

Full Length Research Paper

Evaluation of Different Soil Sources and Pot Sizes on Early Seedling Growth of *Parkia Biglobosa* [keay] (Locust beans)

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ABSTRACT: The study investigated the influence of different soil sources and pot sizes on the early seedling growth of *Parkia biglobosa*. The height, girth, and leaf counts were assessed. These treatments were subjected to a 3 x 3 factorial experiment that was replicated four times and laid in a Randomized Complete Block Design (RCBD). Twelve 35cm x 25cm (large) polythene pot, 25cm x 20cm (medium-sized) polythene pot and 7.5cm x 10.3cm (small-sized) polythene pot were filled with different soil sources. These are forest soil, plantation soil, and actively cultivated forest soil. The result showed that the treatments containing forest soil in large polythene pot (S3P3) had the best performance in terms of height with the mean value of 14.47cm and a total height of

202.53cm, stem diameter of 0.45mm and leaf count a total number of 55.75 and mean of 3.98. actively cultivated soil in the medium poly pot is the least with a mean value of 9.73cm and total height 136.26cm, stem diameter with a total girth of 3.61mm and mean stem diameter of 0.26cm, and leaf count with the mean value of 43.50 and mean of 3.12. The above experimental results recommended that the forest soil in a large poly pot can be used by the farmers as it enhances better growth of *Parkia biglobosa* seedlings.

Keywords: Pot sizes, soil sources, locust beans, early seedling

INTRODUCTION

Soil is the unconsolidated mineral material within the layer of earth crust that serves as natural medium for the growth of plant. Soil differs from the original mineral in many physical, chemical, biological characteristics. Different soils differ in mineral content depending on the ability of the trees species to recycle nutrient. Tropical tree seedlings are many and varied in their nutrient requirement and the amount of inorganic fertilizer. The soil thus contributes to tree growth in very fundamental way. They dictate how best it can be managed to obtain the highest yield as well as the type of tree to grow. The different soils sources include forest soil, plantation soils and actively cultivated forest soil (Nwoboshi, 1980). Soils are highly weathered ultisol derived from coast sediments. They have weak structure, low clay contents and highly acidic. The organic matter accumulation is fairly high and higher at sub-soils than the top soil. Nitrogen and potassium contents appear to be marginal. Considering the fragile nature of the degraded soils, one of the promising alternative systems is the planting of important tree crops like *Parkia biglobosa* and *Pentaclethra macropphylla* to improve the quality of the

soils. The low growth rate and low yield of the natural forest (1.5-2.3m³/year) force the forest authorities to set up forest plantations in indigenous and exotic species, in which *Pentaclethra macropphylla* and *Parkia biglobosa* are important component. They are established to augments wood supplies from the natural forest for domestic and industrial use. *Parkia biglobosa* seed is a multipurpose tree species which have been recognized as potential, raw materials for soup or food condiment. The high nutrient values of processed seeds of this species have been reported by various studies (Awodola, 1993). The importance of *Parkia biglobosa* as one of the indigenous tree species has resulted in its high dormalinal wherever it is grown. It is used for fodder human food, fuel, wood, timber, green manure and medicine. It is a well drained soil, through mostly in moderately fertile soil and at an altitude of 1300m- above the sea level and appreciate forest dry season lasting for 2-7 months and bimodal rainfall of 400-1400mm. The temperature is general is 2005-300c (Sabrite, 1991., Oni, 1997., Oremakinde, 1994 and Oleleye, 2004). The forest and forest industry play crucial roles in providing services necessary for

sustainable development of the environment. They fulfill environmental function of soil and water conservation and the conservation of biodiversity. The product of the forest and forest industry are generally environmentally. Studies revealed that the growth rate of *Parkia biglobosa* in its natural condition is very low because of man's activities like fire, massive felling, pest and fungi attack etc. there is the need to study the growth rate of the species in order to have a massive regeneration and establishment in plantation.

The amount of wood that a well stocked of a given species lay down in a single year, depend upon it age freedom from external disturbances and the environmental conditions. It also varies with the species but proportional to the number of tree per unit provided that the company is close (Rotowa, 2004). In many research works, different pot sizes were used to carry out experiment. An even aged stand in its seedlings stages normally has several thousand of young tree per hectare. At this tree increase in size and components for lights, soil, water, and nutrient, they wither and eventually die. As the struggle to survive continues, the number of tree becomes successively reduced (Nwoboshi, 1982). Reserved soil, natural soil and actively cultivated soil has been recognized as effective silvicultural tools for raising healthy forest stocks and hastening growth of trees in forest plantations.

The forest sector has suffered a relative decline because of the dominance of oil in the economy, but still accounts 33% of GDP (1997) and provides employment, both formal and informal, for a large majority of the population (Obenbe, 2004., Okikiola, 2004 and Maydell, 1983). Although Nigeria previously had a strong export sector, the range and quality of products has declined sharply in the early 1990s. But with regret, little or no efforts have been made to replace what have been exploited in those forests. Also the like in the cost of procuring mineral fertilizers has stood up to be a limiting factor. Consequently, foresters, agriculturists, horticulturists and other land users find it difficult to purchase them. However, this problem could be remedied through the use of different soil sources which cost nothing. At the initial stage of plantation establishment, raising of viable planting stocks is one of the factors to consider by forest manager; therefore special care is need to raise good planting stocks. To achieve this, there is need to determine the different soil sources and pot sizes that will facilitate the growth of the planting stock (Ladipo et al., 1990, Irvine, 1961 and Ibirinke, 2004).

Objectives of the study

The general objective is to evaluate the effect of different soil sources and pot sizes on the early seedling growth of *Parkia biglobosa*.

MATERIALS AND METHODS

Collection of materials

The seeds of *Parkia biglobosa* were collected from West African hardwood improvement section nursery (W.A.H.I.P) Forestry Research Institute of Nigeria, Ibadan. Plantation soils were collected from *Gmelina arborea* plantation plot at Federal Department of Forestry within Federal College of Forestry, Ibadan. Forest soils were collected from the back of West African hardwood improvement, Forestry Research Institute of Nigeria, Ibadan. Activity cultivated soils were collected from the school farm.

Location of experimental site

Nursery site were located at the nursery of West African hardwood within Forestry Research Institute of Nigeria (FRIN) Ibadan. The area is located at latitude 1026N and longitude 3015 E with a rainfall regime of 114mm – 152mm (Meteorological station, FRIN).

MATERIALS

The materials used were:

- (i) *Parkia biglobosa* seed
- (ii) Different polythene pot
- (iii) Small size (7.5cm x 103cm)
- (iv) Medium size (25cm x 20cm)
- (v) Large size (35cm x 25cm)
- (vi) Sterilized river sand
- (vii) Germination stray
- (viii) Propagator
- (ix) Watering can
- (x) Different soil sources
- (xi) Forest soil
- (xii) Plantation soil
- (xiii) Actively cultivated forest soil
- (xiv) Water
- (xv) Ruler
- (xvi) Vernier caliper

METHOD

On the 2nd of February, 2005 the river sand was collected, sterilized and poured into germination tray and watered before planting the seeds. The seeds were planted into the germination tray by broadcasting method of about 1cm deep. These were watered every morning and evening and they started sprouting on the 17th of February, 205 that is 15days after planting.

RESULTS AND DISCUSSION

Table 1 shows that the highest mean height of 14.47cm was obtained from natural forest soil in large polytop

Table 1: Mean of the parameter

Treatment	Height	Girth	Leaf Count
S1P1	10.06	0.29	3.42
S1P2	9.73	0.26	3.12
S1P3	10.97	0.32	3.29
S2P1	11.79	0.31	3.24
S2P2	10.79	0.28	3.60
S2P3	10.86	0.33	3.57
S3P1	10.60	0.31	3.63
S3P2	12.12	0.50	3.63
S3P3	14.47	0.45	3.93

Table 2: ANOVA for the height of *Parkia biglobosa*

Source of variance	Sum of squares	Degree of freedom	Mean square	F-calculation
Treatment	203.10	8	25.39	
Error	26896.76	36	747.13	0.03
Total	27099.76	44		

F Calculated = 0.03

F tabulated = 4.69

Table 3: ANOVA leaf count of *Parkia biglobosa*.

Source of variance	Sum of squares	Degree of freedom	Mean square	F-calculation
Treatment	7.82	8	0.91	
Error	1422.19	36	39.51	0.025
Total	1430.01	44		

F Calculated = 0.063

F tabulated = 3.47

Table 4: ANOVA for increase in girth of *Parkia biglobosa*

Source of variance	Sum of squares	Degree of freedom	Mean square	F-calculation
Treatment	0.69	8	0.09	
Error	16.65	36	0.46	0.20
Total	17.34	44		

F Calculated = 0.20

F tabulated = 4.65

S3P3 followed by natural forest soil in medium polypot with mean height of 12.12cm while actively cultivated soil gave the least of 9.73cm. It was also revealed that the seedlings containing forest soil in large polypot S3P3 had the highest mean of 3.98 while actively cultivated forest soil in medium polypot has the least mean of 3.12. In term of girth the highest mean girth of 0.50mm was obtained from the plant containing natural forest soil in medium polypot S3P3 followed by natural forest soil in large polypot with mean girth of 0.45mm while actively cultivated forest soil in medium polypot S1P2 gave the least girth of 0.26. The study is in contrary to Olaleye, (2004) whose natural forest soil has the highest leaf count, girth and height. The analysis of variance at 5% level of probability shows that F Cal (0.03) is less than F Tab (4.69) $P > 0.05$ (Table 2). The result shows that the highest height growth was obtained from the seedlings containing forest soil in large poly pot (S3P3). It has a mean of 202.53 due to the fact that the soil was obtained

from the natural forest and this enhanced the proper development of the *Parkia biglobosa* seedlings, actively cultivated forest soil in medium poly pot has the least height of 136.26 due to the fact that the soil is being cultivated on yearly basis which led to high loss of nutrient, it agrees with Olaleye, (2004). The analysis of variance at 5% level of probability shows that F Cal (0.063) is less than F Tab (3.47) (Table 3). The result shows that the highest leaf count was obtained from the seedling containing forest soil in large poly pot (S3P3), a mean of 3.98 due to the high level of nutrient. Actively cultivated soil in medium poly pot has the least, which is in contrary to Olaleye, (2004). Table 4 showed that F Cal (0.20) is less than F Tab (4.65). The forest soil in medium poly pot (S3P3) has the highest mean girth of 0.50. Actively cultivated forest soil in medium polypot (S1P3) has the least. The analysis of variance that produced no significant difference explains the fact that the use of the different soil types in the various sizes of the polypots did

not give any significant difference in the growth of the three considered parameters. The soil type produced simultaneous development on each of the parameters, which agrees with Olaleye, (2004).

Conclusion

The investigation shows that *Parkia biglobosa* seedlings respond very well to forest soil, plantation soil, and actively cultivated forest soil as applied to different pot sizes. The result showed that there is no significant difference in the increase in height, leaf count and girth in the nine treatments.

Recommendation

Owing to the fact that there is no difference in the height, number of leaves and increase in girth of the treatments, the study shows that forest soil in large polypot gave a better development in the number of leaves, girth and height of the seedlings. Those of actively cultivated and plantation soil showed a close marking development level to that of the forest soil and as a result of this, I suggest and comfortably recommend the use of forest soil for the raising of *Parkia biglobosa* seedlings since it produced a better growth rate in the aforementioned parameters considered.

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