

Studies on Acacias in the Zaria Area of Kaduna State, Nigeria

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Abstract: A study of the floristic diversity of *Acacia* was conducted in the Zaira and its environs in Kaduna State with the objective of determining distribution and economic importance of members of the genus. Field surveys were undertaken to seven localities where samples of *Acacia* trees were collected and identified as described by D Oliver [1]. Random sampling technique was also used to interview 280 respondents from the localities using a check-list to collect information on uses of the trees by the local people. Additional information was collected using Focus Group Discussion (FGD) and In-depth Interview with Key Informants (IDI). Results revealed that in all, seven species namely *Acacia albida*, *A. nilotica*, *A. seyal*, *A. sieberiana*, *A. senegal* and *A. auriculiformis* were found in the study area. Members of the genus were reported to have a wide range of uses in industries as raw materials for medicinal products as well as food items for both man and animals. It was recommended that further research be carried out to ascertain the diversity of species and their economic uses.

Keywords: Floristic, diversity, distribution, economic importance.

1. Introduction

The genus *Acacia* belongs to the family *Leguminosae* and sub-family *Mimosoideae* [2], [1]. It has been reported that members of the family constitute a dominant part of the flora of the savannah vegetation of the arid and semi-arid Sub-Saharan region of Africa. As early as 1959, Brenan found the genus to comprise about 750-800 species [2]. Apart from being part of the flora of Nigeria vegetation, it has been found to be very useful to man especially pastoralists [4], [5]. West [6] earlier indicated several uses of *Acacia* to include raw materials for industries, fencing materials, and domestic implements for human activities like hunting and fishing. Gum from *Acacia* has been reported to have been used as medicines or raw materials in confectionary industry. Leaves, pods and bark have all been used to provide various industrial products [7], [8], [9] [6] and [4].

In West Africa and indeed Nigeria, several workers have reported the existence of some species of *Acacia*, [10], [11], [12], [2], [13]. Keay *et al* [11] found 14 species in Nigeria while Nielson [12] discovered 8 species. This clearly shows that there is still need for further investigations to ascertain the exact number that exist in Nigeria generally and in specific location.

Despite this need, not many studies have been undertaken in this regard particularly in recent times when there has been massive destruction of ecological formations. Apart from this, most of the studies focused on the biology of members with little or no emphasis on their economic importance. The broad objective of this study was therefore to identify the different species of *Acacia*, determine their distribution and identify their economic importance to man.

2. Methodology

2.1 Study Site

The study area is located in Zaria area which is made up of seven contiguous sites randomly selected. The sites were University Campus including Kubani Dam, Dumbi Settlement, Bassawa Village, Aviation Area, Wussasa Hospital and Zaira Dam. The entire area lies within latitude 11°11'N and longitude 7°38'E. The vegetation is typical of the Sudano-Sahelian region, comprising few scattered trees along river courses [14].

2.2 Study Procedure

The survey involved visits to the study area to identify *Acacia* trees. During the visits, sample collection of species was made and preserved in presses and were later identified following procedure outlined by D Oliver [1].

2.3 Collection and Identification of Plant Species

With the help of secateurs, two branch-lets containing flowers, fruits and leaves together or leaves only, were collected and properly placed in plant press. Using simple tools such as hand-lens, needles, ruler, veneer calipers and knives, gross morphological features such as arrangement of leaves, colour of flowers and fruits, presence of spines/thorns, were recorded. It was also recorded whether the sample was from an herb, shrub, tree or a climber. Using the information recorded, the specimens were identified in the laboratory with the help of keys as described in [1].

2.3 Administration of Questionnaire

The study was conducted using questionnaire as the major tool. For each study site, 40 respondents were selected randomly and were later asked to respond to questions as contained in the questionnaire. In all 280 respondents gave their opinions. The questionnaire was collated and analyzed

using simple statistical tools such as frequencies and percentages. The results were later presented in tables. In addition, FGDs and IDI were conducted to illicit more information that could not be captured in the questionnaire.

3. Results and Discussions

3.1 Socio-Economic Characteristics of Respondents

Socio-economic characteristics of respondents revealed that of the two hundred and eighty respondents interviewed, 65% were males while 35% were females. Gender is very important in a study like this because the views about economic importance of tree species are best appreciated by both males and females.

Out of the respondents, 50% were from the age category of 30-40 years, 25% were from ages below 30 years while 25% were above 40. Age is necessary because the older a person is the more experience he or she has concerning value systems. In this study, half of the respondents were in the prime age of knowing about the value of trees generally.

Majority of those interviewed (55.7%) have lived in the study area for over 12 years. It is expected that someone who has resided in an area for a reasonable period of time will know more about the value system of a people than someone who has stayed for a shorter period. In this case majority was found to be resident in the study area for a long time. Results indicated also that 63.5% of respondents were farmers leaving a balance of 36.5% for the other means of livelihood. Details are given in Table I.

3.2 Floristic Composition and Distribution

Results of the study showed that in all seven species of Acacia were found in the study area. Among them were *A. ataxacantha*, *A. albida*, *A. seyal*, *A. senegal*, *A. nilatica*, *A. sieberiana* and *A. auriculiformis*. It was found that while the others are indigenous, *A. auriculiformis* is exotic. Frequency of each species in the locality varied as some sites recorded all species while others did not. Observations were as presented in Table 2. The trees were mostly found along river courses. The significance of this is that the trees can also exist in areas with wet conditions.

3.3 Distinguishing Features

Members of the species found in the study area had special distinguishing features which conformed to those described in [1]. Features for each species are given in Table 3.

3.4 Economic Importance

According to respondents' information provided in the questionnaire as well as information from the interviews (FGDs and IDI), the species are of high economic value. These uses range from industrial raw materials, medicinal products as well as food items for both man and animals. These findings agree with those of Gwyune, [5]. The species are also valued as fuel wood. Table 4 contains details of the uses.

4. Conclusion

1. Seven different species of *Acacia* were identified in the study area. This is in line with the findings by Nielson [12] who identified 8 species of *Acacia* as existing in Nigeria. Although the number falls short by one, it could be explained that the difference might be that the species existed but probably it was not captured in the area due to human activities.
2. The importance of *Acacia* for the well being of the people of the area was confirmed from a variety of uses indicated by the locals during FGDs, IDI and from respondents. The results were in agreement with the findings of Gwyune [5] and Adewoye, [9]. During interactions, local communities described *Acacia albida* as a high quality feed for animals during the period of general shortage of forage, which has been sustaining livestock in the area.
3. Respondents also agreed that members of *Acacia* have been used for fencing to ward off both animals and human beings from entering compounds or as a protective hedge around farmlands. Other uses such as fish poisons, farm implements and industrial products were indicated.
4. From available literature, and this study, there is still no consensus on the exact number of species of *Acacia* in Nigeria and the Zaria area in particular.

5. Future Scope

It was recommended that further studies be carried out to ascertain the number of species as well as the diversity of economic uses particularly of pods, seeds, and leaves. There is also need to carry out proximate analysis of the different parts to determine the active nutrients when used as feeds for animals or as human food.

Table 1: Socio-economic characteristic of respondents in the study area (n=280)

Socio-economic	Classification	Percentage
Age	< 30	25
	31-40	50
	41-50	14.3
	51-60	10.7
	> 60	-
Sex	Male	75
	Female	25
Education	Non-formal	10.8
	Adult literacy	21.4
	Primary education	35.7
	Secondary education	22.1
	Tertiary education	10
Marital status	Married	94.6
	Single	1.8
	Separated	3.6
Membership of community	3-5 yrs	3.6
	6-8 yrs	19.3
	9-11 yrs	21.4
	> 12 yrs	55.7
Occupation	Farmers	63.5
	Civil servants	7.1
	Traders	5.8
	Headsmen	23.6

Table 2: Frequency and percentage distribution of Acacia species in the sampled sites

Species	University Campus	University Farm	Dumbi	Aviation	Wusasa Hospital	Zaira Dam	Bassawa	Frequency	%
A. albida		1	1		1	1	1	5	71
A. ataxacantha	1	1	1	1	1	1	1	7	100
A. nilotica	1	1	1	1	1	1	1	7	100
A. seyal			1			1		2	29
A. senegal			1					1	14
A. sieberiana	1	1	1	1	1		1	7	100
A. auriculiformis	1	1				1		2	29

Source: Field Survey, 2012

Table 3: Distinguishing features of Acacia in the study area

Species	Distinguishing features		
	Leaves	Flower	Fruit
A. nilotica	Presence of 3-5 pairs of pinnal per rachis. Leaflets are very small and hairy, 1.5-7mm long, 0.3-0.8mm wide. The leaflets range from 8-10 pairs per pinna	Have bright yellow flowers. In axillary, long pedunculated 6-15mm in diameter. Caly x is 1-2mm long. Corolla is 2.5-3.5mm long. Flowers between September-January	Broad, pods, tomentose, heavily constricted. Some pods are slightly falcate, up to 13 seeds per pod.
A. albida	Rachis contains a single gland at the junction. Have between 4-8 pairs of pinnae. Eac pinna has 12 or more pairs of leaflets. Hairy leaflets measuring between 4-5mm by 1.8-2mm wide.	Cream flowers, sessile to sub-sessile and are in spikes, 3.5-12cm long. Usually on pedicels, 1.3-3.5cm long. Caly x is 1-1-17mm long. Corolla is 3.3-5mm long. Stamens are between 4-5mm long. Flowers in November.	Large pods which are bright orange, fleshly, indehiscent, falcate, curled, 6-25cm long and 2-3.5cm wide. The seeds are up to 6 per pod. Fruiting period is between December-April.
A. senegal	Rachis is glandular between the top pinnae, 3-6 pairs of pinnae. Each pinna bears 8-15 pairs of leaflets. Each leaflet is about 3mm long and 1mm wide.	Flowers are sessile, in spikes, 2-10cm long and densely crowded. Usually white or cream in colour.	Pods are pale brown, dehiscent, flat, pupery, oblong, 2.5-12cm. usually 9cm long, 1.5-2cm broad. Seeds are 8-12mm in aliameter. Fruits in January-April. About 2-6 seeds per pod.
A. seyal	Bi-pinnately compound with 5-8 pairs of pinnae, tomentose. Leaflets are numerous and small, usually between 12-20 pairs per pinna. Each leaflet measures between 4-6mm by 0.8-1mm wide.	Brightly yellow in auxillary pedumculate, globular heads. Flowers between August-December	Pods are 5-22cm long, 0.5-0.9cm wide, slightly curved. The pods are constrieted between seeds, dehiscent. The seeds are olive to brown, 7-9mm by 4.5-5mm wide. Fruits between October-March.
A. ataxacantha	Rachis contains 8-16 pairs of pinnae with 7-35 pairs of leaflets per pinna. Leaf rachis has prominent gland at base.	Flowers are cream white, 0.25mm-0.4mm, pedicellate or appearing sessile, in racemes 4-8 long, on peduncles, axis densely puberous. Calyx 1-10.1mm long, glabrous. Flowers in September-December.	Reddish brown, shining with several seeds. Seeds are 3-8 per pod. The fruit is between 6-10cm long and 1.6cm-2cm wide. The pods are dehiscent, almost glabrous, straight, very cuminated at both ends. Fruits in September-December.
A. sieberiana	Leaves are bipinnate with common stalk, bear 6-20 pairs of pinnae, each with 20-40 leaflets. Hairs occur on the individual leaflets. Leaflets measured between 2-2.5mm by 0.81mm wide.	The flowers are white or creamy white, in glabose heads, about 1.25cm across, on a slender stalk, frglant. Flowers in April.	The pods are straight or falcate, flattened, thick and woody in texture, 8-21cm long, mostly 1.5-1.7cm wide or rarely 3cm wide. Seeds are 12-15 per pod. The pods are tomentous each possessing a stalk. Fruits in April.
A. auriculiformis	Petioles modified into leaves (phyllodes) which are sickle-shaped (falcate); simple with alternate arrangement. Hardly can upper or lower surfaces be recognized, glabrous. Leaf length is between 10.8cm-12.5cm by 2.4cm-3cm wide.	Flowers in spikes, bright yellow. Flowers between September and November.	Broad, glabrous, greatly twisted and strongly falcate. Fruit in October and December.

Source: Field Survey 2010.

Table 4: Local uses of Acacia in the study areas.

Species	Uses																					
	medicinal	Dyeing materials	Livestock feeds	Fuel wood	Fish poison	Gum	Fish Hooks	Ropes	Tannin	Cosmetics & Pomade	Fencing	Hut Pole	Timber	Furniture	Hunting Implement	Mortar	Pestle	Walking sticks	Chewing stick	Shade		
<i>A. albida</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count	276		256	280	17	164	164	240	224	208	234	148	240	26	250	264	204	264	174	280	
	%	94		91	100		77	58	85	85	77	100	52	85	9	89	94	72	94	62.1	100	
<i>A. ataxacantha</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count	274		264	280			130	264			170			244					174	280	
	%	97.1		94.2	100			46	94			60			87					62	100	
<i>A. nilotica</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count	260		228	280		210			240	156	184	184	260	238		266	242	216	196	280	
	%	92		81	100		75			85	55	65	65	92		95	86	77	70	70	100	
<i>A. seyal</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count	252	112	240	280		176	210				112	112	204	24	264	244	260	244	202	280	
	%	90	40.2	85.7	100		62	96				40	40	72	8	94	87	92	87	72	100	
<i>A. senegal</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count	266	240	256	280		192		216			162	168	198	208		216	266	234	244	280	
	%	95	85	91	100		68		77			57	60	70		77	95	83	87	87	100	
<i>A. sieberiana</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count	228		216	280		182	156	156	214	184	192	156	174	24	240	242	242	242	216	280	
	%	81		77	100		65	40	55	76	65	68	55	62	8	85	86	86	86	77	100	
<i>A. auriculiformis</i>	Use	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	Count				280							42	96							60	180	280
	%				100							15	34							21	64	100

Source: Field Survey (2010)

References

- Oliver, D. (1971) Flora of Tropical Africa Vol. II. Published under the Authority of the First Commissioner of the Majesty's Works, London.
- Brenan, J.P.N (1959) Leguminosae; Sub-Family Mimosoideae in "Flora of Tropical East Africa", Crown Agents London S.W.I
- Coe, M and Coe C. F (1987) Large herbivores, Acacia tress, and bruchid beetles. *South Africa Journal of Science* 85 624-635.
- Gwyne, M.D. (1969) The nutritive value of Acacia pods in relation to Acacia seed distribution by ungulates, *East Africa Wildlife Journal*, 7, 176-8.
- West, C. (1986) Insect communities in tree canopies. In Kora: an ecological inventory of the Kora National Reserve, Kenya (ed. M. Coe and N.M Collins) PP. 209-22. Royal Geograph
- Irvine, F. R. (1961) "Woody Plants of Ghana' Oxford University Press, London.
- Waterman, P.G. (1986) Resins and other exudates from the flora of the Kora National Reserve, Kenya. In Kora: an ecological inventory of the Kora National Reserve, Kenya (ed. M. Coe and N.M Collins) PP. 137-156. Royal Geography Society, London.
- Adewoye, R. O. (1981) "Preliminary Investigation into the use of an indigenous vegetable tanning material, the pods of *Acacia nilotica var adansonii* as retaining agent for chrome side leather". A dissertation submitted to the University of Leads as partial requirement for the degree of Master of Science.
- Hutchinson, J. and Dalziel, J. M. (1954) "Flora of Tropical West Africa Vol. 1 Ed. II. Crown Agents London, S.W.I
- Key, Onochie and Stanfield (1964) "Nigeria Tress" Vol. II. Department of Forest Research Ibadan.
- Nielson, M.S. (1965) "Introduction to the Flowering Plants of West Africa". University of London Press. London E.C. 4.
- Lawson, G.W. (1966) Life in West Africa" Oxford University Press London.
- Famuyide, O. O. Popoola, L. and Owonumbi, J. J. (2002). An Evaluation of Preferred Forest Resources in Selected Areas of Nigeria. In *Proceedings of the 28th Annual Conference of Forestry Association of Nigeria, held in Akura, Ondo State.*

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