Research Article

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Performance of cashew types under Bhubaneswar condition

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Abstract

An experiment was conducted at the Cashew Research Station of Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India during 1994 to 2011 to identify the cashew types for commercial cultivation under Odisha condition. Evaluation of the 13 cashew types over fourteen years revealed significant variations for nut yield among the types. The result indicated a wide range of variation for different parameters under study. The maximum average number of nuts panicle^{-1} was recorded in H 303 (4.19). Highest weight (g) of nut as well as apple was observed in H 367 (9.7 and 92.7). All the cashew types under study exhibited shelling percentage more than 28 but maximum kernel recovery was observed in H 255 (31.7). BPP 30/1 and M44/3 were the early flowering types that recorded panicle initiation during 4th week of November, whereas NRCC Sel.-1 and H 255 were late flowering types that flowered during first week of January. The flowering period ended first in M 15/4 (1st week February) while it was during 3rd week of March in H 255 and BPP 3/28. Maximum flowering duration was observed in BPP 30/1 (96 days) and minimum in NRCC Sel.-2 (59 days). The cumulative nut yield (kg plant^{-1}) at 14th harvest was observed in H 303 (106.8) followed by NRCC Sel.-2 (100.0), H 68 (93.1) and lowest in M 15/4 (37.5).

Key words: Cashew, nut yield, shelling percentage

Introduction

Cashew (*Anacardium occidentale* L.) is an important export earning plantation crop of India which has earned a foreign exchange of ₹ 2598 crores through export of cashew kernel and ₹ 31.85 crores by export of the cashew nut shell liquid during 2010-2011 (Hubballi and Jnandevan, 2012). Presently, total cashewnut production in the country is 7.28 lakh tonnes from an area of 9.82 lakh hectares with a productivity of 772 kg ha^{-1} (Saroj *et al.,* 2014), while in Odisha, cashew is grown in an area of 1.58 lakh hectares, producing 97,000 MT nuts with a productivity of 683 kg ha^{-1}. The productivity of existing cashew orchard in India is much less against the target of 2000 kg ha$^{-1.}$ Besides other factors low productivity of cashew in India is mainly due to the poor yielding seedling originated cashew plantations and very low adoption of high yielding grafts. The present investigation was carried out to identify promising cashew types under Odisha condition through evaluation of different cashew collection for their yield performance.

Materials and methods

The present experiment was conducted at the Cashew Research Station, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India during the period 1994 to 2011. Thirteen different cashew types clonally multiplied from different Cashew Research Stations of the country were collected and planted during 1994 in randomized block design with three replications. The cashew types *viz*. NRCC Sel.-1 and, NRCC Sel.-2 from Directorate of Cashew Research (DCR), Puttur, Karnataka; M44/3 and M15/4 from Cashew Research Station (CRS), Vridhachalam, Tamil Nadu; BPP 3/33, BPP 10/19, BPP 30/1 and BPP 3/28 from CRS, Bapatla, Andhra Pradesh and H 320, H 255, H 367 and H 68 from Vengurla, Maharashtra were evaluated. In each replication four cashew

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plants were planted at a spacing of 7.5 m x 7.5 m. The soil type of the experimental plot was loamy sand having pH 5.2. The plants were fertilized with 500:250:250 g NPK plant^{-1} as per the recommended dose under Odisha condition. All the recommended package of practices were adopted uniformly for all the treatments to raise a good crop. Observations on yield and yield attributing traits such as, average number of nuts per panicle, nut weight (g), apple weight (g) and period of flowering were recorded along with nut yield. The recorded data were analyzed statistically (Panse and Sukhatme, 1978).

Results and discussion

The data presented in Table 1 indicated wide range of variations among the varieties tested over fourteen years of experiment. The average number of nuts panicle^{-1} ranged from 1.7 in variety H 255 to 4.2 in variety H 303. The cashew types producing more than 3 nuts panicle^{-1} under Odisha condition were BPP 3/33 (3.1), H 320 (3.3), NRCC Sel. 2 (3.3), BPP 3/28 (3.5), H 68 (3.7), BPP 30/1 (4.1), M44/3 (4.2) and H 303 (4.2). Nawale *et al.* (1983) found that only 0.9 to 4.3 nuts panicle^{-1} was retained till maturity. Nuts panicle^{-1} ranging from 2.7 to 4.2 in cashew was reported by Reddy *et al*. (2002). Rao (1998) observed positive and significant association of nuts panicle^{-1} with nut yield plant^{-1}. Nut weight amongst other yield components is very essential for cashew breeders in the selection of crop improvement programme (Dadzie *et al.,* 2014). The present study revealed a wide range of variation for yield among the different cashew types over fourteen years of evaluation. The average nut weight ranged from 5.4 g (M44/3) to maximum of 9.7 g (H 367); the ideal average nut weight is considered to be more than 7.0 g. In the present study, the cashew types producing more than 7.0 g nut weight were M15/4 (7.1 g), BPP 3/28 (7.5 g), NRCC Sel. 1 (7.7 g), H 303 and H 68 (8.1 g each), H320 (8.2 g), NRCC Sel. 2 (8.7 g), H 225 (9.5 g) and H 367(9.7 g). Samal *et al.* (2006) reported heavier nut weight for H 320 under Bhubaneswar condition. The apple weight of cashew under study varied from 30.3 g in cashew type M 44/3 to maximum of 92.6 g in H 376. The cashew types such as NRCC Sel.-1, NRCC Sel.-2, M 15/4, BPP 3/28, H 320, H 255, H 367 and H 68 recorded heavier apple weight of more than 60 g than rest of the cashew types.

The total nut yield of cashew plant was also influenced by period of flowering. The study indicated that all the thirteen genotypes recorded flowering from 4th week of November to 3rd week of March. Samal *et al*. (2006) reported that under Bhubaneswar agro-climatic condition, flowering in cashew normally commences up to mid March with peak flowering between mid January to mid February. Cashew types M 44/3, M 15/4, BPP 30/1 and BPP 3/28 exhibited earliness in early flowering

Table 1. Yield attributing traits of cashew types under Bhubaneswar condition

Cashew types	Number of nuts panicle^{-1}	Nut wt. (g)	Apple wt. (g)	Shelling (%)	Period and duration of flowering (days)
NRCC Sel. 1	2.3	7.7	63.8	31.6	1st week of January to 2nd week of March (65)
NRCC Sel. 2	3.3	8.7	65.8	30.6	4th week December to 4th week February (59)
M 44/3	4.2	5.4	30.3	30.7	4th week November to 2nd week February (70)
M 15/4	2.3	7.1	60.7	30.4	4th week November to 1st week February (66)
BPP 3/33	3.1	6.5	55.6	31.1	3rd week December to 1st week March (76)
BPP 10/19	3.0	6.2	52.9	30.0	3rd week December to 3rd week February (61)
BPP 30/1	4.1	6.3	40.6	28.9	4th week November to 1st week March (96)
BPP 3/28	3.5	7.5	60.5	30.6	3rd week November to 3rd week March (86)
H 303	4.2	8.1	59.9	30.2	1st week December to 1st week March (90)
H 320	3.3	8.2	64.3	29.0	1st week December to 1st week March (89)
H 255	1.7	9.5	67.4	31.7	1st week January to 3rd week March (71)
H 367	2.2	9.7	92.7	28.8	2nd week December to 1st week March (80)
H 68	3.7	8.1	61.8	30.0	3rd week December to 4th week February (66)

Table 2. Mean nut yield (kg plant^{-1}) of cashew types from 1-14 year of harvesting

Cashew types	Year of harvesting (1997-2011)														Yield
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
NRCC Sel. 1	0.4	1.5	2.9	1.6	1.9	1.9	2.8	4.0	6.9	3.2	3.0	4.1	4.7	5.0	43.8
NRCC Sel. 2	1.1	3.4	4.0	3.2	5.1	7.8	8.3	8.0	10.5	9.9	9.0	9.4	10.0	10.4	100.0
M44/3	1.9	2.8	2.1	2.1	2.6	2.8	3.0	2.4	3.9	1.7	3.2	3.2	3.5	3.8	38.9
M15/4	3.3	2.1	2.7	1.8	2.4	2.9	3.5	2.0	3.7	1.2	1.8	2.8	3.2	4.0	37.5
BPP 3/33	1.2	3.6	4.0	2.8	4.9	3.2	6.5	6.0	4.7	6.5	4.3	3.5	3.9	4.5	59.6
BPP 10/19	1.4	2.7	3.6	1.9	3.5	3.1	5.5	3.5	2.9	4.4	1.9	3.0	3.6	4.8	45.6
BPP 30/1	1.3	8.0	5.7	3.3	5.9	6.7	9.3	5.3	3.2	5.3	5.3	3.5	3.9	4.3	71.0
BPP3/28	1.4	3.8	4.7	2.9	2.4	5.2	6.2	5.9	2.3	7.4	2.9	3.3	3.7	3.9	55.9
H303	3.0	5.8	5.4	3.2	6.4	7.3	9.6	8.7	10.0	10.0	9.3	8.7	9.2	10.2	106.8
H320	4.7	4.6	4.5	4.4	8.7	7.5	9.8	9.5	9.7	5.3	2.3	3.2	4.0	4.8	83.0
H255	3.7	3.6	1.8	3.9	3.3	3.4	3.6	3.2	4.4	2.4	2.0	1.1	2.4	3.0	41.9
H367	1.7	4.2	1.4	5.6	7.2	5.9	6.1	6.4	8.5	3.3	6.0	3.6	4.0	4.7	68.6
H68	1.6	3.2	3.2	2.2	3.8	9.0	11.8	6.3	9.5	9.4	9.2	7.3	8.0	8.8	93.1
SEm (±)	0.2	0.4	0.4	0.7	0.3	0.7	1.2	0.9	1.6	1.7	1.7	0.5	0.3	0.3	
CD (5%)	0.7	1.1	1.0	2.0	1.0	2.0	3.5	2.6	4.7	5.0	4.9	1.4	0.8	0.8	

compared to other cashew types. Wide variation in the duration of flowering was noted which varied from 59 days in NRCC Sel.-2 to 96 days in BPP 30/1.

The shelling percentage is treated as one of the most important criteria for selection of cashew varieties of commercial importance. Minimum shelling of 28 per cent is essential for commercial cultivar. The study indicated higher shelling percentage in most of the cashew types and it ranged from 28.8 per cent in genotype H 367 to 31.7 per cent in H 255. The genotype having shelling percentage more than 30 identified under Odisha condition were M15/4 (30.4%), H 303 (30.2%), H 68 (30.0%), NRCC Sel.-2 (30.6%), BPP3/33 (31.1%), NRCC Sel.-1 (31.6%) and H 255 (31.7%). Hence, these genotypes can be selected for further breeding programme with respect to shelling percentage. Significant variation for nut yield was observed among the genotypes. The results indicated that the nut yield was stabilized and optimum nut yield was achieved from 9th harvest onwards (Table 2). The yield at 9th harvest and cumulative yield at fourteen harvests (kg plant^{-1}) was recorded higher in H 303 (10.0 and 106.8) followed by NRCC Sel.-2 (10.5 and 100.0) and H 68 (9.5 and 93.14).

Nut yield over fourteen harvests among cashew types indicated that H 303 followed by H 320 produced higher nut yield in each harvest at consistent rate from first harvest to fourteenth harvest (Table 2). The cashew type H 303 recorded significantly higher nut yield of 7.3, 9.6, 8.7, 10.0, 10.0, 9.3, 8.7, 9.2 and 10.2 kg plant^{-1} during 6th, 7th, 8th, 9th, 10th, 11th 12th, 13th and 14th harvest respectively. The cashew type NRCC Sel.-2 although produce relatively lower yield during initial harvest upto 5th harvest but afterwards there was increase in nut yield (kg plant $^{-1}$) particularly after 6th (7.8), 7th (8.3), 9th (10.5), 10th (9.9), 11th (9.0),12th (9.4), 13th (10.0) and 14th (10.4) harvest respectively. Similar trend of consistently higher nut yield were recorded in cashew type H 68. The present study revealed the consistent and significantly higher nut yield as well as higher cumulative nut yield of cashew types H 303, NRCC Sel. 2 and H 68. These three genotypes also produced bold nuts, borne in clusters with high kernel recovery percentage. Hence, they may be recommended for cultivation in Odisha.

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