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Suitability of some growing media for cashew seedling growth and development in the nursery

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Abstract. *Using the right growing media is pivotal for cultivating high-quality seedlings. While topsoil remains a prevalent choice in nurseries, there is a growing need to explore its effectiveness in cashew seedling production and find potential alternatives that might reduce our dependence on it. A three-month experiment was undertaken at the Cocoa Research Institute of Nigeria's nursery. The setup followed a Completely Randomized Design (CRD) incorporating ten treatment variations, each replicated thrice. These treatments involved two cashew nut types, Jumbo and Medium, and five distinct growing media: 100% Topsoil, 100% Sawdust, 75% Topsoil + 25% Sawdust, 50% Topsoil + 50% Sawdust, and 25% Topsoil + 75% Sawdust. For the procedure, each of these media was filled into perforated polythene bags measuring 30cm x 15cm, with one seed planted per bag. Data collected were on % emergence, morphological, shoot and root data. Data were subjected to ANOVA using SAS (version 2010) statistical package and means were separated using DMRT at (P≤0.05). Findings revealed no notable variance in percentage mean emergence at four weeks post-planting or in leaf count at the twelve-week mark. Control treatments (100% topsoil) for jumbo and medium had the shortest plant height, lowest number of leaves, seedling vigour, fresh root weight and taproot length. 100% topsoil as a growing medium for raising cashew seedlings should be discouraged as the experimented growing media offered statistically the same or improved emergence, morphology, and root growth development.*

Keywords: cashew, growing media, nursery, sawdust, seedling, topsoil

Introduction

The cashew tree, *Anacardium occidentale*, is a significant nut crop cultivated primarily in West Africa, South East Asia, and East Africa (Nitidae, 2019). It belongs to the *Anacardiaceae* family of plants. The cashew plant is dicotyledonous and undergoes epigeal germination. This tropical evergreen tree (Ferreira-Silva et al., 2012) can withstand adverse conditions, such as drought, salinity, and high temperatures (Ferreira-Silva et al., 2011). It grows up to 12 meters high and has a symmetrical spread of up to approximately 25 meters (Akos et al., 2017). Typically, it is grown from seeds, which should be dry, clean, and free from insect or fungal infestations to enhance growth (Akos et al., 2017). Germination usually takes place in about 15-20 days when the seeds have absorbed water (Azam-Ali and Judge, 2004). The fruit has a fleshy, red or yellow component, known as the apple, from which a hard-shelled, kidney-shaped nut emerges. Roasted cashew nuts are edible and are extensively used in the confectionery and baking industries (Jegede et al., 2020). The liquid from the cashew nut's shell is valuable and used as a chemical

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compound in products like brake linings, paints, varnishes, and surface coatings (Kumar et al., 2002). The cashew nuts and apples are astringent and not suitable for raw consumption. However, when processed, they can be used for jams, chutney, pickles, and wine. In Nigeria, cashews have significant economic importance. It is among the most crucial cash crops with vast potential for increased production for both domestic and international markets (Olife et al., 2013).

Observations indicate that the size of the sown cashew nuts significantly influences the morphological growth performance of the seedlings in the nursery (Adebola et al., 1999) and recommendations favour using larger nuts over smaller ones for raising cashew seedlings for plantation establishment. Seedling establishment is a primary growth process that is achieved using stored food nutrients in seed and is greatly impacted by the soil environment (Nelson and Larson, 1984). The cotyledons and soil nutrient reserves serve as sources of nutrition for cashew seedlings (Hammed and Adeyemi, 2005). The nursery serves as the starting point for cashew field establishment. Good nursery performance results in good and vigourous crop establishment in the field (Brown, 1984).

Growing media, which can either originate from generative or vegetative propagation, are substances or combinations of materials that anchor plant roots, provide air space that enables plant respiration, and maintain the water available to allow the proper growth and development of plants (Marjenah et al., 2016). The use of suitable growing medium is essential for the production of quality plant seedlings since it directly affects the growth, development and maintenance of the functional rooting system.

In developing countries, woody plants are cultivated using a variety of growing media, including sawdust, sand, soil, manure, and various combinations of these. In the nursery, topsoil is a typical growing medium used in raising seedlings (Marjenah, et al., 2016). Primarily, a growing medium should meet the requirements for nursery plant establishment and early growth (Shah et al., 2006). In addition, long-term plant performance can be predicted by early growth factors. For example, initial plant height reflects subsequent heights and overall development (Schmidt-Vogt, 1981; South et al., 2005).

Given the degradation of land from topsoil collection and the growing demand for cultivation areas, it is essential to reduce or eliminate reliance on topsoil for nursery seedlings. In addition, there is a need to also explore the most suitable growing media for crops such as cashew in the nursery. Therefore, it is necessary to explore growing media that will substitute or reduce the dependence on topsoil and also identify the most suitable one.

A crop's root system significantly determines its successful establishment or post-transplantation (Sánchez-Blanco et al., 2014). Often, the focus is on the shoot system, overlooking the root system of nursery crops. Thus, it is crucial to understand the effect of growing media on the root systems of nursery plants like cashew.

Considering the impact of growth media on cashew germination and seedling growth, this investigation aims to study the effect of different media on the morphology and root development of cashew seedlings as against the conventional use of topsoil and also, to observe if any of the experimented media can substitute the use of topsoil in raising jumbo and medium cashew seedlings.

Material and methods

The three months' experiment was conducted from March 2021 to June 2021 in the nursery at Cocoa Research Institute of Nigeria (CRIN). Using a 2-factorial Completely Randomized Design (CRD), the experiment had ten treatments and replicated three times using two cashew nut types (Jumbo and Medium), five growing media (Topsoil 100%, Sawdust 100%, Topsoil 75% + Sawdust 25%, Topsoil 50% + Sawdust 50% and Topsoil 25% + Sawdust 75%) and 4 seedlings representing each treatment making 40 seedlings per replication. The treatments were as follows:

- A (100% T, J) = 100% Topsoil with Jumbo nut;
- B (100% S, J) = 100% Sawdust with Jumbo nut;
- C (75% S, 25% T, J) = 75% Sawdust + 25% Topsoil with Jumbo nut;
- D (50% S, 50% T, J) = 50% Sawdust + 50% Topsoil with Jumbo nut;
- E (25% S, 75% T, J) = 25% Sawdust + 75% Topsoil with Jumbo nut;
- F (100% T, M) = 100% Topsoil with Medium nut;
- G (100% S, M) = 100% Sawdust with Medium nut;
- H (75% S, 25% T, M) = 75% Sawdust + 25% Topsoil with Medium nut;
- I (50% S, 50% T, M) = 50% Sawdust + 50% Topsoil with Medium nut;
- J (25% S, 75% T, M) = 25% Sawdust + 75% Topsoil with Medium nut.

The topsoil was sourced from fallow land within the Research Institute, sieving out debris using a 2 mm sieve. The sawdust came from a nearby sawmill. We used perforated 30 cm by 15 cm polythene bags to allow for moisture release and the planted nuts were from the current season. We sowed one seed per bag at a 4 cm depth, watering immediately afterwards. Subsequently, watering occurred twice weekly. Post-germination, data collection

began on emergence percentages at two, three, and four weeks post-planting. Measurements, including seedling vigour (rated from 5-Excellent to 1-Bad), plant height (cm), stem girth (cm), number of leaves, and leaf area (cm^2), were taken biweekly starting four weeks after planting until the experiment's conclusion.

Upon conclusion, we conducted a destructive analysis and data on fresh shoot weight, fresh root weight and taproot length were taken. We subjected all collected data to Analysis of Variance (ANOVA) using the SAS 2010 Package. Mean values were differentiated using DMRT at a 0.05% probability level.

Results and discussion

Emergence among the nut types and treatments was evident two weeks post-planting, as illustrated in Table 1. Both E (58.33%) and J (75.00%), sharing the same growing medium (25% S, 75% T) for both nut types, displayed the highest emergence, though with no significant disparity. It could be deduced that (25% S, 75% T) encourages the early emergence of cashew seedlings of either jumbo or medium. Emergence in control treatments A (50.00%) and F (66.67%) did not significantly differ from E and J, which had average and above-average emergences, respectively. G and H both had the least emergence of 16.67% for the medium nut type, while B had the least emergence of 25.00% for jumbo. J (75%) had the highest overall emergence which was followed by F (66.67%), E (58.33%) and A (50.00%) 2 weeks after planting. By the two-week mark, growing media either entirely composed of topsoil or with a dominant topsoil-to-sawdust ratio facilitated earlier emergence compared to other combinations. This early-stage variance in emergence significance is likely attributed to changes in the physical properties of the growing media, affecting the plant's air and water supply (Baiyeri, 2005; Khayyat et al., 2007). Three weeks after planting, no significant difference was observed among the different growing media and nut types. From Table 1, it could be observed that there was a relatively high increase in emergence rate among growing media with a high proportion of sawdust (B, C, D, G, H and I) compared to 2 weeks after sowing. The peak rate of seedling emergence was observed at 3 weeks after planting. By the fourth week post-planting, emergence differences among treatments were not significant. B and G with 100% sawdust gave 100% emergence at 4 weeks after planting, while A and F with 100% topsoil had 91.67%, respectively. The different growing media only influenced emergence at the very early stages of emergence, while only D (50% S, 50% T, J) and H (75% S, 25% T, M) had below 90% emergence at 4 weeks after planting. Nut type seems to have not influenced emergence significantly as there was no significant difference between (A and F), (B and G), (C and H), (D and I) and (E and J) at 2, 3 and 4 weeks after planting. For jumbo, B, C and E compared favourably with A which is the control treatment, while for medium, G, I and J compared favourably with F which is the control treatment at 4 weeks after planting.

Table 1. Effect of growing media on cashew seedling mean emergence (%)

Treatments	Mean Emergence (%)		
	Week 2	**Week 3**	Week 4
A (100% T, J)	50.00^{abc}	91.67^{a}	91.67^{a}
B (100% S, J)	25.00^{bc}	75.00^{a}	100.00^{a}
C (75% S, 25% T, J)	41.67^{abc}	91.67^{a}	91.67^{a}
D (50% S, 50% T, J)	41.67^{abc}	83.33^{a}	83.33^{a}
E (25% S, 75% T, J)	58.33^{abc}	100.00^{a}	100.00^{a}
F (100% T, M)	66.67^{ab}	83.33^{a}	91.67^{a}
G (100% S, M)	16.67^{c}	91.67^{a}	100.00^{a}
H (75% S, 25% T, M)	16.67^{c}	75.00^{a}	83.33^{a}
I (50% S, 50% T, M)	33.33^{abc}	83.33^{a}	91.67^{a}
J (25% S, 75% T, M)	75.00^{a}	83.33^{a}	91.67^{a}

Means with the same letter(s) in a column are not significantly different ($P \leq 0.05$)

Throughout the experiment, as depicted in Table 2, we observed significant differences at fortnightly intervals. Four weeks post-planting, E (25% S, 75% T, J) exhibited the tallest plant height, though it wasn't markedly different from other treatments except H. Notably, H (23.18 cm) only stood shorter than control treatments A (24.37 cm) and F (24.05 cm). Among the nut types and the growing media used, the control treatments A and F had the lowest plant height from 6 weeks after planting to 12 weeks after planting. This implies that other growing media used in the experiment encourage taller plant height than topsoil though at 12 weeks after planting significant

difference was only observed in B (100% S, J) and D (50% S, 50% T, J) when compared with the control treatment A for the jumbo nut type, while significant difference was only observed in I (50% S, 50% T, M) when compared with the control F for the medium nut type. Our observations align with Ugwu et al. (2020) findings, where they noted taller cashew seedlings when using formulated growing media combination of topsoil, sawdust, and poultry droppings compared to the conventional topsoil usage.

Table 2. Effect of growing media on cashew seedling mean plant height

Treatments	Plant Height (cm)				
	Week 4	Week 6	Week 8	Week 10	Week 12
A (100% T, J)	24.37^{ab}	27.17^{c}	29.27^{c}	33.38^{c}	34.38^{c}
B (100% S, J)	26.47^{ab}	35.97^{ab}	39.58^{abc}	44.52^{abc}	49.60^{ab}
C (75% S, 25% T, J)	26.15^{ab}	34.62^{ab}	37.35^{abc}	43.45^{abc}	46.13^{abc}
D (50% S, 50% T, J)	26.25^{ab}	32.95^{abc}	37.50^{abc}	40.60^{bc}	50.05^{ab}
E (25% S, 75% T, J)	28.03^{a}	32.98^{abc}	35.32^{abc}	40.80^{bc}	46.63^{abc}
F (100% T, M)	24.05^{ab}	28.70^{bc}	32.08^{bc}	36.67^{bc}	40.13^{bc}
G (100% S, M)	25.75^{ab}	32.58^{abc}	38.53^{abc}	45.37^{ab}	49.67^{ab}
H (75% S, 25% T, M)	23.18^{b}	34.75^{ab}	38.15^{abc}	44.97^{ab}	48.95^{ab}
I (50% S, 50% T, M)	26.20^{ab}	35.35^{ab}	42.95^{a}	52.35^{a}	59.75^{a}
J (25% S, 75% T, M)	27.58^{ab}	37.22^{a}	42.35^{ab}	44.35^{abc}	52.07^{ab}

Means with the same letter(s) in a column are not significantly different (P≤0.05)

Table 3 reveals significant differences in the stem girth of cashew seedlings at weeks 4, 10, and 12. Four weeks post-planting, among the jumbo nut type treatments, only E (7.68 mm) demonstrated a slightly reduced stem girth compared to control treatment A (7.77 mm). Conversely, for the medium nut types, only I (7.64 mm) surpassed control F (7.49 mm). Though no significant difference in stem girth was observed in week 6 and week 8, control treatment A (8.11 mm and 8.28 mm) still had the smallest stem girth when compared to the jumbo nut type treatments (B, C, D, E), while only H (7.94 mm) had a smaller stem girth than the control F (8.00 mm) among the medium nut type treatments. During weeks 10 and 12, control treatments F (8.16 mm and 8.26 mm) and A (8.36 mm and 8.52 mm) consistently exhibited the leanest stem girths in comparison to treatments B through J, though at 12 weeks after planting no significant difference in stem girth was observed between the control A (8.52 mm), B (9.17 mm) and E (8.60 mm) among the jumbo nut type treatments, while no significant difference was also observed in control F (8.26 mm) when compared with H (8.95 mm), I (9.22 mm) and J (9.22 mm). These findings suggest that the growing media C (75% S, 25% T, J) and D (50% S, 50% T, J) notably bolstered the stem girth of jumbo nut-type cashew seedlings. For medium nut types, G (100% S, M) emerged as the significant positive influencer. Across both nut types, 100% sawdust outperformed 100% topsoil. This aligns with Nnedu et al. (2019) observation that soilless media yield thicker stems than topsoil.

Table 3. Effect of growing media on cashew seedling mean stem girth

Treatments	Stem Girth (mm)				
	Week 4	Week 6	Week 8	Week 10	Week 12
A (100% T, J)	7.77^{ab}	8.11^{a}	8.28^{a}	8.36^{bc}	8.52^{b}
B (100% S, J)	7.97^{ab}	8.28^{a}	8.40^{a}	8.54^{abc}	9.17^{ab}
C (75% S, 25% T, J)	8.48^{a}	8.66^{a}	9.06^{a}	9.50^{a}	9.81^{a}
D (50% S, 50% T, J)	8.18^{ab}	8.51^{a}	8.98^{a}	9.41^{ab}	9.63^{a}
E (25% S, 75% T, J)	7.68^{ab}	8.20^{a}	8.35^{a}	8.50^{abc}	8.60^{b}
F (100% T, M)	7.49^{ab}	7.83^{a}	8.00^{a}	8.16^{c}	8.26^{b}
G (100% S, M)	7.29^{b}	8.22^{a}	8.77^{a}	8.94^{abc}	9.64^{a}
H (75% S, 25% T, M)	7.37^{b}	7.71^{a}	7.94^{a}	8.63^{abc}	8.95^{ab}
I (50% S, 50% T, M)	7.64^{ab}	8.02^{a}	8.43^{a}	8.98^{abc}	9.22^{ab}
J (25% S, 75% T, M)	7.30^{b}	8.15^{a}	8.42^{a}	8.71^{abc}	9.22^{ab}

Means with the same letter(s) in a column are not significantly different (P≤0.05)

No significant difference in leaf area of cashew seedlings was observed between week 4 to week 8, which indicates that the growing media did not influence leaf area in the first two months after planting as significant differences were only observed in weeks 10 and 12 as shown in Table 4. Though at week 4, control A (53.87 cm^2) only had a larger leaf area than C (49.14 cm^2) among the jumbo nut treatment types, while control F (60.43 cm^2) had the largest leaf area among the medium nut types. At week 6, control treatment A had the smallest leaf area among the jumbo nut treatment types, while only I (65.47 cm^2) performed better than F (64.58 cm^2). A (57.95 cm^2 and 58.45 cm^2) had the smallest leaf area in weeks 10 and 12 among the jumbo nut treatment types (B, C, D, E), while F (72.84 cm^2 and 74.6 cm^2) performed better than H (63.96 cm^2) and J (72.73 cm^2) in week 10 and H (66.31 cm^2) only in week 12. At the end of the experiment at week 12, a significant difference was only observed in D (50% S, 50% T, J) when compared with control A for the jumbo nut treatment types, while there was no significant difference among the medium nut treatment types when compared with the control F. This implies that only 50% sawdust and 50% topsoil mixture significantly increases the leaf area of cashew seedlings when planted with jumbo cashew nut type. The findings in Table 4 resonate with Ugwu et al. (2020) report, suggesting that formulated media typically yield a more expansive leaf area for cashew seedlings.

Table 4. Effect of growing media on cashew seedling mean leaf area

Treatments	Leaf Area (cm^2)				
	Week 4	Week 6	Week 8	Week 10	Week 12
A (100% T, J)	53.87^{a}	56.41^{a}	59.16^{a}	57.95^{c}	58.45^{c}
B (100% S, J)	61.17^{a}	65.08^{a}	69.38^{a}	70.98^{ab}	76.86^{abc}
C (75% S, 25% T, J)	49.14^{a}	61.74^{a}	58.19^{a}	65.77^{abc}	66.13^{bc}
D (50% S, 50% T, J)	58.83^{a}	66.13^{a}	69.02^{a}	76.95^{ab}	91.04^{a}
E (25% S, 75% T, J)	61.51^{a}	67.66^{a}	67.04^{a}	70.89^{ab}	80.03^{ab}
F (100% T, M)	60.43^{a}	64.58^{a}	64.65^{a}	72.86^{ab}	74.36^{abc}
G (100% S, M)	57.34^{a}	59.97^{a}	62.69^{a}	74.35^{ab}	78.01^{abc}
H (75% S, 25% T, M)	51.83^{a}	61.72^{a}	61.45^{a}	63.96^{bc}	66.31^{bc}
I (50% S, 50% T, M)	55.71^{a}	65.47^{a}	71.01^{a}	78.33^{a}	86.98^{a}
J (25% S, 75% T, M)	51.92^{a}	64.00^{a}	64.16^{a}	72.73^{ab}	78.80^{abc}

Means with the same letter(s) in a column are not significantly different (P≤0.05)

Table 5 indicates a consistency in the number of leaves across all growing media, with no discernible difference observed throughout the experiment's duration. This indicates that the growing media did not influence leaf production for both the jumbo and medium nut types considerably. However, between weeks 4 and 12, control treatments F (5.6) and A (6.7) showed the most modest leaf increase. In contrast, C (12) led the surge, trailed by H (11.5), I (10.8), D (9.3), B (9), J (9), G (8.5), and E (8.3). Control treatment F (13.8) and A (15.0) had the lowest numbers of leaves at the end of the experiment, while other growing media had higher numbers of leaves though stats proved that the values are not significantly different from 100% topsoil.

Table 5. Effect of growing media on cashew seedling mean numbers of leaves

Treatment	Number of leaves				
	Week 4	Week 6	Week 8	Week 10	Week 12
A (100% T, J)	8.3^{a}	10.8^{a}	12.2^{a}	14.0^{a}	15.0^{a}
B (100% S, J)	7.7^{a}	11.2^{a}	13.3^{a}	15.7^{a}	16.7^{a}
C (75% S, 25% T, J)	7.7^{a}	11.8^{a}	15.8^{a}	17.2^{a}	19.7^{a}
D (50% S, 50% T, J)	8.0^{a}	10.3^{a}	12.3^{a}	13.3^{a}	17.3^{a}
E (25% S, 75% T, J)	8.5^{a}	11.0^{a}	12.8^{a}	14.3^{a}	16.8^{a}
F (100% T, M)	8.2^{a}	10.2^{a}	12.5^{a}	12.8^{a}	13.8^{a}
G (100% S, M)	8.3^{a}	11.7^{a}	13.3^{a}	15.7^{a}	16.8^{a}
H (75% S, 25% T, M)	8.2^{a}	13.3^{a}	16.5^{a}	19.0^{a}	19.7^{a}
I (50% S, 50% T, M)	8.7^{a}	12.0^{a}	14.5^{a}	16.8^{a}	19.5^{a}
J (25% S, 75% T, M)	7.5^{a}	10.0^{a}	11.5^{a}	13.5^{a}	16.5^{a}

Means with the same letter(s) in a column are not significantly different (P≤0.05)

Baiyeri (2003) asserts that the choice of growing medium profoundly affects seedling emergence, vitality, and the ultimate quality of the seedlings produced. Table 6 shows the effect of the growing media on cashew seedling vigour. Throughout the 12-week period, marked disparities were evident. Although all growing media displayed commendable performance, a stark contrast was observed at the crucial 12-week mark, which is the recommended transplantation period, control treatment A (4.0) was significantly different from B (4.8), C (4.8), D (4.8) and E (4.8) which implies that they performed better than topsoil when considering the jumbo nut type. Also, control treatment F (4.5) was not significantly different from its medium nut counterparts G (4.8), H (4.5), I (4.8), and J (4.8). The control treatments A and F had the least seedling vigour among the treatments except for H which had the same seedling vigour as F. Insights from Table 6 highlight that while control treatment F aligned closely with its medium nut counterparts, control treatment A lagged behind its jumbo nut counterparts. The growing media influenced cashew seedling vigour only in the jumbo nut type and does not have a comparable effect on the medium nut type.

Table 6. Effect of growing media on cashew seedling mean seedling vigour

Treatments	Seedling Vigour				
	Week 4	Week 6	Week 8	Week 10	Week 12
A (100% T, J)	5.0^{a}	5.0^{a}	4.7^{a}	4.3^{b}	4.0^{b}
B (100% S, J)	5.0^{a}	5.0^{a}	5.0^{a}	5.0^{a}	4.8^{a}
C (75% S, 25% T, J)	4.5^{b}	5.0^{a}	4.8^{a}	4.7^{ab}	4.8^{a}
D (50% S, 50% T, J)	5.0^{a}	4.8^{ab}	5.0^{a}	4.8^{ab}	4.8^{a}
E (25% S, 75% T, J)	5.0^{a}	5.0^{a}	5.0^{a}	5.0^{a}	4.8^{a}
F (100% T, M)	5.0^{a}	4.5^{b}	4.3^{b}	4.7^{ab}	4.5^{ab}
G (100% S, M)	5.0^{a}	4.8^{ab}	4.8^{a}	5.0^{a}	5.0^{a}
H (75% S, 25% T, M)	4.8^{ab}	4.8^{ab}	5.0^{a}	5.0^{a}	4.5^{ab}
I (50% S, 50% T, M)	4.8^{ab}	5.0^{a}	5.0^{a}	5.0^{a}	4.8^{a}
J (25% S, 75% T, M)	4.8^{ab}	4.8^{ab}	5.0^{a}	5.0^{a}	4.8^{a}

Means with the same letter(s) in a column are not significantly different (P≤0.05)

Table 7 shows the fresh shoot weight (FSW), fresh root weight (FRW) and taproot length (TRL) of the cashew (destructive sampling). For FSW, treatment A (18.83 g) recorded the lowest weight, setting it apart from B (6.50 g), D (41.33 g), and E (37.33 g) among the jumbo nut variety. In contrast, for the medium nut type, control treatment F showed no remarkable variance when compared to G, H, I, and J. This implies that the growing media influenced FSW in jumbo, while it did not when considering the medium nut type. In terms of FRW, treatment A (7.33 g) registered the least weight, differing from B (12.67 g) and D (11.83 g) for the jumbo nut type. However, the medium nut type displayed no significant deviation when control treatment F was set against G, H, I, and J. It could be noted that the growing media influenced the FRW of jumbo nut type, while it did not influence the FRW of medium nut type notably. For the TRL, control treatment A (18.58 cm) marked the shortest length, only significantly trailing behind D (33.80 cm) in the jumbo nut category. Notably, for the medium nut type, control treatment F, despite being the shortest, did not differ significantly from G, H, I, and J. This indicates that growing medium D (50% S, 50% T, J) only influenced TRL in the jumbo nut type.

Table 7. Effect of growing media on cashew seedling mean fresh shoot weight (FSW), fresh root weight (FRW) and taproot length (TRL)

Treatments	FSW (g)	FRW (g)	TRL (cm)
A (100% T, J)	18.83^{c}	7.33^{b}	18.58^{b}
B (100% S, J)	36.50^{ab}	12.67^{a}	26.40^{ab}
C (75% S, 25% T, J)	34.50^{abc}	11.17^{ab}	25.15^{ab}
D (50% S, 50% T, J)	41.33^{ab}	11.83^{a}	33.80^{a}
E (25% S, 75% T, J)	37.33^{ab}	10.50^{ab}	25.75^{ab}
F (100% T, M)	30.00^{abc}	9.00^{ab}	22.18^{ab}
G (100% S, M)	44.33^{ab}	12.67^{a}	29.12^{ab}
H (75% S, 25% T, M)	28.50^{bc}	10.50^{ab}	29.48^{ab}
I (50% S, 50% T, M)	47.00^{a}	11.50^{ab}	24.82^{ab}
J (25% S, 75% T, M)	45.50^{ab}	12.83^{a}	27.33^{ab}

Means with the same letter(s) in a column are not significantly different (P≤0.05);
Fresh Shoot Weight (FSW); Fresh Root Weight (FRW); Tap Root Length (TRL)

Conclusion

Relying solely on 100% topsoil as a growing medium for nurturing cashew seedlings is not the most efficient method. Alternatives like 100% sawdust, 75% Sawdust + 25% Topsoil, 50% Sawdust + 50% Topsoil, and 25% Sawdust + 75% Topsoil have showcased either comparable or enhanced seedling emergence, morphology and root development across both nut types. The experimented growing media improved the shoot weight, root weight and tap root length of both jumbo and medium cashew seedlings except 75% sawdust + 25% topsoil which had a lesser shoot weight but statistically the same as 100% topsoil among the medium seedlings. A good growing media in the nursery does not assure a successful establishment after transplanting. Therefore, it is important to examine the performance of the seedlings grown on the field using the researched growing media used in this experiment.

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