Plant Archives Vol. 25, Supplement 2, 2025 pp.1807-1814 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.supplement-2.228

EFFECT OF GROWING MEDIA AND BIO FERTILIZERS ON GRAFT TAKE IN CASHEW (*ANACARDIUM OCCIDENTALE* L.)

U. Sriya[1*], K. Dhanumjaya Rao[2], K. Umamaheswara Rao[3], L. Naram Naidu[4] and K. Umakrishna[5]

[1]Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Dr. YSR Horticultural University, Anantharajupeta, Kadapa (D), Andhra Pradesh, India.
[2]Director of Industrial & International Programmes, Horticulture, Administrative Office, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari(D), Andhra Pradesh, India.
[3]Department of Horticulture, Cashew Research Station, Bapatla (D), Andhra Pradesh, India.
[4]Department of Horticulture, Administrative Office, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari(D), Andhra Pradesh, India.
[5]Department of Statistics, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari (D), Andhra Pradesh, India.
*Corresponding author E-mail: usirikayala.sriya1630@gmail.com
(Date of Receiving : 29-03-2025; Date of Acceptance : 08-06-2025)

ABSTRACT

A study was conducted to find out the "Effect of growing media and biofertilizers on Graft take in cashew (*Anacardium occidentale* L.)" at Cashew Research Station, Bapatla, Andhra Pradesh in the year 2021-22. The experiment was laid out in a Factorial Randomized Block Design (FRBD) with two replications containing of twenty four treatment combinations which consists of two factors *viz*., growing media at four levels (M0: soil + sand +FYM (2:1:1) M1: soil + sand+ vermicompost (2:1:1) M2: soil + sand + FYM + cocopeat (2:1:1:1) M3: soil + sand + vermicompost + cocopeat (2:1:1:1)) and biofertilizers at six levels (B0: SSP @ 10 g/Bag +N:P: K (19:19:19) @ 5 g/lit (foliar spray) + Formula 4 @ 5g/lit (foliar \spray), B1: Phosphorus Solubilizing Bacteria, B2: Vascular Arbuscular Mycorrhizal fungi, B3: *Pseudomonas fluorescence*, B4: Arka Microbial Consortium, B5: *Trichoderma viride*), by adopting standard methodology, observations were recorded on days to 50% sprouting, graft take percentage, length of new scion shoot (cm), sprout diameter (cm), girth of scion (cm), graft height (cm), number of branches per graft, number of leaves produced per graft, percentage of yellow leaves. Interaction effect of growing media contained soil + sand + vermicompost + cocopeat (2:1:1:1) inoculated with bio fertilizer Arka Microbial Consortium (M3B4) had recorded highest among all other treatment combinations.

***Keywords*:** Media, bio fertilizers, vigour, DASG (Days after Softwood Grafting) cashew, *Anacardium occidentale* L.

Introduction

Cashew (*Anacardium occidentale* L.) (Anacardiaceae, 2n=42), a dollar earning crop, is a native of Brazil. It was introduced to India in 16th century by Portuguese to cover bare hills and for soil conservation. Cashew is known as the "gold mine of the wasteland" because it is a resilient, drought-tolerant tree that thrives on nutrient constraints soils (Ramteke *et al*., 2020). Being a tropical evergreen tree produces two main products: seed and cashew apple. Cashew trees are cross-pollinated and heterozygous, so their seedling progenies do not consistently resemble the parent plants, making vegetative propagation necessary. Softwood grafting is the most commercially used method of propagation. The growing media are

crucial in influencing seedling growth, root development, and graft success. To maximize the benefits of different growing media, nurserymen often combine them in various proportions, as no single medium can fully meet all the needs of growing seedlings. However, the proportions of each component in a potting mix need to be standardized. Many previous studies have focused on the use of soil, sand, and farmyard manure (FYM). Research on incorporating vermicompost or cocopeat into potting mixtures, particularly in combination with biofertilizers, is limited. Additionally, biofertilizer formulations containing living or dormant cells of efficient microorganism strains can enhance nutrient uptake by crops through their interactions in the rhizosphere when applied *via* seed or soil.

In cashew nursery management, nurserymen face several challenges, including low seed germination rates, high seedling mortality, poor grafting success, stunted graft growth, yellowing of scion leaves, and graft failure. Since the success of grafting and the subsequent growth of the graft largely depend on the health of the rootstock, there is potential to leverage the beneficial effects of biofertilizers to promote seedling growth and improve grafting success.

In light of the above factors, an experiment is proposed to investigate the effect of growing media and bio fertilizers on graft take in cashew with the following objectives.

1. To study the effect of different growing media on cashew grafts.
2. To study the effect of different biofertilizers on cashew grafts.
3. To study the interaction of growing media and biofertilizers on cashew grafts.

Materials and Methods

The experiment was conducted during the year 2021–2022 at the Cashew Research Station, Bapatla, Andhra Pradesh. It was laid out in a Factorial Randomized Block Design (FRBD) with three replications, comprising twenty-four treatment combinations. The study involved two factors: growing media and bio-fertilizers. The growing media were tested at four levels M_0: soil + sand + FYM (2:1:1), M_1: soil + sand + vermicompost (2:1:1), M_2: soil + sand + FYM + cocopeat (2:1:1:1), and M_3: soil + sand + vermicompost + cocopeat (2:1:1:1) (Plate 1). The bio-fertilizers were applied at six levels—B_0: SSP @ 10 g/bag + N:P:K (19:19:19) @ 5 g/l (foliar spray) + Formula 4 @ 5 g/l (foliar spray), B_1: Phosphorus Solubilizing Bacteria, B_2: Vesicular Arbuscular Mycorrhizal (VAM) fungi, B_3: *Pseudomonas fluorescens*, B_4: Arka Microbial Consortium, and B_5: *Trichoderma viride* (Plate 2). Observations were recorded for various growth and development parameters after softwood grafting (Plate 3) including days to first sprout, days to 50% sprouting, graft take percentage, length of new scion shoot (cm), sprout diameter (cm), girth of scion (cm), graft height (cm), number of branches per graft, number of leaves produced per graft, percentage of yellow leaves.

Results

As mentioned in (Table 1), Minimum number of days taken to 50% sprouting (11.57 days) were observed by the medium containing soil+ sand+ vermicompost+ cocopeat (2:1:1:1) (M_3).Maximum percentage of graft take (95.22 and 94.49 at 60 and 90 DASG respectively), length of scion (27.47 and 36.20 cm at 60 and 90 DASG respectively), sprout diameter (1.42 and 1.53 cm at 60 and 90 DASG respectively), girth of scion (1.56 and 1.62 cm at 60 and 90 DASG respectively),height of the graft (45.87 and 52.43 cm at 60 and 90 DASG respectively) , number of branches per graft (2.14, 3.10 at 60 and 90 DASG respectively), number of leaves per graft (6.85 and 12.05 at 60 and 90 DASG respectively), and root length (25.92 cm at 90 DASG) by the medium containing soil+ sand+ vermicompost+ cocopeat (2:1:1:1) (M_3) which also recorded the minimum per cent yellow leaves (5.78 at 90 DASG) .

As mentioned in (table 2) Minimum number of days taken to 50% sprouting (11.47 days) were recorded when the medium was inoculated with biofertilizer Arka microbial consortium (B_4). Maximum percentage of graft take (96.30 and 95.27 at 60 and 90 DASG respectively), length of scion (27.99 and 36.13 cm at 60 and 90 DASG respectively), sprout diameter (1.43 and 1.54 cm at 60 and 90 DASG respectively),girth of scion (1.58 and 1.65 cm at 60 and 90 DASG respectively), height of the graft (45.99 and 52.91 cm at 60 and 90 DASG respectively),number of branches per graft (2.49, 3.57 at 60 and 90 DASG respectively),number of leaves per graft (7.43, 12.25 at 60 and 90 DASG respectively), root length (25.20 cm at 90 DASG) were also recorded with plants raised in growing medium supplemented with Arka Microbial Consortium which recorded the minimum percentage (3.33) of yellowing in leaves.

As mentioned in (table 3) The interaction of growing media and biofertilizers also exerted significant influence on graft take as well as growth of the successful grafts. The growing medium soil+ sand+ vermicompost + cocopeat inoculated with Arka Microbial Consortium (M_3B_4) recorded the lowest number of days to 50% sprouting (11.20). Maximum percentage of graft take (96.60 ,95.80 % at 60 and 90 DASG respectively), length of scion (28.94, 36.89 cm at 60 and 90 DASG respectively) , sprout diameter (1.45 ,1.55 cm at 60 and 90 DASG respectively), girth of scion (1.59, 1.66 cm at 60 and 90 DASG respectively), height of the graft (46.83, 53.48 cm at 60 and 90 DASG respectively) , number of branches per graft (2.97, 3.87 at 60 and 90 DASG respectively), number of leaves per graft (7.53 , 12.98 at 60 and 90 DASG respectively), root length (28.64 cm at 90 DASG) .The minimum percentage of yellow leaves (2.67) at 90 DASG was observed in the media that contained biofertilizer Arka microbial consortium(M_3B_4).

Similar observations of positive effects of growing medium containing soil+ sand + vermicompost+ cocopeat (2:1:1:1) inoculated with Arka Microbial Consortium (M_3B_4) were also made in respect of growth parameters of successful grafts. This treatment combination recorded minimum days to 50% sprouting and highest percentage of graft take, length of scion, sprout diameter, girth of scion, height of the graft, number of leaves per graft, while the lowest values for the said parameters were observed in case of growing medium containing soil+sand+FYM (1:1:1) which was not supplemented with any of the biofertilizer (Plate 4). The minimum per cent of yellow leaves at 90 days after softwood grafting was also recorded by the same treatment combination (M_0B_0).

Discussion

Arka microbial consisted of Azotobacter, PSB, and ZSB, which facilitated the early growth of the scion. Chandu *et al*. (2021) reported similar results, where among different combinations, 75% RDN + 25% N through Vermicompost + Arka Microbial Consortium was effective. Azotobacter is known to produce growth-regulating substances, such as gibberellic acid (Brown and Burlingham, 1968).

Similar results were reported by Diksha *et al*. (2019), who found that a combination of soil + FYM + vermicompost + rice husk in a 1:1:1:1 ratio, with 1" Cocopeat added as top potting media, resulted in maximum beneficial graft characters (maximum shoot girth, maximum height, maximum number of shoots, and maximum number of leaves) in nutmeg grafts. These findings support the present investigation and highlight the favourable effects of vermicompost. The beneficial effects of vermicompost are attributed to its ability to improve soil water-holding capacity, provide essential nutrients for plant growth, and offer a large surface area for nutrient retention by creating numerous microsites, as indicated by Edwards *et al*. (2011).

The positive effects of vermicompost, cocopeat, and biofertilizer supplementation observed in this study are consistent with the findings of several earlier researchers. Qayom (2011) studied the effect of media composition on seed germination, growth, and grafting in mango, noting the longest internodal length, which led to longer stem length, in soil: sand: compost: coir pith (1:1:1:1) media. Bharathi (1997) and Mamatha (1998) reported that a medium consisting of sand, coir dust, soil, and compost in the ratio of 1:0.5:1:1 (v/v) resulted in maximum graft union success, highest plant height, and maximum number of leaves in cashew. Dash *et al*. (2019) observed the maximum plant height with the use of the Arka microbial consortium treatment in radish.

Similar results were reported by Gawankar (2019), who found maximum shoot girth and stem girth in jackfruit grafts grown on soil + vermicompost + cocopeat (1:1:1). Kumar *et al*. (1998) also found significant variation in stem girth in biofertilizer-treated cashew seedlings compared to untreated seedlings. Barman *et al*. (2016) observed that Arka fermented cocopeat treated with 2.0% Arka microbial consortia prior to seed sowing can be used for the rapid development of superior and healthy seedlings and grafts in jamun under shade house conditions.

The findings of the present investigation are consistent with the observations made by the aforementioned researchers.

Conclusion

Thus, it could be inferred that the growing media comprising of either vermicompost or cocopeat and inoculated with any of the biofertilizers used in the experiment could exert significant positive effect in terms of rootstock/scion growth as well as the graft take and the effects being maximum where the medium was inoculated particularly with Arka Microbial Consortium.

Table 1 : Effect of different growing media on cashew grafts.

Treatment	Number of days taken to 50 percent sprouting	Graft take (%)		Length of scion (cm)		Sprout diameter (cm)		Girth of scion		Height of the graft (cm)		Number of branches per graft		Number of leaves per graft		Root length (cm) of cashew grafts	Percentage of yellow leaves
Media	30 DAG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	90 DASG	90 DASG
M_0	13.05	94.62 (9.74)	93.45 (9.68)	25.49	34.38	1.35	1.50	1.53	1.59	44.29	50.83	1.54	2.63	6.65 (2.75)	10.31 (3.34)	20.66	9.00 (3.13)
M_1	12.03	95.00 (9.76)	94.06 (9.71)	27.35	35.78	1.42	1.52	1.55	1.61	45.38	51.67	1.94	2.90	6.80 (2.78)	11.72 (3.55)	23.53	7.11 (2.77)
M_2	12.80	94.82 (9.75)	93.82 (9.70)	26.40	34.82	1.40	1.51	1.54	1.60	44.82	51.23	1.74	2.78	6.74 (2.77)	10.93 (3.44)	22.15	8.44 (3.03)
M_3	11.57	95.22 (9.77)	94.49 (9.73)	27.47	36.20	1.42	1.53	1.56	1.62	45.87	52.43	2.14	3.10	6.85 (2.79)	12.05 (3.59)	25.92	5.78 (2.56)
SE (m) ±	0.018	0.008	0.020	0.008	0.003	0.012	0.003	0.002	0.001	0.005	0.011	0.006	0.032	0.051	0.006	0.015	0.480
CD at 5%	0.053	0.024	0.060	0.024	0.007	0.036	0.009	0.006	0.003	0.015	0.033	0.016	0.096	0.153	0.018	0.042	1.370

Table 2 : Effect of different biofertilizers on cashew grafts.

Treatment	Number of days taken to 50 percent sprouting	Graft take (%)		Length of scion (cm)		Sprout diameter (cm)		Girth of scion		Height of the graft (cm)		Number of branches per graft		Number of leaves per graft		Root length (cm) of cashew grafts	Percentage of yellow leaves
Bio fertilizers	30 DAG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	90 DASG	90 DASG
B_0	13.55	93.82 (9.70)	92.78 (9.65)	25.32	34.36	1.36	1.48	1.51	1.56	43.97	49.42	1.35	2.32	6.12 (2.66)	10.23 (3.33)	19.82	10.50 (3.37)
B_1	11.97	95.47 (9.78)	94.30 (9.72)	27.40	35.71	1.41	1.52	1.55	1.61	45.62	52.50	1.81	2.83	6.84 (2.79)	11.79 (3.56)	24.56	7.67 (2.92)
B_2	11.66	95.70 (9.80)	94.50 (9.73)	27.05	35.53	1.41	1.53	1.56	1.63	45.43	52.16	2.39	3.38	7.37 (2.88)	11.52 (3.52)	24.02	6.50 (2.71)
B_3	12.77	94.30 (9.72)	93.70 (9.69)	26.82	35.22	1.39	1.52	1.54	1.60	45.03	51.94	1.59	2.62	6.50 (2.73)	11.27 (3.49)	23.37	8.00 (2.98)
B_4	11.47	96.30 (9.83)	95.27 (9.77)	27.99	36.13	1.43	1.54	1.58	1.65	45.99	52.91	2.49	3.57	7.43 (2.89)	12.25 (3.62)	25.20	3.33 (2.04)
B_5	12.77	93.90 (9.70)	93.19 (9.67)	25.50	34.83	1.38	1.50	1.53	1.58	44.51	50.30	1.43	2.41	6.27 (2.68)	10.46 (3.37)	21.42	9.50 (3.22)
SE (m) ±	0.023	0.010	0.025	0.010	0.003	0.015	0.003	0.002	0.001	0.006	0.013	0.007	0.039	0.021	0.008	0.018	0.588
CD at 5%	0.065	0.030	0.075	0.030	0.009	0.045	0.009	0.006	0.003	0.018	0.039	0.019	0.117	0.060	0.022	0.025	1.678

Table 3 : Effect of the interaction of growing media and biofertilizers on cashew grafts

Treatment	number of days taken to 50 percent sprouting	graft take (%)		Length of scion (cm)		Sprout diameter (cm)		Girth of scion		height of the graft (cm)		number of branches per graft		number of leaves per graft		root length (cm) o cashew grafts	percentage of yellow leaves
Interactions	30 DAG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	60 DASG	90 DASG	90 DASG	90 DASG
M0B0	14.60	93.52 (9.68)	92.20 (9.62)	23.56	33.00	1.31	1.48	1.49	1.54	43.00	49.02	1.24	2.18	5.99 (2.63)	9.00 (3.11)	17.97	12.67 (3.68)
M0B1	12.29	95.20 (9.77)	93.80 (9.70)	26.34	35.00	1.35	1.50	1.53	1.60	45.00	52.00	1.50	2.64	6.79 (2.78)	11.00 (3.45)	21.92	8.67 (3.10)
M0B2	12.02	95.40 (9.78)	94.00 (9.71)	26.04	34.91	1.36	1.51	1.54	1.61	44.81	51.45	1.83	3.04	7.25 (2.86)	10.86 (3.43)	21.37	8.00 (2.99)
M0B3	13.60	94.00 (9.71)	93.20 (9.67)	26.00	34.27	1.34	1.52	1.52	1.58	44.10	51.03	1.42	2.48	6.37 (2.70)	10.24 (3.34)	20.93	8.67 (3.10)
M0B4	12.00	96.00 (9.81)	94.80 (9.75)	27.01	35.12	1.38	1.52	1.57	1.63	45.29	52.21	1.99	3.20	7.33 (2.87)	11.62 (3.54)	22.84	5.33 (2.50)
M0B5	13.80	93.60 (9.69)	92.72 (9.64)	24.00	34.00	1.32	1.49	1.51	1.56	43.56	49.24	1.27	2.22	6.14 (2.66)	9.12 (3.17)	18.93	10.67 (3.40)
M1B0	13.20	93.92 (9.70)	93.00 (9.66)	25.87	35.00	1.39	1.49	1.52	1.56	44.00	49.00	1.38	2.31	5.99 (2.63)	10.91 (3.44)	20.08	10.00 (3.30)

M1B1	11.60	95.47 (9.78)	94.40 (9.73)	28.11	36.10	1.42	1.53	1.55	1.62	46.00	52.81	1.93	2.87	6.17 (2.67)	12.11 (3.60)	24.92	7.33 (2.87)
M1B2	11.40	95.80 (9.80)	94.60 (9.74)	28.00	36.00	1.43	1.53	1.57	1.63	45.89	52.20	2.57	3.47	6.79 (2.78)	12.00 (3.59)	24.89	6.67 (2.76)
M1B3	12.60	94.40 (9.73)	93.80 (9.70)	27.68	35.82	1.41	1.51	1.55	1.60	45.28	52.00	1.63	2.64	7.43 (2.89)	11.89 (3.57)	24.03	8.00 (2.99)
M1B4	11.20	96.40 (9.83)	95.27 (9.77)	28.45	36.51	1.45	1.55	1.58	1.65	46.11	53.00	2.66	3.67	6.55 (2.74)	12.43 (3.65)	25.36	1.33 (1.52)
M1B5	12.20	94.00 (9.71)	93.32 (9.67)	26.00	35.22	1.39	1.50	1.53	1.58	45.00	51.00	1.48	2.45	7.51 (2.90)	11.00 (3.45)	21.90	9.33 (3.20)
M2B0	14.20	93.72 (9.69)	92.53 (9.63)	25.03	33.97	1.36	1.48	1.50	1.55	43.89	48.65	1.29	2.26	6.12 (2.66)	10.00 (3.30)	19.18	10.67 (3.40)
M2B1	12.60	95.40 (9.78)	94.20 (9.72)	27.24	35.09	1.42	1.52	1.54	1.61	45.19	52.14	1.75	2.73	6.80 (2.78)	11.47 (3.52)	23.48	9.33 (3.20)
M2B2	12.00	95.60 (9.79)	94.40 (9.73)	27.00	35.00	1.43	1.52	1.56	1.62	45.00	52.00	2.22	3.33	7.36 (2.88)	11.00 (3.45)	22.92	7.33 (2.87)
M2B3	13.27	94.20 (9.72)	93.60 (9.69)	26.58	34.78	1.40	1.51	1.53	1.59	44.82	51.80	1.46	2.50	6.50 (2.73)	10.94 (3.44)	22.46	9.33 (3.20)
M2B4	11.47	96.20 (9.82)	95.20 (9.77)	27.54	35.98	1.44	1.53	1.57	1.64	45.72	52.94	2.34	3.53	7.36 (2.88)	11.98 (3.59)	23.96	4.00 (2.23)
M2B5	13.27	93.80 (9.70)	93.01 (9.66)	25.00	34.10	1.39	1.49	1.52	1.57	44.27	49.86	1.37	2.31	6.29 (2.69)	10.21 (3.33)	20.93	10.00 (3.30)
M3B0	12.20	94.12 (9.72)	93.40 (9.68)	26.81	35.47	1.39	1.47	1.53	1.57	45.00	51.00	1.47	2.51	6.19 (2.67)	11.00 (3.45)	22.06	8.67 (3.10)
M3B1	11.40	95.80 (9.80)	94.80 (9.75)	27.89	36.64	1.43	1.53	1.56	1.63	46.27	53.06	2.06	3.07	6.99 (2.81)	12.58 (3.67)	27.90	5.33 (2.50)
M3B2	11.20	96.00 (9.81)	95.00 (9.76)	27.15	36.21	1.44	1.54	1.58	1.64	46.00	53.00	2.92	3.67	7.45 (2.89)	12.21 (3.62)	26.91	4.00 (2.23)
M3B3	11.60	94.60 (9.74)	94.20 (9.72)	27.00	36.00	1.42	1.52	1.55	1.61	45.91	52.91	1.82	2.84	6.57 (2.74)	12.00 (3.59)	26.07	6.00 (2.63)
M3B4	11.20	96.60 (9.84)	95.80 (9.80)	28.94	36.89	1.45	1.55	1.59	1.66	46.83	53.48	2.97	3.87	7.53 (2.91)	12.98 (3.72)	28.64	2.67 (1.91)
M3B5	11.80	94.20 (9.72)	93.72 (9.69)	27.00	35.99	1.40	1.52	1.54	1.59	45.21	51.11	1.59	2.65	6.34 (2.70)	11.50 (3.52)	23.92	8.00 (2.99)
SE (m) ±	0.045	0.020	0.049	0.019	0.006	0.030	0.006	0.004	0.002	0.011	0.026	0.014	0.078	0.051	0.015	0.036	1.175
CD at 5%	0.129	0.060	0.147	0.057	0.018	0.090	0.018	0.012	0.006	0.033	0.078	0.043	0.234	0.153	0.043	0.018	3.525

Plate 1: Different growing media.

Phosphorus Solubilizing Bacteria **Vesicular Arbuscular Mycorrhizae**

Plate 2 Different biofertilizers.

Pseudomonas fluorescence **Arka Microbial Consortium** ***Trichoderma viride***

Plate 2 cont.. Different biofertilizers.

Plate 3. Softwood grafting technique**.**

(A) Precured scion sticks **(B)** Wedge shaped cut given to scion. **(C)** Beheaded rootstock
(D) Scion inserted in rootstock with slit **(E)** Secured with polythene strip **(F)** Covered with polythene cap

Plate 4 . (A) Grafts growth at 60 days after softwood grafting. **(B)** Grafts growth at 90 days after softwood grafting.

References

Barman, P., Rekha, A. and Pannerselvan, P. (2016). Effect of microbial inoculants on physiological and biochemical characteristics in jamun (*Syzygium cumini* L.) under different propagation substrates. *International Journal of Minor Fruits, Medicinal and Aromatic Plants*. **2**(1), 1-5.

Bharathi, T.S. (1997). Standardization of media for container grown cashew grafts (*Anacardium occidentale* L.). *M.Sc (Horti.) Thesis*. University of Agricultural Sciences. Bangalore.

Brown, M.E. and Burlingham, S.K. (1968). Production of plant growth substances by *Azotobacter chroococcum*. *Microbiology*. **53**(1),135-44.

Diksha, G. (2019). Effect of potting media on growth of soft wood grafts of nutmeg (*Myristica fragrans* H.). *M.Sc.Thesis*. Department of Horticulture, College of Horticulture. Mulde.

Edwards, C.A., Arancon, N.Q. and Sherman, R.L. (2011). Vermiculture technology earthworms, organic wastes and environmental management. *vermiculture.*134.

Gawankar, M.S., Haldankar, P.M., Haldavanekar, P.C., Salvi, B.R. and Jamadagni, B.M. (2019). Studies on seed germination and seedling growth in Jackfruit (*Artocarpus heterophyllus* L.) as influenced by media. *International Journal of Chemical Studies*. **7**, 1699-705.

Kumar, D.P., Hegde, M., Bagyaraj, D.J. and Mahadeva, A.R. (1998). Influence of biofertilizers on growth of cashew (*Anacardiam occidentale* L.) rootstocks. *The Cashew*. **12** (1), 3-9.

Mamatha, Y.N. (1998). Nutrition management and use of biofertilizers on container grown cashew grafts. M.Sc. (Horti.) *Thesis*. University of Agricultural Sciences, Bangalore.

Qayom, A. (2011). Studies on the effect of media composition on seed germination, growth and its effect on grafting in mango (*Mangifera indica* L.). M. Sc. *thesis* submitted to the University of Agricultural Sciences, Bangalore.

Ramteke, V., Nirala, Y.S., Nayak, M.G. and Mohana, G.S. (2020). Evaluation of apple and nut characters of cashew germplasm from Bastar region, Chhattisgarh*, India. J. Plantation Crops,* **48**(2), 142-45.