ISSN 2229-5518

Performance of Different Seedlings Accessions of *Acacia senegal* (L.) Willd in Bauchi, Nigeria

Ibrahim, N[*]. Gani, A. M.[**], Abdul, S. D.[**] and Omokhafe, K .O.[*]

Abstract— The seeds of eight accessions of Acacia senegal (L.) Willd gum arabic was collected from farmers fields in Yobe and Borno States of Nigeria. Seedlings raised from the seeds were evaluated for the following morphological characters: seedling height, stem girth, number of leaves, and number of days to transplanting. Results obtained indicated that morphological characters differed significantly ($P < 0.05$) among the accessions. Some accessions had outstanding seedling features for rapid growth. Hence, there were genotypic differences that could be explore and exploited for genetic improvement and establishment of gum arabic plantations.

Index Terms— Acacia - Seedlings – Morphology - Evaluation-Bauchi-Nigeri.

1 INTRODUCTION

Acacia senegal (L.) Willd, also known as gum arabic or desert gold (Kol-kol, Dakora or Karo in Hausa, Dacche in Fulfulde, and Hashab in Arabic), is a leguminous tree species belonging to the genus *Acacia*, Family Fabaceae, subfamily Mimosoideae, consisting of more than 300 species. It is adapted to the hot dry and barren region of Africa principally lying between 11^0 and 14^0 N latitudes, comprising of Chad, Niger, Nigeria and Sudan, Their distribution extends to Kenya, South Africa and Zimbabwe [1]. In Nigeria, the tree is found naturally growing in the Sudan and Sahelian regions with predominance in the North East [2], [3], [1].The zone is characterized by erratic rainfall distribution and constant deforestation [4]. The tree produces grade one gum in commercial quantity which is used as a major ingredient in adhesives, tannins, dyes, pharmaceuticals, beverages, foods, textiles and cosmetics industries [5], [6], [1]. Recent findings by Ishraga [7] have shown that gum arabic is a reliable prebiotic In addition, the tree increases soil fertility through the activities of mychorizal fungi *Vesicular arbuscular* (VAM) in its root nodules [8].

A. senegal demonstrates substantial morphological variation [9]. Identifying fast growing genotypes is therefore one of the major improvement focus. The objective of this study is to evaluate morphological characteristics of accessions of *A. senegal* collected Borno and Yobe States.

2 MATERIALS AND METHODS

Seed accessions were collected from Borno and Yobe States in 2008 by by purposeful sampling as descrived by Potton [10]. One gum arabic farm was sampled in each state. Each farm was divided into four plots and tree that produced the highest gum yield from each plot was selected for seed collection. Matured pods containing seeds from selected trees were collected as accessions. Accessions no.1, 2, 3, 4 are from Borno while accessions no. 5, 6, 7 and 8 represent the one from Yobe. Seeds were soaked in distilled water for 24hours to soften the seed coat and thereafter, sown in perforated polythene pots measuring 20cm height x 8cm radius containing a potting mixture of river sand, top soil and cow dung blended together at a ratio of 2:2:1 [3]. The experiment was laid out in randomized complete block design comprising of 8 treatments (Accessions) with four replications in a screen house. Hand weeding was carried out on regular basis, while watering was ensured on daily basis for good seedling growth. Assessments were carried out for three months on seedling characters such as seedling height, number of leaves, stem girth and number of days to transplant. The data collected were subjected to Analysis of Variance with means separation using the LSD [11].

RESULTS AND DISCUSSION

For Morphological characters of seedlings raised from the .seeds collected as accessions are given in Table 1. The green

house studies revealed that there was variation in seedling-related characters. There was significant variation for seedlings height a range of 26.90cm for Acc 05 to 40.05cm with two accessions from Yobe state (Table 1). In Borno state, higher seedling height was obtained in Acc 04 at 38.45cm. Similar trend was obtained in stem diameter with higher value of 0.402cm in Acc 08 in Yobe state and least values of 0.282cm in Acc 05 and Acc 01 Borno state. These results suggested higher variation among accessions collected in Yobe state. Based on values of stem diameter and height, Acc 06-08 are the best materials. Stem diameter and height are important vigor parameters which serve as indices of tapping efficiency [13 and 12]. The highest number of leaves at 26 was obtained Acc 02 from Borno state followed by 25 leaves obtained in Acc 06 in Yobe state (Table 1). The lowest number of days to transplanting was obtained in Acc 06 and Acc 08 in Yobe state at 57 days to transplanting. Lower nursery life suggests reduced nursery activities for reduction in cost. In addition, the leaser the nursery period the higher the number of cycles of nursery operations in the nursery season and hence higher turnover of seedlings. Seedlings characters as in thus study are widely used in evaluating nursery seedlings of tree crops [13and14].

Table1: Morphological Characteristics of *Acacia senegal* Seedlings

Acc. No	Source (State)	MorphologicalCharacters			
		SH (cm)	NL	SD(cm)	NDTT
Acc 01	Borno	35.64	20	0.282	68
Acc 02	Borno	35.60	26	0.308	74
Acc 03	Borno	33.56	19	0.300	61
Acc 04	Borno	38.45	19	0.352	61
Acc 05	Yobe	26.90	19	0.282	65
Acc 06	Yobe	37.35	25	0.342	57
Acc 07	Yobe	37.77	22	0.368	68
Acc 08	Yobe	40.05	21	0.402	57
Mean		36.94	21	0.329	64
$LSD_{0.05}$		6.03	4.61	0.08	5.57

Acc= *Acacia senegal* Accession, SH= Seedlings Height, NL= Number of Leaves, SD= Seedling Diameter, NDTT= Number of Days to Transplant.

CONCLUSION

Acc no. 08 from Yobe had the desirable seedlings characters: fast growth habit, highest seedling girth, and could be transplanted within 57days of sowing. Therefore, these observations will be studied to find out the relationship between these juvenile characters and gum yieldand extensions. Authors are strongly encouraged not to call out multiple figures or tables in the conclusion—these should be referenced in the body of the paper.

Acknowledgements

The authors are grateful to Prof. I. O. Eguavoen, Executive Director, Rubber Research Institute of Nigeria for providing the support for this study. We are grateful to the farm managers of A.A. Abdallah and Jibo Gum Arabic Farms for allowing us to use their farms for this study. The assistance of the Staff of Gum Arabic Research Station, Gashua, Yobe State, Nigeria for data collection and field work is highly appreciated.

- *Ibrahim, N.*,Rubber Research Institute of Nigeria , PH-+234-802-145-4866. E-mail: _nasiruibra@yahoo.com*
- *Gani, A.M.Abubakar Tafawa Balewa University Bauchi, Nigeria, PH-+234-803-592-0734. E-mail: _almohgani1959a@gmail.com*
- *Abdul, S. D. Abubakar Tafawa Balewa University Bauchi, Nigeria, PH-+234-803-3324-573. E-mail: sanadul@yahoo.com*
- *Omokhafe, K.O Rubber Research Institute of Nigeria, PH-+234-808-5796-250. E-mail: author_name@mail.com*

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