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Evaluation of cashew genotypes for nut yield and yield attributing characters under Bhubaneswar condition of Odisha

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Abstract
The present experiment was conducted at Cashew Research Station, All India Coordinated Research Project on Cashew, OUAT, Bhubaneswar, Odisha to evaluate the performance of eleven diverse genotypes of cashew. There were significant differences among the genotypes for plant height, trunk girth, canopy spread and ground area coverage by canopy, nuts/panicle, apple weight, nut weight and nut yield/tree. Maximum plant height was found in H-32/4. Longest flowering duration (68.00) was observed in the genotype BH-85 while Goa 11/16 recorded the shortest duration of flowering (55.00). Apple weight(65.60g) was recorded maximum in genotype H-1593 whereas the genotype H 2/16 showed the maximum nut weight(8.17g). Highest nut yield/tree was observed in BH-85(18.34kg/tree) for 12th harvest.

Keywords: Cashewnut, genotypes, vegetative, yield attributing traits and nut yield

Introduction
Cashew (*Anacardium occidentale* L.) is one of the important horticultural crops of India which has unique importance in human life for varied uses in agriculture, industry and medicine as well as its uses in domestic life. Cashew kernel derived by processing of raw nuts, is highly nutritious and is an ingredient of dietary item in most of the developed countries. The cashew is being grown in India in an area of 10.40 lakh hectares with the total production of 7.79 lakhs MT of raw nuts and unit area productivity of 753kg/ha (Huballi, 2018) [2]. The gap between present production and the demand by the processors can be bridged by increasing the production of raw nuts. In Odisha, cashew is grown in an area of 1.83 lakh hectares with the production of 0.94 lakhs MT and productivity of 513kg/ha. As the crop has wider adoptability to various agro-climatic condition and different types of soil, extension of cashew plantation in Odisha will be helpful for increasing the raw nut production. Success of cashew cultivation depends on various technologies like selection of high yielding varieties suitable for the agro-climatic condition and adaptation of different package and practices at proper time etc. As selection of varieties is one of the most important factor in the plant management system (Salam, 1999) [7], an attempt was undertaken to evaluate the different genotypes of cashew with respect to vegetative, yield attributing traits and nut yield in order to select the best genotype suitable for this region to increase the raw nut production.

Materials and Methods
The present investigation was carried out at Cashew Research Station, All India Coordinated Research Project on Cashew, OUAT, Bhubaneswar, Odisha situated at 20 45" N latitude and 86 10" E longitudes, at an elevation of 60 meters above MSL. The experiment was laid out in Randomized Block Design (RBD) with three replications. The genotypes were planted in the year 2003 following a spacing of 7.5m x 7.5m. All the recommended package of practices was adopted uniformly for all the treatments to raise a good crop. Observations on various vegetative, and yield attributing traits and nut yield were recorded for the fruiting season 2016-17. The recorded data were analyzed statistically by adopting the standard procedure of Panse and Sukhatme.

Results and Discussion
The results obtained from the experiment have been discussed under the following heads.

Vegetative Growth Characters

There were significant differences among the genotypes with respect to growth characters like plant height, trunk girth, canopy spread and ground area coverage by canopy(Table 1).Among the genotypes, plant height varied from 4.23m(K-22-1) to 6.17m(H-32/4).Trunk girth ranged from 76.40cm(H-14) to 98.87cm(H-1593).Maximum canopy spread (E-W-9.80m and N-S-9.40m) and minimum values were recorded by H-675. Similarly maximum ground coverage by canopy (128.62) was observed by H-2/16 followed by BH-85. The results obtained from the evaluation of genotypes of cashew nut with respect to morphological characters revealed that the differences exhibited by them were significant. Variation in different genotypes might be attributed to varietal characters. The similar result in respect of significant differences in plant height, trunk girth and canopy spread among different cashew genotypes were reported by Sreenivas *et al*. (2016) [11], Singh *et al*. (2010) [10], Desai (2009), Reddy *et al*. (2002) and Naik *et al*. (1997) [5].

Yield attributing characters and nut yield

The data (Table 2) on reproductive growth characters reveals that the genotypes H-1593 recorded maximum total laterals (35.58) and flowering laterals (34.75), whereas maximum sex ratio(0.35) and nuts/panicle(10.67) were observed in H-675 which are the important yield attributing characters. Longest flowering duration (68.00) was observed in the genotype BH-85 and short flowering duration (55.00) in Goa 11/16.Similar studies were also reported by Reddy *et al.* (2001) [6], Dorajeerao *et al.* (1999) [1] and Sena *et al.* (1995) [9]. There were significant differences among the genotypes with respect to apple weight, nut weight, nut yield and shelling percentage (Table 3).Among the genotypes, the apple weight varied from 32.40gm (H-14) to 65.60(H-1593). The variation in apple weight could be due to genetic variability and varietal characters. Nut weight ranged from 4.67gm(H-675) to 8.17gm(H 2/16).The analysis of the data on nut parameters showed that the nut weight has not followed the trend in apple weight, thus indicating that it is not important to have larger apples for producing heavier nuts. Smaller apples also were found to bear larger nuts in some of the genotypes (Goa 11/16). As regards to shelling percentage, highest shelling percentage was recorded by the genotype H-675(32.43%) and minimum was observed by H-32/4(27.97). Similar results of significant differences among nut parameters were also reported by Mahesha *et al*. (2005) [4] and Vishnu Vardhan *et al.* (2003) [12].

Maximum nut yield/tree was observed in BH-85(18.34), whereas minimum values were recorded in K-22-1 (5.50). The genotypes showing bold sized nuts indicating that they could deposit maximum amount of photosynthetic assimilates in to nut and thus maintaining an individual nut weight at higher order. Similar observations of significant differences among the values of nut yield/tree was also reported by Samal *et al* (2006) [8], Reddy (2001) [6] and Lakshamana *et al.* (2001) [3].

From the above study, it has been found that the genotype BH-85 was found suitable for this region with respect to nut yield and yield attributing characters.

Table 1: Vegetative characters of different cashew genotypes

Genotypes	Plant height(m)	Trunk girth(cm)	Canopy spread(m)		Ground area coverage by canopy(m^2)
			E-W	N-S	
BH 6	5.73	86.33	9.07	9.17	116.00
BH 85	5.63	95.23	9.03	9.33	117.70
H 1593	5.53	98.87	9.17	8.93	114.34
K 22-1	4.23	60.27	5.93	6.33	52.52
H 662	5.10	57.67	6.43	6.90	62.03
H 675	4.60	62.63	5.93	5.50	45.62
H 11	5.57	86.00	8.63	9.10	109.72
H 14	5.57	76.40	8.57	8.70	104.04
H 32/4	6.17	96.73	8.93	9.13	113.89
Goa 11/6	5.77	86.27	8.80	9.13	112.23
H 2/16	5.97	94.83	9.80	9.40	128.62
Mean	5.44	81.93	8.20	8.33	97.88
SEM(±)	0.09	1.09	0.10	0.11	1.56
CD(5%)	0.29	3.22	0.31	0.31	4.60
CV(%)	3.15	2.31	2.26	2.22	2.76

Table 2: Yield attributing characters of different cashew genotypes

Genotypes	Total number of laterals	Sex ratio	Nuts/panicle	Flowering duration (days)	Flowering laterals/m^2	Nut/m^2	Apple weight(g)	Nut weight(g)	Shelling (%)
BH 6	33.84	0.18	5.00	59.00	33.25	34.00	59.67	7.83	30.97
BH 85	29.17	0.22	7.67	68.00	28.92	37.17	63.43	7.60	29.80
H 1593	35.58	0.28	6.33	60.67	34.75	36.33	65.60	7.40	30.30
K 22-1	25.17	0.28	7.67	60.33	24.25	34.2	47.00	6.13	30.03
H 662	22.25	0.15	4.67	63.67	19.67	21.58	58.00	7.13	30.70
H 675	27.92	0.35	10.67	65.00	28.25	51.58	25.00	4.67	32.43
H 11	32.75	0.23	8.33	56.00	31.42	49.25	36.77	5.73	30.07
H 14	32.17	0.20	9.00	61.67	32.17	52.30	32.40	5.10	29.70
H 32/4	23.72	0.20	8.33	61.33	21.83	43.50	60.87	6.70	27.97
Goa 11/6	26.58	0.19	7.00	55.00	26.33	38.00	53.67	7.37	29.40
H 2/16	21.33	0.13	4.67	64.33	19.25	30.83	62.73	8.17	29.03
Mean	28.22	0.22	7.21	61.36	27.28	39.00	51.37	6.71	30.05

SEM(+)	1.95	0.01	0.44	1.56	2.13	1.69	1.37	0.14	0.16
CD(5%)	55.75	0.04	1.29	4.62	6.29	5.00	4.05	0.41	0.48
CV(%)	11.96	11.00	10.58	4.42	15.53	7.52	4.63	3.59	0.93

Table 3: Mean annual nut yield and cumulative nut yield of different cashew genotypes

Genotypes	Mean annual nut yield(kg/tree)	Cumulative nut yield(kg/tree) at 12th harvest
BH 6	16.33	81.77
BH 85	18.34	93.68
H 1593	15.19	70.58
K 22-1	5.50	33.53
H 662	6.92	40.06
H 675	5.47	29.42
H 11	8.57	61.56
H 14	6.73	49.12
H 32/4	11.83	57.9
Goa 11/6	10.67	61.69
H 2/16	10.62	62.89
Mean	10.56	
SEM(+)	0.21	
CD(5%)	0.61	
CV(%)	3.38	

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