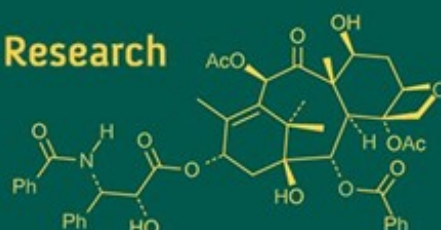


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The names and affiliations of all authors are provided below, following the references.

Evaluation of suitable host for Sandalwood (*Santalum Album* L.) and its effect on rhizospheric soil properties under greenhouse condition

Arbaj V Pathan¹, NA Meshram², Suchitra S Desai³, AD Rane⁴, RA Raut⁵, NH Khobragade⁶, AS Gawali⁷, PB Bansode⁸, Chetana S Chaudhari⁹, ST Burhade¹⁰, RB Pailvan¹¹, AD Raut¹²

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ABSTRACT

A pot culture experiment was conducted using a Completely Randomized Design (CRD) with eleven host species replicated in thrice 1:1 soil: vermicompost media under control greenhouse condition. The study evaluated the direct linear relationships and multivariate patterns linking six-month sandalwood vegetative traits—specifically plant height, stem collar diameter, root interceptions, total fresh biomass and total dry biomass with corresponding rhizospheric soil fertility parameters, including pH, Electrical Conductivity (EC), Total Carbon (TC), Total Nitrogen (TN), Total Phosphorus (TP), Total Potassium (TK) and the C:N ratio. Significantly maximum growth performance of Sandalwood was observed by Tur (*Cajanus cajan*) followed Suru (*Casuarina equisetifolia*) and Mangium (*Acacia mangium*) hosts. Similar performance of rhizospheric soil properties of media under greenhouse condition was noticed. Sandalwood biometric attributes exhibited pronounced, statistically significant positive correlations ($p < 0.01$) with soil available macronutrients: Total Potassium ($r = 0.916$ to 0.926), Total Nitrogen ($r = 0.748$ to 0.809) and Total Phosphorus ($r = 0.551$ to 0.795). Soluble electrolyte accumulation (EC) was similarly positively correlated ($r = 0.405$ to 0.774) with growth. Conversely, vegetative growth and haustorial connection frequency demonstrated marked inverse correlations with the soil C:N ratio ($r = -0.835$ to -0.958) and soil pH ($r = -0.295$ to -0.788). The maximum root biomass, nitrogen fixing nodules with maximum host interceptions may increase mineralization of nutrients and easily available for plant. Thus, Tur (*Cajanus cajan*), Suru (*Casuarina equisetifolia*) and Mangium (*Acacia mangium*) hosts were noticed highly suitable host for getting healthy sandal under greenhouse condition.

Keywords: Sandalwood, Haustoria, Media C:N Ratio, Root interception

Corresponding Author: Arbaj V Pathan

E-mail:

Mobile No.: +91 8999542525

1. Introduction

Indian sandalwood (*Santalum album* L.) belonging to the family Santalaceae. It is an economically important small evergreen hemi-parasitic tree commonly known as 'Chandan'. It is valued for its fragrant heartwood and essential oil. Its wood and oil are widely used in religious and cultural activities, perfumery, cosmetics, medicines, carving and other value-added products. The characteristic fragrance and commercial value of sandalwood oil are mainly due to compounds such as α and β santalol (Chavan *et al.*, 2024) [1]. Increasing demand and the limited availability of natural sandalwood have encouraged its cultivation in different parts of India. The success of sandalwood plantations largely depends on the availability of healthy and vigorous seedlings. Sandalwood is a root hemi-parasite and requires suitable host plants during its early growth. It forms haustorial connections, which are vascular connections between roots of sandalwood and its host plant and gets water, minerals and nutrients through these connections (Rocha *et al.*, 2014) [2]. Although sandalwood seeds can germinate independently, the presence of a suitable host improves seedling growth and development (Zhang *et al.*, 2022) [3]. The host species can also influence seedling survival, biomass production and establishment (Radomiljac *et al.*, 1998) [4]. Therefore, proper host selection is an important nursery practice for producing quality sandalwood seedlings for field planting.

Chandan cultivation has gained further importance through recent government initiatives aimed at promoting high-value agricultural commodities. NITI Aayog has emphasized agricultural diversification, sustainable

Corresponding Author:
Arbaj V Pathan
M. Sc. Scholar, Department of Forest Recourse Management, DBSKKV, Dapoli, Maharashtra, India

resource use and opportunities for increasing farmer's income through high value crops (NITI Aayog, 2026) [5]. The Government of India has also constituted a Sandalwood Development Committee to address issues related to sandalwood cultivation and development of the sector (Government of India, 2025) [6]. The Union Budget 2026–27 highlighted sandalwood as a high value agricultural commodity and proposed measures to promote its cultivation and post-harvest processing in collaboration with State Governments (Government of India, 2026) [7]. These initiatives indicate the growing scope for scientific and commercial sandalwood production. Pot culture provides a controlled condition for comparing different hosts and assessing their influence on seedling growth and establishment. In view of these, this experiment was carried out to find most suitable host species for improving the early growth and establishment of sandalwood seedlings. Despite widespread recognition of the hemi-parasitic nature of *Santalum album*, comprehensive studies examining the simultaneous correlations between sandalwood growth parameters and rhizospheric soil chemical properties under multi-host pot culture regimes remain limited. Specifically, evaluating the directional relationships linking sandal plant height, collar diameter, haustorial root interception and fresh and dry total biomass accumulation with soil pH, EC, Total C, Total N, Total P, Total K and the C:N ratio is essential for optimizing nursery media management and host selection. A suitable host for sandal can be getting healthy sandal seedlings. Accordingly, this investigation was designed to evaluate the growth performance of *Santalum album* across eleven diverse host combinations in pot cul-

ture under the coastal agro-climatic conditions of the Konkan region and to elucidate the linear correlation and multivariate dynamics governing plant rhizosphere interactions at the completion of a six-month nursery cycle.

2. Materials and methodology

The pot-culture experiment investigation was carried out from late December 2025 to late June 2026 under an agro-shade net nursery at the College of Forestry, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra, India (17.45° N latitude, 73.10° E longitude; 250 m above mean sea level). The experimental station experiences a warm, humid tropical climate with an annual precipitation exceeding 3000 mm, concentrated during the southwest monsoon. The pot culture trial was arranged in a Completely Randomized Design (CRD). For the present investigation, two-month-old sandalwood seedlings comprising eleven host treatment combinations replicated three times, totaling 33 experimental units. Each unit consisted of a heavy-duty, black-pigmented polyethylene nursery bag measuring 10 × 12 inches filled with 10 kg of a standardized 1:1 (by volume) growing mixture of native surface lateritic soil and well-decomposed vermicompost. The numerical data of all the observations were subjected to analysis of variance (ANOVA) using a completely randomized design. In the present investigation, seedlings of sandalwood and eleven host species (Table 2.1) were transferred to plastic bags.

Table 2.1. Treatment details of sandal and different host plants under different host combinations.

Tr. Code	Parasite	Host
T ₁	Sandal	Jackfruit (<i>Artocarpus heterophyllus</i>)
T ₂	Sandal	Jambhul (<i>Syzygium cumini</i>)
T ₃	Sandal	Karonda (<i>Carissa carandas</i>)
T ₄	Sandal	Amla (<i>Emblica officinalis</i>)
T ₅	Sandal	Kokum (<i>Garcinia indica</i>)
T ₆	Sandal	Suru (<i>Casuarina equisetifolia</i>)
T ₇	Sandal	Subabul (<i>Leucaena leucocephala</i>)
T ₈	Sandal	Mangium (<i>Acacia mangium</i>)
T ₉	Sandal	Karanj (<i>Millettia pinnata</i>)
T ₁₀	Sandal	Khair (<i>Acacia catechu</i>)
T ₁₁	Sandal	Tur (<i>Cajanus cajan</i>)

3. Result and discussion

The biometric development of Sandalwood (*Santalum album*) and the corresponding physiochemical modifications of the potting media after six months (180 days after re-planting) exhibited statistically significant variations ($p < 0.01$) across the eleven host treatments. Sandalwood performance was evaluated alongside the host plants, with parameters encompassing plant height, stem collar diameter, functional root interceptions, fresh and dry total biomass accumulation and complete soil nutrient profiles.

3.1 Growth parameters

At six months after planting, all biometric attributes of Sandalwood (*Santalum album* L.) and host plants differed significantly across the eleven host treatments ($p < 0.01$):

Plant Height: Sandalwood co-cultivated with Tur (*Cajanus cajan*, T₁₁) achieved the highest height (69.27 cm), remaining statistically at par with Suru (*Casuarina equisetifolia*, T₆, 60.86 cm) and Mangium (*Acacia mangium*, T₈, 58.71 cm), whereas Kokum (*Garcinia indica*, T₅) produced the shortest plants (32.13 cm). Similar results were found by Rot *et al.* (2022) [8]; Mohapatra *et al.* (2022) [9]. The variation in sandalwood plant height among different host combinations may be attributed to differences in host compatibility, root develop-

ment, haustorial association and availability of water and nutrients (Anandalakshmi *et al.*, 2023, Rot *et al.*, 2022) [10]. Among host plants, Mangium grew tallest (153.50 cm), while Subabul (T₇) remained the shortest (61.02 cm) are given in Table 3.1.

Collar Diameter: Stem collar diameter of sandalwood peaked in Tur (T₁₁, 9.12 mm), followed closely by Suru (T₆, 8.14 mm) and Mangium (T₈, 7.56 mm), which were significantly superior to the remaining treatments (CD = 1.60 mm). Sandalwood with Kokum recorded the lowest diameter (2.63 mm). Among hosts, Suru attained the largest diameter (29.10 mm), whereas Tur had the smallest (7.63 mm), the results are shown in Table 3.1. Similar results were observed by Annapurna *et al.* (2006) [11].

Total Plant Biomass: Sandalwood fresh biomass was highest in Mangium (T₈, 86.74 g), Tur (T₁₁, 84.10 g) and Suru (T₆, 80.07 g), while dry biomass peaked in Tur (26.19 g), Mangium (25.85 g) and Suru (24.77 g) as given in Table 3.1. The greater leaf production, branching, root development and shoot growth under these hosts would consequently result in greater accumulation of total biomass (Annapurna *et al.*, 2006) [11]. In contrast, Kokum produced the lowest sandalwood biomass (5.47 g fresh and 1.78 g dry). Suru yielded the maximum host fresh and dry biomass (552.34 g and 187.02 g, respectively).

Root Interception: Vigorous hosts with extensive and well branched root systems would provide greater root interception and more opportunities for haustorial attachment by sandalwood [Sun et al. \(2014\) \[12\]](#). Root-to-root haustorial connections diverged widely, with Tur (T_{11}) recording an outstanding, significantly superior maximum of 216.67 connections per plant, followed by Suru (77.67) and *Mangium* (50.00). Fruit tree hosts like Karonda (T_3 , 1.00) and Kokum (T_5 ,

1.00) showed virtually no haustorial attachment (Fig. 1). The variation in root interception and haustoria formation among different host plants may be associated with their nodulation ability, which is largely influenced by their leguminous or non-leguminous nature and their capacity to establish symbiotic associations with nitrogen-fixing microorganisms [\(Lu et al., 2014\) \[13\]](#).

Table 3.1. Growth performance of sandal and different host plants under different host combinations at six months.

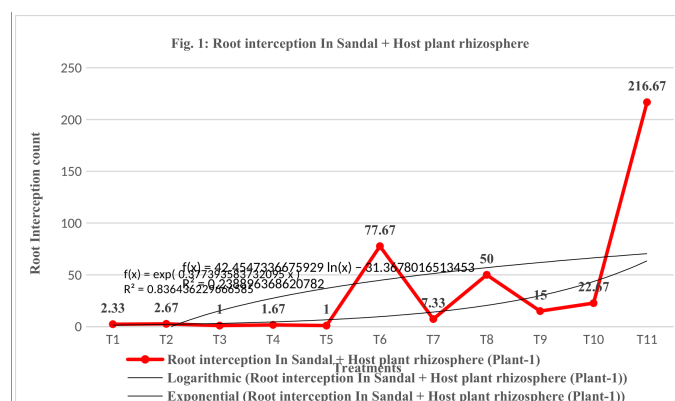
Treatments	Plant height		Collar diameter		Total plant biomass			
	Sandal	Host	Sandal	Host	Sandal		Host	
	(cm)	(cm)	(mm)	(mm)	Fresh (g)	Dry (g)	Fresh (g)	Dry (g)
T_1	32.90	69.75	4.20	9.54	12.88	4.21	116.53	36.11
T_2	36.34	96.78	3.91	21.28	16.58	5.50	372.37	116.94
T_3	34.67	64.33	3.37	24.69	12.33	3.78	254.03	79.93
T_4	35.10	70.08	3.35	13.20	6.25	1.91	210.25	65.73
T_5	32.13	62.67	2.63	7.72	5.47	1.78	72.19	22.27
T_6	60.86	138.67	8.14	29.10	80.07	24.77	552.34	187.02
T_7	41.92	61.02	4.65	12.15	13.94	4.30	83.47	25.59
T_8	58.71	153.50	7.56	20.59	86.74	25.85	465.66	141.02
T_9	36.59	139.10	3.23	26.21	26.71	7.98	445.29	134.78
T_{10}	42.67	75.03	3.93	11.03	32.49	9.93	117.57	37.88
T_{11}	69.27	98.33	9.12	7.63	84.10	26.19	220.38	68.81
Mean	43.74	93.57	4.92	16.65	34.32	10.56	264.55	83.28
SE ($\pm$)	5.04	12.36	0.56	2.05	3.16	1.33	21.66	4.20
CD at 1 %	14.34	35.16	1.60	5.83	9.00	3.78	61.62	11.96
CV (%)	11.53	16.17	14.01	15.08	11.29	15.39	10.03	6.18

3.2 Soil properties

In the potting soil, the baseline acidic pH shifted from 5.52 toward neutrality across all treatments (6.54 to 7.47), largely driven by basic cations released through the decomposition of vermicompost and management amendments. [Mei et al. \(2011\) \[14\]](#) reported that sandalwood thrives in slightly acidic to neutral, with a pH range of 6.5 to 8.5. Notably, *Cajanus cajan* (T_{11}) maintained a significantly lower pH (6.54) than all other treatments, reflecting intense organic acid secretion and proton extrusion driven by active biological nitrogen fixation. Similarly, [Rajan et al. \(2017\) \[15\]](#) reported the sandalwood can grow in slightly acidic to acidic soils as well as neutral soils. Electrical conductivity rose from an initial 0.045 dS m^{-1} to 0.42–0.55 dS m^{-1} , indicative of steady organic mineralization and electrolyte release into the soil solution. Similarly, [Garad \(2019\) \[16\]](#) reported the successful plantation of sandalwood with the host *Cajanus cajan* in Soil, FYM, Cocopeat, Biochar potting medium where, EC ranged from 0.07 to 0.90 dS m^{-1} .

Total Nitrogen was markedly enriched from its baseline of 0.54% to a maximum of 0.93% under *Cajanus cajan*, 0.86% under *Casuarina equisetifolia* and 0.83% under *Acacia mangium* as given in Table 3.2. Similar findings were reported by [Santosa et al. \(2023\) \[17\]](#); [Garad \(2019\) \[16\]](#). The presence of nitrogen fixing or nitrogen associated microbial populations around certain hosts may also have contributed to the improvement in soil N status [\(Ojha et al., 2018\) \[18\]](#). Thus, the increase in total N indicates a net enrichment of the soil nitrogen pool during the six-month growing period. Total Phosphorus increased from 0.90% to 1.28% (T_6) and Total Potassium rose from 0.51% to 0.73% (T_{11}) as given in Table 3.2. Similarly, [Przemieniecki et al. \(2021\) \[19\]](#) reported improvement in phosphorus from 92 to 521 mg kg^{-1} and of potassium from 142 to 1912 mg kg^{-1} , compared with the control soil. Conversely, Total Carbon declined from 25.61% to 16.83–23.56% as warm and humid conditions stimulated heterotrophic microbial decomposition and respiratory loss of organic substrates. The warm and humid conditions of the Konkan region favour rapid microbial decomposition of organic carbon, resulting in

the conversion of organic C into CO_2 and its loss from the soil system. [Mhalshi \(2013\) \[20\]](#) reported that the CO_2 evolution (357.00 mg kg) improved with the application biofertilizers under cowpea in lateritic soil in Konkan region. As a consequence of nitrogen accretion coupled with carbon mineralization, the C:N ratio narrowed from 47.43 down to 18.04–29.88, reaching its lowest value in T_{11} (18.04). A similar trend was recorded by [Przemieniecki et al. \(2021\) \[19\]](#) of C:N ratio from 21 to 32.



3.3 Correlation studies

The correlation matrix computed between the vegetative growth attributes of Indian Sandalwood (*Santalum album* L.), the morphometric parameters of associated host plants and the post-harvest chemical properties of the potting soil after six months of growth illustrates a tightly coupled, reciprocal continuum between rhizosphere fertility and hemi-parasitic development. Linear correlation coefficients (r) reveal that sandalwood growth is largely governed by the concentration of available macronutrients, the degree of organic matter mineralization and the frequency of haustorial bridge establishment. The positive associations observed among beneficial growth parameters indicate that host species capable of improving the rhizosphere vol

ume and accelerating nutrient turnover directly enhance sandalwood vegetative vigor, whereas stagnant soil conditions and nutrient immobilization markedly depress sapling growth.

Sandalwood biometric attributes encompassing plant height (SPH), stem collar diameter (SCD), total fresh plant biomass (STFPB) and total dry plant biomass (STD PB) demonstrated exceptionally strong. It is statistically significant positive correlations with the primary soil macronutrients, most notably Total Potassium (TK), Total Nitrogen (TN) and Total Phosphorus (TP). Among these, Total Potassium exhibited the most pronounced positive linear correlation with sandalwood growth traits, yielding coefficients of $r = 0.926$ for dry plant biomass, $r = 0.923$ for fresh plant biomass, $r = 0.920$ for plant height and $r = 0.916$ for stem collar diameter. Total Nitrogen similarly maintained robust positive correlations with sandal collar diameter ($r = 0.809$), sandal plant height ($r = 0.806$), total dry biomass ($r = 0.750$) and total fresh biomass ($r = 0.748$). Total Phosphorus likewise showed highly significant positive relationships with total fresh biomass ($r = 0.795$), total dry biomass ($r = 0.793$), plant height ($r = 0.744$) and collar diameter ($r = 0.736$). Most of the parameters showed significantly correlated with each other. The more than 0.80 values were observed under correlation studies. The +ve correlations in most of the parameters of available nutrients were recorded due to higher contribution for producing quality seedlings reflected due to higher soil media fertility, soil chemical diversity and humus formation. The +ve correlation indicate both sandal and host plants would have increased the rhizospheric volume and soil chemical interactions with plant growth parameters compared with the -ve correlation. Similarly, Verma *et al.* (2023) [21] studied the growth parameters (collar diameter, height and biomass) of sandalwood.

Root interception was positively correlated with Total Potassium ($r = 0.776$), Total Nitrogen ($r = 0.702$) and Total Phosphorus ($r = 0.551$), alongside a moderate positive relationship with Soil Electrical Conductivity ($r = 0.405$). Conversely, root interception exhibited ex-

tre negative correlations with the soil C:N ratio ($r = -0.958$) and soil pH ($r = -0.788$). These associations confirm that haustorial cushion proliferation and effective vascular docking occur preferentially in biologically active soils with narrow C:N ratios and slightly acidic to neutral reaction regimes (Li *et al.*, 2023) [22].

In contrast to available macronutrients, the soil C:N ratio exhibited consistent, highly significant negative correlations with every sandalwood growth metric. It was inversely correlated with root interception ($r = -0.958$), sandal plant height ($r = -0.896$), stem collar diameter ($r = -0.852$), total dry biomass ($r = -0.843$) and total fresh biomass ($r = -0.835$). A wider C:N ratio indicates slow organic substrate decomposition, low microbial activity and biological immobilization of inorganic nitrogen by heterotrophic microorganisms. Previous studies have demonstrated that carbon availability and substrate stoichiometry can strongly influence microbial nitrogen immobilization and consequently soil nitrogen availability (Li *et al.*, 2023) [22]

Soil reaction (pH) similarly showed a continuous inverse correlation with sandalwood development, displaying negative coefficients with root interception ($r = -0.788$), plant height ($r = -0.472$), stem collar diameter ($r = -0.449$), total dry biomass ($r = -0.309$) and total fresh biomass ($r = -0.295$), while initial potting soils were acidic (pH 5.52) and shifted toward neutrality due to basic cations released during organic decomposition, higher alkaline shifts (pH exceeding 7.40, as seen in non-leguminous combinations like (*Syzygium cumini*)) restricted phosphorus and micronutrient solubility, thereby depressing haustorial cushion formation. In contrast, mild rhizosphere acidification (pH 6.54) generated by active root respiration, organic acid secretion and proton extrusion during biological nitrogen fixation improved nutrient solubility and promoted haustorial attachment. Similar findings have been reported for the influence of soil conditions and host identity on sandalwood growth (Singh *et al.*, 2018) [23].

Table 3.2. Soil chemical properties of potting media under different host combinations

Treatments	pH	EC (dS m ⁻¹)	Total N (%)	Total P (%)	Total K (%)	Total C (%)	C:N ratio
T ₁	7.31	0.46	0.68	1.15	0.62	19.54	28.74
T ₂	7.47	0.44	0.67	1.14	0.61	19.75	29.48
T ₃	7.20	0.44	0.74	1.11	0.60	21.92	29.76
T ₄	7.35	0.46	0.63	1.05	0.58	18.79	29.83
T ₅	7.37	0.42	0.57	0.96	0.55	17.03	29.88
T ₆	7.46	0.54	0.86	1.28	0.71	21.25	24.81
T ₇	7.20	0.51	0.85	1.17	0.64	23.56	27.90
T ₈	7.45	0.55	0.83	1.27	0.70	20.80	25.17
T ₉	7.31	0.47	0.79	1.23	0.65	20.60	26.08
T ₁₀	7.42	0.43	0.66	1.22	0.64	17.67	26.91
T ₁₁	6.54	0.49	0.93	1.26	0.73	16.83	18.04
Mean	7.28	0.47	0.75	1.17	0.64	19.79	26.96
SE (±)	0.09	0.01	0.02	0.02	0.01	0.35	0.78
CD at 1 %	0.24	0.02	0.05	0.06	0.02	1.01	2.21
CV (%)	1.44	1.84	2.72	2.26	1.56	2.19	3.53
Initial	5.52	0.045	0.54	0.90	0.51	25.61	47.43

Soil Electrical Conductivity (EC) maintained consistent, significant positive correlations across all sandal growth traits displaying $r = 0.774$ for collar diameter, $r = 0.752$ for fresh biomass, $r = 0.744$ for dry biomass and $r = 0.727$ for plant height. Because EC levels remained within an optimal non-saline threshold (0.42 to 0.55 dS m^{-1}), higher conductivity reflected beneficial electrolyte release from mineralized organic inputs rather than osmotic stress. Similarly, Srikantaprasad *et al.* (2022) [24] reported low soil EC (0.32 dS m^{-1}) along with variation in soil nutrient status in a sandalwood-growing sites.

In comparison, Total Carbon (TC) displayed negative correlations with sandal height ($r = -0.078$), collar diameter ($r = -0.011$), fresh biomass ($r = -0.058$) and dry biomass ($r = -0.068$), while showing a weak negative correlation with root interception ($r = -0.359$). The weak association of total carbon with sandalwood growth may reflect its dependence on host plants for nutrient acquisition. Similar findings were reported by [Srikantaprasad *et al.*, 2022](#) [24]

The growth parameters of the host species exhibited distinct correlation dynamics that provide insights into comparative host–parasite biology. Host plant height (HPH) correlated positively with Total

Phosphorus ($r = 0.710$), Total Potassium ($r = 0.688$), Electrical Conductivity ($r = 0.675$) and Total Nitrogen ($r = 0.531$), while exhibiting a moderate negative correlation with the soil C:N ratio ($r = -0.484$) and a weak positive relationship with pH ($r = 0.153$). Host fresh biomass (HTFPB) and dry biomass (HTDPB) behaved almost identically, exhibiting positive correlations with TP ($r = 0.584$ and 0.583), EC ($r = 0.576$ and 0.580), TK ($r = 0.537$ and 0.542) and TN ($r = 0.444$ and 0.445), alongside negative correlations with the C:N ratio ($r = -0.277$ and -0.278) and weak positive correlations with pH ($r = 0.256$ and 0.262). These findings agree with other studies showing that host species and vigour influence sandalwood

growth and performance (Singh *et al.*, 2018; Kaur *et al.*, 2026) [23, 25].

SPH– Sandal Plant Height, **HPH**– Host Plant Height, **SCD**– Sandal Collar Diameter, **HCD**– Host Collar Diameter, **STFPB**– Sandal Total Fresh Plant Biomass, **STDPB**– Sandal Total Dry Plant Biomass, **HTFPB**– Host Total Fresh Plant Biomass, **HTDPB**– Host Total Dry Plant Biomass, **RISHPR**– Root Interception in Sandal and Host Plant Rhizosphere; **pH**– Potential of hydrogen, **EC**– Electrical Conductivity, **TN**– Total Nitrogen, **TP**– Total Phosphorus, **TK**– Total Potassium, **TC**– Total Carbon and **C:N**– Total Carbon: Total Nitrogen.

Table 3.3. Correlation between soil and growth parameters of sandalwood and host plants under different combinations

Plant	Soil	pH	EC	TN	TP	TK	TC	C:N
SPH		- 0.472	0.727	0.806	0.744	0.920	- 0.078	- 0.896
HPH		0.153	0.675	0.531	0.710	0.688	0.161	- 0.484
SCD		- 0.449	0.774	0.809	0.736	0.916	- 0.011	- 0.852
HCD		0.406	0.353	0.287	0.388	0.245	0.591	0.072
STFPB		- 0.295	0.752	0.748	0.795	0.923	- 0.058	- 0.835
STDPB		- 0.309	0.744	0.750	0.793	0.926	- 0.068	- 0.843
HTFPB		0.256	0.576	0.444	0.584	0.537	0.315	- 0.277
HTDPB		0.262	0.580	0.445	0.583	0.542	0.315	- 0.278
RISHPR		- 0.788	0.405	0.702	0.551	0.776	- 0.359	- 0.958

Conclusion

It can be concluded that *S. album* + Tur was noticed significantly superior with respect to haustoria formation properties, growth properties of sandal and host plant, quality and suitable host properties for sandal. Among the treatments, *S. album* + Tur (T_{11}) followed by *S. album* + Suru (T_6) and *S. album* + *Acacia mangium* (T_8). Maximum accumulation of root biomass, root interception of sandal and host plant, less C:N ration of media and higher nutrient storage was noticed by only *S. album* + Tur (T_{11}) followed by *S. album* + Suru (T_6) and *S. album* + *Acacia mangium* (T_8) than other.

The correlation analysis demonstrates that juvenile growth and biomass accumulation of Indian sandalwood (*Santalum album* L.) are governed by the chemical fertility and microbial turnover of the host rhizosphere, showing strong, statistically significant positive correlations with Total Potassium ($r = 0.916$ to 0.926), Total Nitrogen ($r = 0.748$ to 0.809), Total Phosphorus ($r = 0.736$ to 0.795) and Electrical Conductivity ($r = 0.727$ to 0.774). Conversely, sandalwood growth attributes and functional haustorial root interception exhibit pronounced inverse correlations with the soil C:N ratio ($r = -0.835$ to -0.958) and soil pH ($r = -0.295$ to -0.788). Root interception negatively correlated with the C:N ratio ($r = -0.958$) and pH ($r = -0.788$), while positively correlated with Potassium ($r = 0.776$) and Nitrogen ($r = 0.702$).

Among the host plants, Tur (*Cajanus cajan*), Suru (*Casuarina equisetifolia*) and *Mangium* (*Acacia mangium*) were identified as highly suitable hosts for sandalwood under greenhouse conditions. These host plants were performed well under pot culture conditions, contributing to the production of healthy sandalwood seedlings, improved nutrient availability in the soil based medium, improvement in the microbial C:N ratio and overall growth performance of sandalwood.

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Authors

Arbaj V Pathan

M. Sc. Scholar, Department of Forest Recourse Management, DBSKKV, Dapoli, Maharashtra, India

NA Meshram

Scientist, AICRP on Agroforestry, DBSKKV, Dapoli, Maharashtra, India

Suchitra S Desai

Senior Scientist, AICRP on Agroforestry, DBSKKV, Dapoli, Maharashtra, India

AD Rane

Associate Dean, College of Forestry, Dapoli, DBSKKV, Maharashtra, India

RA Raut

Assistant Professor, Department of Plant Pathology, DBSKKV, Dapoli, Maharashtra, India

NH Khobragade

Assistant Professor, Department of Soil Science and Agricultural Chemistry, DBSKKV, Dapoli, Maharashtra, India

AS Gawali

Assistant Professor, Department of Forest Products Utilization, DBSKKV, Dapoli, Maharashtra, India

PB Bansode

Assistant Professor, Department of Soil and Water Conservation Engineering, DBSKKV, Dapoli, Maharashtra, India

Chetana S Chaudhari

Ph. D. Scholar, Department of Soil Science and Agricultural Chemistry, DBSKKV, Dapoli, Maharashtra, India

ST Burhade

Ph. D. Scholar, Department of Genetics and Plant Breeding, DBSKKV, Dapoli, Maharashtra, India

RB Pailvan

M. Sc. Scholar, Department of Silviculture and Agroforestry, DBSKKV, Dapoli, Maharashtra, India

AD Raut

M. Sc. Scholar, Department of Forest Recourse Management, DBSKKV, Dapoli, Maharashtra, India