



Research Article

EFFECT OF CASHEW SEED NUT SOWING POSITION OF ORIENTATION INFLUENCE ON GERMINATION AND PLANT GROWTH PERFORMANCE OF CASHEW (*Anacardium occidentale* L.) var. ULLAL-1 SEEDLINGS

LAKSHMANA*, MAHESH MATH AND SOWMYA KUMARI

ICAR-Agricultural and Horticultural Research Station, Ullal, 575020, University of Agricultural and Horticultural Research Sciences, Shivamogga, 577 204, Karnataka

*Corresponding Author: Email -lakshmanaupadi@gmail.com

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Abstract: The study on influence of germination and vigour of plant growth by sowing position orientation of cashew seed was conducted at Agricultural and Horticultural Research Station, Ullal, Mangaluru, Karnataka during 2017-18. Results revealed that significantly the highest per cent seed germination was recorded in T3-notch side down position of orientation and T4- stalk end up position of orientation of seed sown (70.00 % and 6.70 %, respectively). With respect to number of leaves per plant indicated that 14, 21, 28 and 35 days after seed sowing the maximum number of leaves per plant was recorded in T3-notch side down position of orientation followed by T4- stalk end up position of orientation of seed sowing. Results on plant girth indicated that 20, 35 and 45 days after seed sowing found no significant difference among the seed sowing positions, however the plant girth ranged from 0.98 to 2.08 mm. The maximum root length was recorded in T4- stalk end up position of seed sowing (27.00 cm) followed by T5- stalk end down position of orientation seed sowing (21.50 cm).

Keywords: Cashew, positions of seed sowing, gravity position, notch side up, notch side down, stalk end up, stalk end down

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Introduction

Cashew (*Anacardium occidentale* L.), a native of tropical Central and South America, was introduced in India during the latter half of the Sixteenth Century for the purpose of afforestation and soil conservation. It is one of the major tropical tree crops ranking second in the international trade among major edible nuts. The area under cashew cultivation is increasing in Karnataka. Cashew had high export potential. The area under cashew cultivation in India is 10.40 lakh hectares and the production are around 7.79 lakh MT. The national average productivity is 753 kg per hectare [1]. Considering the importance of cashew crop there is a great scope for the production of good germination and vigorous growth of cashew seedlings to raise the root stocks for grafting cashew plants is also an important aspect in cashew propagation to get greater success of grafted plants for establishment of cashew grafts. Hence the present study has been carried out on different positions of cashew seed sowing for raising the rootstocks in nursery.

Materials and methods

The study was conducted at Agricultural and Horticultural Research Station, Ullal, Mangaluru, Karnataka during 2017-18. Newly harvested cashew seeds (var. Ullal-1) were collected from the cashew orchard of AHRS, Ullal, Mangaluru. It is located at a distance of 10 Km South of Mangaluru on the way to Kasargod (NH-66). The altitude of the research station is 15 M above mean sea level (MSL) with latitude of 13° N and longitude of 75° E. Soil is mainly typical laterite soil of the West Coast with patches of red sandy loam. Uniform size, disease and pest free healthy cashew seeds were selected for the study. Before sowing the cashew seeds were soaked in water overnight in plastic bucket and then the next day seeds were taken out and were used for sowing. Cashew seeds were sown in polythene bags of size 6x9 inch. The seeds were sown in different positions viz., gravity position, Notch side up, Notch side down, Stalk end up and stalk end down. Observations were recorded on seed germination percentage, number of leaves per plant (cm),

plant height (cm), plant girth (cm) and root length (cm). There were total five treatments and 4 replications. Data collected were statistically analyzed using analysis of variance through the Wasp1 statistical analytical software package and treatments were compared by following Duncan's multiple range test.

$$\text{Percent seed germination} = \frac{\text{Total number of seeds germinated}}{\text{Total number of seeds sown}} \times 100$$

Results and discussion

Effect of different position orientation of cashew seed sown on per cent germination, number of leaves per plant, plant height, plant girth and root length are presented in [Table-1]. Significantly the highest per cent seed germination was recorded in T3-notch side down orientation and T4- stalk end up position orientation of seed sowing (70.00 % and 6.70 %, respectively). The next best position of cashew seed sowing with respect to seed germination was T1-gravity position orientation and T2-notch side up (57 % and 44.70 %, respectively). With respect to number of leaves per plant after 14 days of cashew seed sowing showed that significantly the highest number was recorded in T3-notch side down position of orientation (4.52 leaves/plant) followed by T4- stalk end up position of orientation of seed sowing (4.25 leaves/plant). The next best position was T1-gravity position of orientation and T2-notch side up position of orientation (4.15 and 3.85 leaves/plant). The lowest number of leaves per plant was found in T5-stalk end down position of orientation of sowing (3.40 leaves/plant). After 21 days of seed sowing significantly the maximum number of leaves per plant was recorded in T3- notch side down position of orientation of seed sown (7.33). The next best treatments were T4-stalk end up and T5- stalk end down position orientation recorded (5.53 and 5.43, respectively) while lowest number of leaves per plant was found in T2-notch side up and T1- gravity position of orientation (4.53 and 5.16 leaves/plant, respectively).

Table-1 Effect of cashew seed nut sowing position of orientation on seed germination, number of leaves per plant, plant height, plant girth and root length

Treatments	Seed germination(%)	No. of leaves/plant				Plant height (cm)			Plant girth (cm)			Root length (cm)
		14 DAS	21DAS	28 DAS	35 DAS	20DAS	35 DAS	45 DAS	20DAS	35 DAS	45DAS	
T1-Gravity position	57.00c	4.15b	5.16b	5.95b	6.02c	11.90b	19.80b	22.30c	1.7	1.86	1.87	9.00 d
T2-Notch side up	44.70d	3.85c	4.53b	5.97b	5.82c	8.70c	16.20d	19.50d	0.98	1.5	1.53	16.50c
T3-Notch side down	70.00a	4.52a	7.33a	8.85a	9.52a	14.00a	25.40a	30.90a	1.51	1.72	2.08	17.00c
T4-Stalk end up	67.00b	4.25b	5.53b	6.51b	8.32ab	14.60a	21.00b	24.50b	1.55	1.63	1.63	27.00a
T5-Stalk end down	46.00d	3.40d	5.43b	6.97b	7.75b	11.20b	18.20c	19.15d	1.34	1.4	1.78	21.50b
SEm±	0.42	0.06	0.4	0.44	0.44	0.44	0.44	0.46	-	-	-	0.41
CD at 5%	1.31	0.19	1.26	1.37	1.37	1.37	1.37	1.42	NS	NS	NS	1.28

After 28 days of cashew seed sowing significantly the maximum number of leaves per plant was recorded in T3- notch side down (8.85), T5- stalk end down position (6.97) and T4- Stalk end up position of orientation of seed sown (6.51), while the lowest was recorded in T1- gravity position and T2- notch side up position of orientation of seed sown (5.95 and 5.97 leaves/ plant, respectively). After 35 days of cashew seed sowing also the same trend was observed, significantly the highest number of leaves per plant was recorded in T3- notch side down (9.52) and followed by T4- stalk end up position of orientation of seed sown (8.32). The other methods of seed sowing T5- stalk end down position orientation recorded (6.97), T1- gravity position (6.02) and T2- notch side up position orientation of seed sowing (5.82). The results on the effect of position of cashew seed sowing on plant height indicated that after 20 days of seed sowing significantly the highest plant height was recorded in T4- stalk end up position of orientation of seed sowing (14.60 cm) followed by T3- notch side down position of orientation (14.00 cm) and both were on par. The next best other treatments in recording higher plant height was T1- gravity position and T5- stalk end down position of orientation of seed sown (11.90 cm and 11.20 cm, respectively). Significantly the lowest plant height was found in T2- notch side up (8.70 cm). After 35 days of seed sown significantly the highest plant height was recorded in T3- notch side down position of orientation (25.40) followed by T4- stalk end up position of orientation of seed sowing (21.0 cm). The next other best treatments were T1- gravity position and T5- stalk end down position of orientation of seed sown recording 19.80 cm and 18.20 cm, respectively. 45 days after seed sown significantly the maximum plant height was recorded in T3- notch side down (30.90) followed by T4- stalk end up position of orientation of seed sowing (24.50 cm). The next best treatments were T1- gravity position (22.30) and T2- notch side up position of orientation (19.50). With respect to plant girth indicated that 20, 35 and 45 days after seed sowing found no significant difference among the treatments, however the plant girth ranged from 0.98 to 2.08 cm. Significantly the higher root length was recorded in T4- stalk end up position (27.00 cm) followed by T5- stalk end down position of orientation of seed sowing (21.50). The next best methods of cashew seed sowing was in T3- notch side down (17.00) and T2- notch side up position of orientation of seed sowing (16.50). The lowest was reported in T1- gravity position of orientation of seed sowing (9.00). Aliyu and Awopetu (2007) [2] and Ohler, (1979) [3] opined that the size and sowing orientation of planting nuts are very important for the recovery of uniform and vigorous plants. According to the findings of Hammed, *et al.*, (2014) [4] Brazilian cashew cultivars with large nuts sown on nut-side and Indian cultivars with medium nuts sown on nut-side and with stalk-end up showed better germination percentage ranging between 86.7% and 100% at 4 weeks after sowing (WAS), while Brazilian cultivars with large nuts, Indian cultivars with medium and small nuts sown with scar-end down, and Indian small with stalk-end down found the lowest germination percentage of between 26.7% and 46.7%. But present study slightly differed from the above finding where the cashew seeds sown notch side down recorded superior with respect to all the parameters observed. Similarly, Hammed and Adeyemi (2005) [5] studied the effect of nut-sowing orientations on the germination of cashew nut in nursery. Cashew nuts sown flat and those with stylar-end up had highest mean germination of 91.67 % and 92.50 % respectively the nuts sown with stalked-end up showed the least mean germination of 51.67 % at 4 weeks after sowing.

Conclusion

Present study indicated that, among the different positions of cashew seed sowing T3- notch side down position of orientation of cashew seed sown found superior

with respect to per cent seed germination, number of leaves per plant, plant height and plant girth compared to other positions of seed sown. Therefore, the notch side down of seed sowing position is the best position and may adopt for raising the root stocks.

Application of Research: Cashew seed nut sowing position orientation for rising of cashew seedlings

Abbreviation: DCCD: Directorate of cashew nut and Cocoa Development

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***Principal Investigator or Chairperson of research:** Dr Lakshmana

University: University of Agricultural and Horticultural Research Sciences, Shivamogga, 577 204, Karnataka

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