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SEEDLINGS PERFORMANCE OF *Triplochiton scleroxylon* (K. Schum.) UNDER DIFFERENT LIGHT INTENSITIES AND SOIL TEXTURAL CLASSES

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ABSTRACT

Forest trees are socio-economically important but are currently threatened. This study adopted 4×4 factorial experiment in completely randomized design with ten replicates to assess effects of light intensities (100%LI, 75%LI, 50%LI and 25%LI) and soil textural classes (Sandy, Loamy, Sandy-loam and Clay) on the early growth of *Triplochiton scleroxylon* seedlings as a necessary step for domestication. Data collected was subjected to One-way Analysis of Variance (ANOVA). The best performance for light intensity was observed under 100%LI with plant height 14.79±1.26cm, collar diameter 2.28±0.18mm and 13.11±0.96 number of leaves while the least performance was observed in seedlings under 25%LI with seedling height 10.23±0.59cm, collar diameter 1.97±0.13mm and 6.41±0.45 number of leaves and best performance in soil textural classes was recorded under loamy soil with seedling height 14.90±1.20cm, collar diameter 2.33±0.18mm and 13.11±0.32 number of leaves while the least performance was observed in seedlings grown with sandy soil with seedling height 11.00±0.61cm, collar diameter 1.99±0.13mm and least number of leaves was recorded in seedlings with sandy-loam with 7.41±0.55 number of leaves. Overall best performance was observed in seedlings grown with sandy-loam under 100%LI with seedling height 23.80±0.75cm, collar diameter 4.69±0.34mm and 14.79±0.29 number of leaves while the least performance was observed in seedlings grown with clay under 25%LI with seedling height 10.30±0.68cm, least collar diameter 3.69±0.28mm and number of leaves 13.69±0.28 was observed in seedlings grown with sandy soil under 75%LI. Therefore, it implies that the specie require little or no shade for rapid growth and will thrive well with sandy-loam soil.

Contribution/Originality: This study revealed that *T. scleroxylon* seedlings can be raised successfully under different light intensity and soil textural class which makes the species a good candidate for afforestation, enrichment planting, soil amendment, land reclamation and restoration to check climate change, land degradation and loss of biodiversity due to land encroachment.

1. INTRODUCTION

Tropical forests contain many socio-economically important tree species, most of which are currently endangered and with edible parts [1]. Environmental services of trees are no doubt having unquantifiable global notability benefits but the choice of many trees may limit their potential. The pressing need of trees for environmental quality restoration and improvement is a global goal, and good candidate character is in its highly adaptability and resistance to degrading agents [2, 3]. *Triplochiton scleroxylon* (Family: Sterculiaceae) also known as obeche and Arere in Yoruba land and few indigenous trees like *Delonix regia* and *Khaya spp.* can be used for environmental amelioration and have been observed to be highly prone to combine pests attack, human inclusive. *Triplochiton scleroxylon* (Obeche) has moderately adequate broad leaf structure and specialty stem characters such as self-pruned cylindrical bole of 30m [4] good anchorage buttress of 6 m and trunk diameter of 1.5m [5]. The timber is naturally widely distributed in its range with recognized three sections: from Sierra Leone to Togo, from the Benin Republic to Nigeria and from Cameroun to Zaire [4]. *Triplochiton scleroxylon* is a successful long-lived tropical organism native to Africa and regrettably, exploration of its success for environmental uses in Nigeria has been grossly ignored while the uses of the wood have been widely intensified [6] little attention has been paid to the potential ecological uses of the tree.

There is dearth of quantified information on the soil textural classes as well as light requirement for early germination of *Triplochiton scleroxylon.* Light is one of the most important environmental factors affecting plant survival, growth, reproduction and distribution [1]. Soil nutrient and texture is another factor responsible for early survival and vigor of seedlings. Adequate knowledge of the roles of soil textural classes is essential for appropriate application to ensure healthy seedling growth of the tropical forest trees in time to meet the current population demand Adelani, et al. [7]. Adelani, et al. [8] stated that one of the major concerns in forest nurseries in the tropics is the lack of adequate information on light intensity for healthy seedling growth of particular tree species. This study investigated the effect of soil textural class and light required by *Triplochiton scleroxylon* to ascertain its nutrition and light requirement for healthy seedling growth and also fill the gap by substantiating *T. scleroxylon* potential as top environmental tree for restoring and improving tropical environmental conditions.

2. MATERIALS AND METHODS

2.1. Study Area

The study was carried out at the Tree Improvement Nursery and Silviculture Nursery of the Department of Sustainable Forest management, Forestry Research Institute of Nigeria, Jericho Hill, Ibadan, Nigeria (FRIN). FRIN is located within longitude 07°23'18"N to 07°23'43"N and latitude 03°51'20"E to 03°51'43"E. Mean annual rainfall is about 1548.9 mm, falling within approximately 90 days. The mean maximum temperature is 31.9°C, minimum 24.2°C while the mean daily relative humidity is about 71.9%. Ibadan is the capital of Oyo state, Nigeria. It is in the sub – humid agro ecological zone of Nigeria. There are two distinct climatic season which are the dry season (from November to March) and rainy season (April to October). Ibadan is characterized by two peak of rainfall.

2.2. Experimental Design

A 4×4 factorial experiment in completely randomized design was adopted with ten replicates each. Factor A: 4 light intensities (100%, 75%, 50%, and 25%) and Factor B: 4 textural classes (Sandy, Loamy, Sandy-loam and Clay). One hundred and sixty seedlings with good vigor and relatively uniform growth were randomly selected and transplanted into medium sized (10 X 18cm) poly pot filled with 2kg of the prepared soils and were exposed to different light intensities by constructing three (3) rectangular cages of 2.5x1.5x1m and was covered with a mosquito net of different layers; 100% light intensity (open field), 75% light intensity (one layer of net), 50% light intensity (double layer of net) and 25% light intensity (triple layer of net). Growth parameters assessed include, Seedling height (using meter rule), collar diameter (using Venier Caliper) and number of leaves were counted manually.

2.3. Data Analysis

The data collected on the early seedling growth of *Triplochiton scleroxylon* were subjected to One-way Analysis of Variance (ANOVA). Significant means on the early seedling growth of *Triplochiton scleroxylon* were separated using Duncans Multiple Range Test.

3. RESULTS AND DISCUSSION

3.1. Effect of Light Intensity on the Growth of Triplochiton Scleroxylon Seedlings

It was revealed that the best performance was recorded under seedlings with 100% light intensity in terms of all parameters assessed with seedling height 14.79±1.26cm, collar diameter 2.28±0.18mm and 13.11±0.96 number of leaves while the least performance was observed in seedlings under 25% light intensity with seedling height 10.23±0.59cm, collar diameter 1.97±0.13mm and 6.41±0.45 number of leaves Table 1.

Table-1. Mean Result for Growth Variables of *Triplochiton scleroxylon*.

Treatment	Height (cm)	Collar Diameter (mm)	Leaves Production
100 % Light Intensity	14.79 ± 1.26^{b}	2.28 ± 0.18^{b}	13.11 ± 0.96^{b}
75 % Light Intensity	13.63 ± 0.69^{ab}	2.26 ± 0.18^{b}	7.53 ± 0.32^{a}
50 % Light Intensity	13.36 ± 0.61^{a}	2.26 ± 0.13^{a}	7.00 ± 0.53^{ab}
25 % Light Intensity	10.23 ± 0.59^{a}	1.97 ± 0.13^{a}	6.41 ± 0.45^{ab}

Note: Means±SE with different alphabet in columns are significantly different from each other ($p\leq0.05$).

3.2. Effect of Soil Textural Classes on Early Growth of Triplochiton Scleroxylon Seedlings

It was revealed that the best performance was recorded under seedlings grown with loamy soil in terms of all parameters assessed with seedling height 14.90±1.20cm, collar diameter 2.33±0.18mm and 13.11±0.32 number of leaves while the least performance was observed in seedlings grown with sandy soil with seedling height 11.00±0.61cm, collar diameter 1.99±0.13mm and the least number of leaves was recorded in seedlings raised with sandy-loam with 7.41±0.55 number of leaves Table 2.

Table-2. Mean result for growth variables of *Triplochiton scleroxylon.*

Treatment	Height (cm)	Collar Diameter (mm)	Leaves Production
Sandy soil	11.00 ± 0.61^{ab}	1.99 ± 0.13^{a}	9.00 ± 0.96^{c}
Loamy soil	14.90 ± 1.20^{c}	2.33 ± 0.18^{b}	13.11 ± 0.32^{a}
Sandy-loam soil	13.38 ± 0.96^{b}	2.29 ± 0.18^{b}	7.41 ± 0.55^{bc}
Clay soil	13.70 ± 0.59^{a}	2.13 ± 0.13^{b}	8.48 ± 0.45^{b}

Note: Means±SE with different alphabet in columns are significantly different from each other ($p\leq0.05$).

Table-3. Mean values for the interaction effect of light intensity and soil textural class on the growth of *Triplochiton scleroxylon* seedlings.

Light Intensity	Soils	Height (cm)	Collar Diameter (mm)	Leaf Production
100%	Clay	15.01 ± 0.63^{a}	4.08 ± 0.29^{ab}	14.08 ± 0.28^{b}
	Sandyloam	23.80 ± 0.75^{b}	4.69 ± 0.34^{b}	14.79 ± 0.29^{b}
	Sandy	14.92 ± 0.66^{ab}	3.91 ± 0.23^{a}	13.91 ± 0.23^{a}
	Loamy	20.76 ± 0.69^{ab}	4.36 ± 0.25^{a}	14.36 ± 0.25^{a}
75%	Clay	13.26 ± 0.70^{ab}	3.90 ± 0.26^{ab}	13.90 ± 0.26^{ab}
	Sandyloam	20.03 ± 0.66^{ab}	4.46 ± 0.26^{ab}	14.46 ± 0.26^{ab}
	Sandy	11.90 ± 0.65^{a}	3.69 ± 0.28^{ab}	13.69 ± 0.28^{b}
	Loamy	19.84 ± 0.69^{ab}	4.19 ± 0.25^{a}	14.19 ± 0.25^{a}
50%	Clay	17.54 ± 0.61^{a}	4.04 ± 0.24^{a}	14.04 ± 0.24^{a}
	Sandyloam	19.66 ± 0.64^{a}	4.51 ± 0.22^{a}	14.59 ± 0.22^{a}
	Sandy	18.77 ± 0.67^{ab}	3.81 ± 0.23^{a}	13.81 ± 0.23^{a}
	Loamy	19.17 ± 0.65^{a}	4.51 ± 0.25^{a}	14.51 ± 0.25^{a}
25%	Clay	10.30 ± 0.68^{ab}	3.83 ± 0.24^{a}	13.83 ± 0.24^{a}
	Sandyloam	11.59 ± 0.69^{ab}	4.35 ± 0.29^{ab}	14.35 ± 0.29^{b}
	Sandy	13.79 ± 0.66^{ab}	3.79 ± 0.28^{ab}	13.79 ± 0.28^{ab}
	Loamy	12.31 ± 0.65^{ab}	4.58 ± 0.25^{a}	14.58 ± 0.25^{a}

Note: Mean±SE followed by the same superscripts in column are not significantly different ($p>0.05$).

3.3. Interaction Effect of Soil Textural Class and Light Intensity on Seedlings of Triplochiton Scleroxylon

It was revealed that the best performance was recorded under seedlings grown with sandyloam soil under 100% light intensity in terms of all parameters assessed with seedling height 23.80±0.75cm, collar diameter 4.69±0.34mm and 14.79±0.29 number of leaves while the least performance was observed in seedlings grown with clay soil under 25% light intensity with seedling height 10.30±0.68cm, least collar diameter and number of leaves was observed in seedlings grown with sandy soil under 75% light intensity 3.69±0.28mm and 13.69±0.28 respectively Table 3.

4. CONCLUSION

The *Triplochiton scleroxylon* seedlings planted under 100% light intensity gave highest morphological and physiological parameters. Investigation conducted into different soil textural class revealed that seedlings planted with loamy soil gave the highest morphological and physiological parameters while the interaction between light intensity revealed that seedlings grown with sandyloam soil under 100% light intensity had the best performance. This study revealed that the seedlings can survive in all environments but require high light intensity with moderate moist soil.

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