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Study on qualitative characters of thirty cashew genotypes

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Abstract

An investigation was conducted at cashew research station under AICRP on cashew Ranasinghapur, Khurda, Bhubaneswar during the year 2015-2017, to study the qualitative characters and yield of thirty genotypes of cashew such as cashew apple weight, TSS and acidity. As per the research it was revealed that the cashew apple weight varied from 24.80 g in Dhauli to maximum 106.40 g in RP-5, the TSS was maximum in RP-5(18.99g) and was significantly superior to all treatments and minimum TSS was recorded in S-21 that is (10.55g) and the acid content was maximum in OS-3(0.89%) and minimum was recorded in RP-1(0.26%). The nut yield per plant was highest in check genotypes that is BH-85(14.96kg) followed by BH-6 (12.97 kg). Among the landraces, highest yield was recorded in BBSR-C-1(10.27) followed by OS-5(10.20kg), Lokipur-1(10.00kg) and minimum was recorded in RP-3(1.6kg).

Keywords: Cashew apple weight, TSS, acid content and yield

Introduction

Cashew is a versatile tree nut having multifarious uses. It is in fact, a precious gift of nature to mankind. Among various nuts as hazelnuts, almonds etc. it, is considered as 'Gold Mine' of wastelands as it requires low inputs for production from its humble beginning as a crop intended to check soil erosion, cashew has emerged as a major foreign exchange earner next only to tea and coffee. Now, the total production of cashew in the country is 7.79 M tones from 1.035 lakh hectare area "(Horticultural statistics at a glance. 2016-17). Most of the area under cashew is in the East-Coast and West-Coast regions of the country. In Odisha, productivity of cashew is about 513 kg ha from an area of 183.3 thousand hectare. (Horticultural statistics at a glance. 2016-17) the wastage of cashew apple is a great economical loss in terms of nutrient as well as national health. It is one of the richest source of ascorbic acid, B-complex and other vitamins. The juice is astringent due to presence of tannins and anacardic acid which cause bitter sensation on both tongue and throat when the apples are eaten. The present investigation was carried out to critically study the qualitative characters of twenty seven landraces and three check genotypes.

Materials and Methods

A detailed account of the materials used and the methods followed during the course of this investigation is embodied in the ensuing chapter.

The experiment was conducted at, All India Coordinate Research Project on cashew O.U.A.T., Bhubaneswar. It is situated at a latitude of 20°15'N and longitude of 85°52'E and altitude of 25.5 meters above the mean sea level. It is 70 km away from the Bay of Bengal and falls under the East coastal plains and Hills zone of the humid tropics of India. The texture of soil is sandy loam Sand 81.2 (%), Silt 1.2 (%), Clay 17.6 (%), Available water holding capacity 6.9 (%), Soil pH of 5.1, EC 0.02, Available Nitrogen 88(kg/ha), Available P₂O₅ (28.1kg/ha), Available K₂O (80.2kg/ha). The experiment was laid in randomized block design with two replication and thirty treatments (twenty seven landraces and three check genotype ie. BH-6, BH-85 and Bhubaneswar- 1) and observations were recorded, as per the standard descriptors of cashew (IBPGR, 1986; Swamy *et al.*, 1998) for two seasons. Recommended package of practices were adopted uniformly to raise a good crop. The present study was undertaken during the fruiting season 2015-2017 of 16 years old cashew plants. Data were recorded on various components adopting standard procedure as described in the Experimental Manual on Cashew (Experimental Manual on cashew, 2005). Statistical analysis of all the recorded data were done by adopting standard procedure as suggested by Panse and Sukhatme (1978).

Weight of apple (g)

Weight of twenty individual matured cashew apples was recorded during the mid-season for each genotype and mean weight computed was expressed in grams.

Total soluble solid (TSS⁰)

The total soluble solids were determined by using hand refractometer and expressed in °Brix as followed by Ranganna (1986).

Titration acidity (%)

A quantity of 10 ml of sample was taken in a 100 ml volumetric flask and the volume was made up with distilled water. From this aliquot of 10 ml was taken in 100 ml conical flask and one to two drops of phenolphthalein indicator was added and titrated against 0.1 N NaOH until faint pink colour is obtained which persists at least for 15 seconds, as end point as followed by (Ranganna, 1986). For the preparations of 0.1 N NaOH, a quantity of 4 g of Sodium Hydroxide was dissolved in small quantity of water initially and the volume is made up to 100 ml by addition of distilled water.

Titration acidity (%) =

$$\frac{\text{Titre value} \times \text{Equivalent weight of acid} \times \text{Normality of NaOH}}{10 \times \text{weight of sample (g)}} \times 100$$

Nut yield per tree (kg): Total weight of raw nuts collected from each of four trees during the entire season, was recorded in kilograms and mean weight was expressed as nut yield per tree in kilograms.

Results and Discussion

The results of the investigation carried out have been described and the means pertaining to various studies have been presented in the form of summarized tables along with

necessary illustrations whenever deemed appropriate. During the course of investigation the weight of cashew apple was found significant. Minimum apple weight was recorded in Odisha selection-3 (24.80g) and maximum was recorded in RP-5 (106.3g) which was found significantly superior to all other treatments. More than 50g of cashew apple weight was recorded in Ranasinghapur bold nut, Kalyanpurbold nut, Orissa selection-3, Khorda-1, selection-8, selection-19, selection-20, selection-21, selection-24, Tapanga, Bhanjakusuma, RP-4, RP-3, BH-85 and the TSS of cashew apple varied from 10.5 brix in selection-21 to maximum of 18.98 in RP-5 followed by RP-4 (8.16 brix) and in RP-2 (17.83) indicating sweetness of cashew apple. The acidity content of cashew apple in different landraces varied from 0.26 (RP-1) to 0.88 in OS-3. A wide variation in acid content of fruit was observed and it may be due to genetic characters of fruits. Similar results were obtained by Nalini and Shantakumari (1991) under Kerala climatic conditions. Attri and Singh (1997) [1] also recorded variation of 70 to 110g in cashew apple. Samal (2002) [17] observed variation in apple length and breadth under Bhubaneswar condition and TSS of cashew apple were reported by Costa *et al.* (2009) [4], Naidu (2012) [14] and are of similar view. The nut yield per plant during the course of investigation was found significant from the pooled data. It was observed that minimum yield was recorded in Rp-3 (1.6kg) and maximum in BH-85 (14.96kg). More than 10 kg nut yield was recorded in Lokipur -1, Orissa selection -5 BBSR-C-1 and BH-6. More than 10kg per plant with more than 8g of nuts are desirable for cashew production. The variation in nut size was reported by Swami *et al.* (1990). The variation was 5 to 7 gm. The variation in nut yield in different cashew genotypes was reported by Delacruz and Feltcher (1996), Abudl Salam (2000), Laxminarayana Reddy (2002), Mahesh *et al.* (2005) [11], Dorajeerao *et al.* (2011) and Mohapatra *et al.* (2017) [12].

Table 1: Qualitative characters of cashew apple weight and TSS

Genotypes	Cashew apple weight(g)			TSS(B ⁰)		
	2015-16	2016-17	Pooled Mean	2015-16	2016-17	Pooled Mean
T ₁ Ranasinghapur Bold Nut	56.50	58.40	57.45	15.10	15.08	15.09
T ₂ Kalyanpur Bold Nut	52.50	52.70	52.60	11.75	11.70	11.73
T ₃ Lokipur _1	52.20	52.60	52.40	12.45	12.48	12.46
T ₄ OS-5	30.05	34.40	32.23	15.50	15.48	15.49
T ₅ Dhauli	20.30	29.30	24.80	11.65	11.75	11.70
T ₆ OS -3	50.05	50.50	50.28	13.15	13.23	13.19
T ₇ Khurda _1	76.85	70.00	73.43	13.05	13.10	13.08
T ₈ Selection-8	57.95	51.20	54.58	11.25	11.34	11.30
T ₉ Selection-36	31.70	34.60	33.15	14.30	14.38	14.34
T ₁₀ Lahanga-1	47.00	44.50	45.75	14.55	14.58	14.56
T ₁₁ Koraput Cluster	23.50	30.00	26.75	17.05	17.15	17.10
T ₁₂ Dutiyayapali	31.10	31.70	31.40	13.10	13.23	13.16
T ₁₃ S-19	61.70	64.10	62.90	11.90	11.85	11.88
T ₁₄ S-20	65.10	64.85	64.98	12.65	12.60	12.63
T ₁₅ S-21	49.95	51.55	50.75	10.45	10.55	10.50
T ₁₆ S-24	54.40	53.60	54.00	14.55	14.60	14.58
T ₁₇ S-25	53.30	46.50	49.90	11.85	11.78	11.81
T ₁₈ Tapanga	56.60	54.30	55.45	15.05	15.20	15.13
T ₁₉ Bhanjakusama	53.05	54.25	53.66	15.80	15.75	15.78
T ₂₀ RP-1	32.90	39.70	36.30	16.20	16.33	16.26
T ₂₁ RP-2	34.95	33.10	34.03	17.85	17.83	17.84
T ₂₂ RP-3	56.73	54.64	55.69	15.30	15.43	15.36
T ₂₃ RP-4	64.25	62.60	63.43	18.10	18.23	18.16
T ₂₄ RP-5	104.39	108.39	106.40	19.10	18.88	18.99
T ₂₅ RP-6	45.80	48.33	47.07	15.40	15.58	15.49
T ₂₆ BBSR C-1	40.10	42.15	41.13	12.60	12.40	12.50

T ₂₇	BBSR C-2	35.50	36.40	35.95	15.15	15.15	15.15
T ₂₈	BH-6	42.50	41.60	42.05	14.90	14.70	14.80
T ₂₉	BH-85	52.30	53.25	52.78	15.70	15.50	15.60
T ₃₀	Bhubaneswar- 1	26.60	30.10	28.35	13.90	13.93	13.91
F test (5% & 1%)		**	**	**	**	**	**
S.Em(+)		0.61	0.81	1.81	0.33	0.61	0.05
C.D (5%)		1.75	2.34	5.28	0.96	1.77	0.16

Table 2: Acid content and yield of cashew landraces

Genotypes	Acid content (%)			Yield (Kg)			
	2015-16	2016-17	Pooled Mean	2015-16	2016-17	Pooled Mean	
T ₁ Ranasinghapur Bold Nut	0.36	0.38	0.37	7.20	9.20	8.20	
T ₂ Kalyanpur Bold Nut	0.47	0.47	0.47	2.60	2.73	2.67	
T ₃ Lokipur_1	0.85	0.87	0.86	9.00	11.00	10.00	
T ₄ OS-5	0.66	0.68	0.67	9.20	11.20	10.20	
T ₅ Dhauli	0.42	0.57	0.50	4.60	4.70	4.65	
T ₆ OS -3	0.92	0.85	0.89	7.50	9.50	8.50	
T ₇ Khurda_1	0.62	0.67	0.64	5.00	3.00	4.00	
T ₈ Selection-8	0.48	0.47	0.48	7.15	9.15	8.16	
T ₉ Selection-36	0.88	0.86	0.87	8.50	10.50	9.50	
T ₁₀ Lahanga-1	0.84	0.82	0.83	7.55	7.30	7.43	
T ₁₁ Koraput Cluster	0.81	0.89	0.85	6.68	8.68	7.68	
T ₁₂ Dutiyayanayapali	0.76	0.76	0.76	6.30	6.10	6.20	
T ₁₃ S-19	0.43	0.48	0.45	6.50	8.50	7.50	
T ₁₄ S-20	0.56	0.57	0.57	3.45	4.30	3.88	
T ₁₅ S-21	0.52	0.57	0.55	4.00	3.60	3.80	
T ₁₆ S-24	0.47	0.48	0.47	5.60	5.00	5.30	
T ₁₇ S-25	0.75	0.76	0.76	6.12	8.12	7.12	
T ₁₈ Tapanga	0.47	0.48	0.47	8.85	6.22	7.54	
T ₁₉ Bhanjakusama	0.33	0.38	0.36	6.61	8.61	7.61	
T ₂₀ RP-1	0.24	0.29	0.26	5.45	4.50	4.98	
T ₂₁ RP-2	0.51	0.48	0.49	5.85	4.30	5.08	
T ₂₂ RP-3	0.53	0.48	0.50	1.40	1.80	1.60	
T ₂₃ RP-4	0.34	0.29	0.31	3.00	3.45	3.23	
T ₂₄ RP-5	0.34	0.29	0.31	3.90	4.38	4.14	
T ₂₅ RP-6	0.39	0.38	0.38	4.50	5.10	4.80	
T ₂₆ BBSR C-1	0.85	0.86	0.85	9.27	11.27	10.27	
T ₂₇ BBSR C-2	0.66	0.67	0.66	8.00	7.20	7.60	
T ₂₈ BH-6	0.52	0.57	0.55	13.40	12.55	12.97	
T ₂₉ BH-85	0.33	0.29	0.31	15.70	14.22	14.97	
T ₃₀ Bhubaneswar- 1	0.46	0.48	0.47	6.40	6.63	6.52	
F test (5% & 1%)		**	**	**	**	**	
S.Em(+)		0.07	0.10	0.02	0.76	0.96	0.70
C.D (5%)		0.21	0.39	0.06	2.19	2.77	2.05

Conclusion

From the present investigation it was concluded that the twenty seven land races and three released cashew genotypes showed significant variation in yield and qualitative characters.

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