = \text{Radius of canopy}$$

Nut and kernel weight was recorded each year and the mean was used in the analysis of data. Nut yield per plant was calculated by adding the total individual nut yield harvested each time. Statistical analysis of all the recorded data was done by adopting standard procedure suggested by Panse and Sukhatme (1978).

RESULTS and DISCUSSION

Significant variations were recorded for vegetative parameters as well as flowering parameters during the period under study (Table 1). The plant height and trunk girth ranged from 3.13 m and 33.67 cm (K 22-1) to 5.41 m and 87.17 cm (H 32/4) respectively. Significantly highest tree height with trunk girth was recorded in H 32/4 and H 1597 (Amrutha) while lowest in K 22-1. Significantly maximum area of 104.384 m²

was recorded in local check, BPP-8 while minimum of 26.08 m² in selections H 675 and K 22 (30.49 m²) than rest of the tested cashew selections. However statistical parity was recorded in H 1597, H 32/4 and Goa 11/6 with highest value of BPP 8. The present study also identified the dwarfing growth habit of cashew selections such as K 22-1 and H 675 which may be useful for high density planting system in future after proper evaluation. Generally cashew produces flowers at the peripheries of the canopy and as such early canopy merger affects cashew nut yield. Therefore genotypes with large canopy may require larger plant spacing. Cashew types with vigorous growth habits identified were H 32/4, BH 85, BH 6, H 1597, BPP 8, Goa 11/6, H 11 and H 14.

The results on flowering parameters revealed significant variations among the tested entries indicating the wide scope for selection of suitable entries for further crop improvement programmes in cashew. The results indicated wide variations for flowering period starting from 4th week of November in BH 85 to 3rd week of April in H 662 under Odisha conditions. The duration of flowering period also showed similar trend which ranged from 73 days in H 662 to maximum of 104 days in BH 85. Similar results of flowering duration of 42 to 123 days were also reported by Samal et al (2006) in different cashew types under Bhubaneswar, Odisha conditions.

The results on number of panicles per m² revealed significant variations among the cashew selections which varied from 16.75 in K 22 to 22.05 in BH 85. Significantly highest number of panicles per m² was observed in BH 85 than rest of the selections. However the cashew selections such as BH 6, H 11, Goa 11/6 and BPP 8 showed relatively better panicles per m² ranging from 18.81 to 21.72 which were statistically at par with BH 85. Similarly ratio of male to bisexual flowers also showed significant variations which varied from 0.11 in H 662 to 0.43 in H 675. Significantly lowest ratio of male to bisexual flower was observed in H 675 than rest of the tested selections except BH 6, H 1597, K 22-1 and H 11 (0.12 to 0.17) which were statistical at par among themselves. Similar variations among cashew types were also observed by Sena et al (1995) under Bhubaneswar, Odisha conditions. Research results on nut yield and yield attributing parameters also indicated significant variations among the tested cashew selections (Table 2). Production of nuts per m² varied from

Table 1. Vegetative growth and flowering attributing parameters of different cashew selections under Odisha condition

Accession #	Mean tree height (m)	Mean stem girth (cm)	Mean canopy area (m ²)	Flowering duration		# panicles /m ²	Ratio of male-bisexual flowers
				Range	Days		
BH 6	5.04	77.66	83.08	1 st week of Jan to 1 st week of April	87	21.22	0.15
BH 85	5.08	78.42	94.92	4 th week of Nov. to 2 nd week of March	104	22.05	0.20
H 1597	5.09	84.75	91.20	2 nd week of Jan to 3 rd week of April	93	17.51	0.13
K 22-1	3.13	33.67	30.49	1 st week of Jan to 1 st week of April	88	16.75	0.12
H 662	4.23	46.00	43.48	1 st week of Jan. to 4 th week of March	73	17.45	0.11
H 675	3.83	56.60	26.08	1 st week of Jan to 1 st week of April	90	17.50	0.43
H 11	4.97	76.42	87.56	4 th week of Dec to 3 rd week of March	94	21.72	0.17
H 14	4.95	60.23	85.61	4 th week of Nov. to 4 th week of March	97	18.54	0.21
H 32/4	5.41	87.17	92.88	3 rd week of Dec to 4 th week of March	101	17.63	0.36
Goa 11/6	5.07	76.33	91.49	2 nd week of Jan to 3 rd week of April	99	21.55	0.30
H 2/16 (BPP 8)	5.27	79.33	104.84	1 st week of Dec. to 1 st week of April	85	18.81	0.21
(local check)							
Sem±	0.210	2.59	5.14		1.93	1.16	0.02
CD _{0.05}	0.662	7.65	15.17		5.69	3.45	0.07

19.00 in H 662 to 42.59 in H 32/4. Significantly maximum number of nuts per m² was recorded in H 32/4 (42.59) and was statistically at par with BH 85, H 11, H 14 and the check, BPP 8 (32.69 to 41.89). Similar trends were also observed for number of nuts per panicle which varied from 3.33 in H-662 to 6.00 in H 32/4 (Table 2). However the cashew selections such as H 32/4, BH 6, BH 85, H 675, Goa 11/6 including the check variety BPP-8 recorded significantly higher nuts per panicle than rest of the tested types. In cashew nuts per panicle has +ve correlation with nut yield (Anitha et al 1991, Manoj et al 1994).

It has been established that the nut weight is highly influenced both genetically and environmentally in cashew. Manoj et al (1993) also reported the variations in nut weight among cashew selections. In the present study the average nut weight ranged from 4.60 (H 675) to 8.63 g (H 622). Cashew types producing average nut weight or more than 7.00 g were BH 6, BH 85, H 1597, H 662, Goa 11/6 and BPP 8.

The data presented in Table 2 also show significant differences among the cashew selections for shelling percentage being the most important parameter for commercialization point of view. The shelling percentage varied from 28.17 in local check variety BPP 8 to maximum of 31.33 per cent in BH 6. Significantly highest shelling percentage was observed in BH 6 (31.33) and it was statistically at par with BH 675, H 1597 and K 22-1 (29.93 to 31.00). Statistical analysis of the nut yield per plant of the eleven tested cashew selections including the local check indicated significant differences in nut yield (Table 2). The mean nut yield per plant during the year of study varied from minimum of 2.57 kg in H 675 to maximum of 7.97 kg in BH 85. Significantly highest mean nut yield per plant of 7.97 kg was recorded in BH 85 and was statistically at par with H 1597 and BPP 8 (7.11 to 7.33 respectively). Significant variations in nut yield per tree among the different types were also reported by Chandregowda et al (1989).

CONCLUSION

Potential promising cashew types such as BH 85 (Balabhadra), BH 6 (Jagannath), Goa 11/6 (Bhaskara) and BPP 8 which produced consistent nut yield may be recommended for cultivation under Odisha conditions. Furthermore shelling percentage demonstrated by majority of the cashew selections

Table 2. Nut yield and yield attributing parameters of different cashew selections under Odisha condition

Accession #	Mean # nuts/m ²	Mean # nuts /panicle	Mean nut weight (g)	Shelling percentage	Mean annual nut yield (kg/plant)
BH 6	31.27	5.67	8.13	31.33	6.06
BH 85	41.89	5.33	7.17	29.33	7.97
H 1597	29.69	3.67	8.53	30.67	7.11
K 22-1	27.87	4.67	5.40	30.33	4.23
H 662	19.00	3.33	8.63	29.33	4.00
H 675	28.61	5.67	4.60	31.00	2.57
H 11	38.39	4.67	5.73	29.27	5.45
H 14	34.77	5.33	4.90	29.93	4.39
H 32/4	42.59	6.00	6.53	28.33	6.27
Goa 11/6	27.91	5.00	7.47	29.20	6.20
H2/16 (BPP 8) (local check)	32.69	5.00	8.60	28.17	7.33
SEm±	3.75	0.39	0.53	0.35	0.54
CD _{0.05}	11.07	1.15	1.58	1.05	1.59

are within the acceptable international standards. The cashew selections K22-1 and H 675 were identified having dwarf growth habit which may be suitable for high density planting system after proper evaluation.

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