Global Scientific JOURNALS

GSJ: Volume 7, Issue 11, November 2019, Online: ISSN 2320-9186
www.globalscientificjournal.com

SEED GERMINATION AND SEEDLING GROWTH OF *Laganaria breviflora* (benth.) *AS* INFLUENCED BY DIFFERENT SOIL TYPES IN SOUTHWEST NIGERIA

***Adeniji, I. T., Kazeem-Ibrahim, F., Olomola, D. B., and Isola J. O.**

Forestry Research Institute of Nigeria, Jericho Ibadan

Corresponding authors email: shinaisola06@gmail.com

Abstract

An experiment was carried out at the Tree improvement program screen house of Forestry Research Institute of Nigeria, Ibadan Oyo state. The aim of this study was to determine the best soil type suitable for *Laganaria breviflora* production in south west Nigeria. The experiment was laid out in Completely Randomized Design (CRD) with four treatments replicated four times. The treatments of the experiments were: clay soil (CS), river sand (RS), clay soil + river sand + top soil (1 + 1 + 1) and top soil (TS). The experiment was monitored for twelve (12) weeks after sowing (WAS) while growth characteristics were measured. Germination was first observed on clay soil + river sand + top soil (1 + 1 + 1) (7th day) followed by top soil (8th day) and least by clay soil (14th day). The results of the study showed that different soil types gave significant (p=0.05) increase in vine length, number of leaves, vine circumference and yield. At 12 weeks after sowing (WAS), top soil filled pot gave the longest vine length (280.50 cm) and the least by clay soil filled pot (40.50 cm). Top soil (41. 00) had the highest number of leaves followed by clay soil + river sand + top soil (1 + 1 + 1) (40.00) and least by clay soil (7.00). Top soil (2.58cm) had the highest Vine circumference followed by clay soil + river sand + top soil (1 + 1 + 1) (2.40 cm) and least by clay soil (1.20 cm). This result suggests that fertile top soil in the cropping systems will increase productivity of *Laganaria breviflora*. Fertile top soil may be recommended for the production of *Laganaria breviflora*.

Keywords: Seed germination, *Growth, Laganaria breviflora, Soil types*

INTRODUCTION

Research attention is mostly on usage of medicinal plant, while much attention is not focused on cultivation and production with the assumption that they will always be available in the wild. Considering the recent urbanization and land use pattern, this assumption may not hold any longer. Significant evidence already showed that the supply of plants for traditional medicines is failing to satisfy the demand (Cunningham, 1993). WHO, (2000) reported that an estimated 80% of the populations in developing nations rely on traditional systems of medicine. This maybe because they believe that they are compatible with human body and with lesser side effects, cheap and readily available (Edeoga *et al*., 2005; Parekh *et al*., 2005). One of such plants is *Laganaria breviflora*.

Laganaria breviflora called Tagiri in the south-west of Nigeria, belonging to the family Cucurbitaceae, is perennial climber with herbaceous stem that can be up to 6m long. The stem scrambles over the ground or climber into surrounding vegetation, attaching themselves by means of tendrils. It is usually gathered from the wild for local use as medicine (Yasuyuki *et al.*, 2005, Oridupa *et al*., 2011, Onasanwo *et al.*, 2011). *Lagenaria breviflora* root, stem, leaves and fruit have broad spectrum antimicrobial activity. Its use in the treatment of cold, schistosomiaisis, digestive disorders, measles and treatment of Newcastle disease and coccidiosis in animal species has been well documented (Tomori *et al*., 2007; Faleyimu and Oluwalana, 2008; Ajayi, 2002; Banjo *et al*., 2013). The cultivation details of *Lagenaria breviflora* at Present

are unknown (Tropical Plant Data Base, 2019). There is an urgent need to develop effective propagation methods for cultivation of these important medicinal plants which will ultimately lead to the conservation as well as supply for commercial use.

Soil is the naturally occurring material that covers the earth crust. It is the basis for human development and survival, providing nutrients which feeds and nourish crops, for food/fiber production. Soil is a natural resource, it gives plant roots anchorage, in addition to been home for billions of micro and macro organisms (Monday, 2016). Soil has biological, physical and chemical properties, which are both inherent and dynamic and can change as a result of some natural processes and in response to use. (Adeyolanu *et al*., 2015). Despite the fact that *Lagenaria breviflora* is useful in traditional medicine, little has been known about the influence of soil types on seed germination and seedling growth of *laganaria breviflora* (benth.) in southwest Nigeria. Therefore the aim of this study is to determine the best soil type suitable for *Laganaria breviflora* production.

MATERIALS AND METHOD

The experiment was carried out at the Tree improvement program screen house of Forestry Research Institute of Nigeria, Ibadan Oyo state (latitude 07^0 23^1 N longitude 03^0 51^1E), Ibadan, Nigeria. The annual rainfall of Ibadan is 1250 mm with a bimodal pattern, wet season of about 8 month, usually between April and October/November, with a brief dry season which starts in most cases in the second half of August. The minimum mean daily temperature of Ibadan is 21.9^0C and maximum temperature of 35.5^0C (FRIN, 2018).

Fresh matured fruits of L. breviflora were collected from Omi – Adio in Ibadan, Oyo state Nigeria, where they were found in the wild. The Fresh fruits were cut into bits and left for 48 hours for ease of de-pulping, after which the seeds were washed and air dried.

Thirty two (32) bottom perforated polypots (50/38cm in dimension) were filled with Five kilogram of four different types of sowing media (soils) namely: clay soil (CS), river sand (RS), clay soil + river sand + top soil (1 + 1 + 1) and top soil (TS) which served as treatments. Floating method was used to determine the viability of the seeds before sowing. Seeds of L. breviflora were sown and the set up was watered to field capacity. The experiment was laid out in Completely Randomized Design (CRD) replicated four times. Stakes were placed beside the pot to support the growing vines. The experiment was observed daily to determine days to germination. At two weeks after sowing data were collected on vine length (cm), number of leaves and vine circumference (cm) which was carried out fortnightly for 12 weeks. Data collected were analysed statistically using Genstat Software Package and were subjected to analysis of variance (ANOVA). Means were separated using Duncan's multiple range test (DMRT) at 5% level of significance.

RESULTS

The typical physical and chemical properties of the soil (0 – 15 cm depth) used for the experiment before planting is as presented in table 1. The soils used are slightly acidic, have high organic carbon in clay and top soil but low organic carbon in river sand. The data in Table 1 further reveals that total nitrogen is moderate in clay and top soils used but low in river sand. Phosphorus is low in clay soil used, moderate in river sand and very high in top soil. Potassium is very high in Clay soil, moderate in river sand and low in top soil. Zinc is low in clay soil and river sand used for the experiment. This is below the critical range (Adeoye and Agboola, 1985, Akinrinde, *et al*., 2005).

Influence of soil types on Seed germination of *Laganaria breviflora* (benth.)

Influence of soil types on Seed germination of *Laganaria breviflora* (benth.) is as presented in table 2. Germination was first observed on clay soil + river sand + top soil (1 + 1 + 1) (7th day) followed by top soil (8th day) and least by clay soil (14th day). There were significant ($P < 0.05$) differences across treatments. There was no significant difference between seed germination on the humus soil and top soil. This may be due to the compact nature of clay soil.

Influence of soil types on vine length of *Laganaria breviflora* (benth.)

Influence of soil types on vine length of *Laganaria breviflora* (benth.) is as presented in table 3.

Vine length increases appreciably across the treatments. Vine length differed significantly (p=0.05) across treatments between 2nd and 12th weeks after sowing (2 and 6WAS). At 12th weeks after sowing, vine length ranged from 40.50 cm in the clay soil filled pot to 280.50 cm in the pot filled with top soil.

Influence of soil types on Number of leaves of *Laganaria breviflora* (benth.)

Influence of soil types on Number of leaves of *Laganaria breviflora* (benth.) is as presented in table 4: Number of leaves increases appreciably and differed significantly (p=0.05) across treatments between 2nd and 12th weeks after sowing (2 and 12 WAS). At 12th weeks after sowing, top soil (41. 00) had the highest Number of leaves followed by clay soil + river sand + top soil (1 + 1 + 1) (40.00) and least by clay soil (7.00).

Influence of soil types on Vine circumference of *Laganaria breviflora* (benth.)

Influence of soil types on Vine circumference *Laganaria breviflora* (benth.) is as presented in table 5: Vine circumference increases appreciably across the treatments and differed significantly (p=0.05) across treatments between 2nd and 12th weeks after sowing (2 and 12 WAS). At 12th

weeks after sowing, top soil (2.58cm) had the highest Vine circumference followed by clay soil + river sand + top soil (1 + 1 + 1) (2.40 cm) and least by clay soil (1.20 cm).

Table1: Soil analysis of different media used in the experiment on *Lagenaria breviflora*

Parameters	**Content in treatment A**	**Content in treatment B**	**Content in treatment C**	**Content in treatment D**
Particle size distribution				
% Sand	44.24	90.24	76.40	
% Clay	54.12	8.12	3.0	
% Silt	1.64	1.64	20.6	
Textural class	Clay soil	River Sand	Topsoil	Clay soil + River Sand + Top Soil (1 + 1 + 1)
pH (H_2O)	5.06	6.29	6.50	6.55
Org. C %	1.6	0.51	2.59	16.20
Tot. N %	0.17	0.04	0.16	0.64
A. P mg/kg	3.75	9.30	33.3	3.05
Exchangeable macronutrient (cmol/kg)				
K	5.00	0.36	0.09	0.59
Na	0.98	0.18	0.31	0.36
Ca	1.77	0.37	8.08	7.10
Mg	3.16	0.74	0.70	0.50
Extractable Micronutrients (mg/kg)				
Cu	0.61	0.46		
Zn	0.13	0.23		
Fe	23.30	18.06		
Mn	3.90	15.28		

N.B: Clay soil is at depth of 100-175 cm

Table 2: Effect of soil types on days to germination of *Lagenaria breviflora*

Treatments	Days to Germination
Cs + RS + TS (1 + 1 + 1)	7.00[a]
Ts	8.00[a]
Rs	11.00[b]
Cs	14.00[c]

Means with the same alphabet are not significantly different from each other at 5% probability level

Table 3: Effect of soil types on Vine length (cm) of *Lagenaria breviflora*

	Weeks after Sowing					
Treatment	2	4	6	8	10	12
Cs	3.85[a]	10.25[a]	24.50[a]	29.35[a]	37.00[a]	40.50[a]
Rs	4.83[a]	13.15[a]	30.63[a]	30.25[a]	37.75[a]	42.00[a]
Cs + RS + TS (1 + 1 + 1)	13.15[b]	77.43[b]	146.75[b]	254.00[b]	262.75[b]	276.75[b]
Ts	14.15[b]	81.45[b]	151.25[b]	262.00[b]	273.50[b]	280.50[b]

Means with the same alphabet are not significantly different from each other at 5% probability level

Table 4: Effect of soil types on Number of Leaves of *Lagenaria breviflora*

	Weeks after Sowing					
Treatment	2	4	6	8	10	12
Cs	2.00[a]	5.00[a]	7.00[a]	10.00[a]	10.00[a]	7.00[a]
Rs	2.00[a]	6.00[a]	11.00[a]	13.00[a]	13.00[a]	11.00[a]
Cs + RS + TS (1 + 1 + 1)	6.00[b]	16.00[b]	29.00[b]	35.00[b]	38.00[b]	40.00[b]
Ts	6.00[b]	18.00[b]	30.00[b]	39.00[b]	39.00[b]	41.00[b]

Means with the same alphabet are not significantly different from each other at 5% probability level

Table 5: Effect of soil types on vine circumference of *Lagenaria breviflora*

	Weeks After Sowing					
Treatment	2Wks	4Wks	6Wks	8Wks	10Wks	12Wks
Cs	0.48[a]	0.65[a]	0.80[a]	0.98[a]	1.13[a]	1.20[a]
Rs	0.50[a]	0.73[a]	0.85[a]	1.15[a]	1.30[a]	1.43[a]
Cs + RS + TS (1 + 1 + 1)	0.70[b]	1.08[b]	1.48[b]	1.90[b]	2.20[b]	2.40[b]
Ts	0.95[c]	1.15[b]	1.73[b]	2.25[b]	2.45[b]	2.58[a]

Means with the same alphabet are not significantly different from each other at 5% probability level

References

Adeoye, G. O., and Agboola, A. A., (1985). Critical level for soil pH, available P, k, Zn and maize ear leaf content for P, Cu and Mn in sedimentary soils of Southwestern Nigeria. 6: 65 – 71.

Adeyolanu, O. D., Ogunkunle, A. O., Oluwatosin, G. A. and Adelana, A. O. (2015). Land use and soil type influence on soil quality: A comparison between tree and arable crops in basement complex soils

Ajayi, G.O., Awajo, N.C., Abulu, L.E. 2002. The miracicidal and cercaricidal activity of the methanolic extract of Lagenaria breviflora Robert family Cucurbitaceae fruit in Schistosoma mansoni. Nigerian Quarterly Journal of Hospital Medicine 12: 57-59.

Akinrinde, E. A., Obigbesan, J. A., and Onanuga, O. A., (2005). Extractable micronutrient in relation to physiochemical properties of soil in four ecological zones in Nigeria. *Global Journal of Pure and Applied science* 2. (11), 197-200.

Banjo,T.A., Kasim,L.S., Iwalokun,B.A., Mutiu, W.B., Olooto,W.E., Mba, N.G., James, E.S and Shorunmu, T.O. 2013. Effects of different extraction methods on in-vitro antimicrobial properties of Lagenaria breviflora whole Fruits. New York Science Journal 6 (10).

Cunningham, A.B. (1993). African medicinal plants: Settings priorities at the interface between conservation and primary health care. People and plant initiative working paper1, Nairobi: UNESCO

Edeoga, HO., Okwu, DE. and Mbaebie, BO., 2005. Phytochemical constituents of some Nigerian medicinal plants. Afr J Biotech. 4 (7): 685–688

Faleyimu, O.I. and Oluwalana S.A. 2008. Medicinal value of forest plant in Ogun State, Nigeria. World Journal of Biology Research. 001: 1-6.

Monday, S. A. (2016). Influence of different soil types and mineral fertilizer on maize (Zea mays L.) growth for effective production, soil fertility improvement and food security. *World Scientific News* 55 137-167.

Onasanwo,S.A., Saba, A.B., Oridup, O.A., Oyagbemi, A.A. and Owoyele B.V. 2011. Anti-nociceptive and anti-inflammatory properties of the ethanolic extract of Lagenaria breviflora whole fruit in rat and mice. Nigeria Journal of Physiology Science 26 071 – 076.

Oridupa OA, Saba AB, Sulaiman LK. (2011). Preliminary report on the antiviral activity of the ethanolic fruit extract of Lagenaria breviflora Roberts on Newcastle Disease virus. Trop Vet. 2011;29(1):22-33.

Oridupa, O. A. and Saba, A. B. (2012). Relative anti-inflammatory and analgesic activities of the whole fruit, fruit bark, pulp and seed of Lagenaria breviflora Roberty. Journal of Pharmacology and Toxicology, 7(6): 288-297

Parekh, J., Jadeja, D., Chanda, S. (2005). Efficacy of aqueous and methanol extracts of some medicinal plants for potential antibacterial activity. Turk J. Biol., 29: 203 210.

Tomori, O.A., Saba, A.B., Dada-Adegbola, H.O. (2007). Antibacterial activity of ethanolic extract of whole fruit of Lagenaria breviflora Robert. Journal of Animal and Veterinary Advances. 6: 752-757.

Tropical plant data base (2019). Kenfern tropical, the ferns info 2019-05-25.Info/viewtropical,i-d- Lagenaria breviflora.

World Health Organization, 2000. World Health Organization: Promoting the Role of Traditional Medicine in Health Systems: a strategy for the African Region 2001–2010. Harare, (document reference AFR/RC50/Doc.9/R..

Yasuyuki, M., Patrick, M., Hiroshi, F.and Hiroko, M., 2005. Diversity of landraces of the white flowered Gourd (Lagenaria siceraria) and its wild relatives in Kenya. Genet. Res. Crop. Evol. 52: 737-747.

.