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# Empirical Studies of Indigenous and Medicinal Utilization of African Locust Beans (*Parkia biglobosa*. Jacq Benth) in Zaria Local Government Area of Kaduna State, Nigeria

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***Authors' contributions***

*This work was carried out in collaboration among all authors. Authors AIS, MBU and MMO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors RS, GLL and OO managed the analyses of the study. Authors NOO and TAA managed the literature searches. All authors read and approved the final manuscript.*

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## ABSTRACT

The study examines the indigenous and medicinal utilization of African locust bean tree *Parkia biglobosa)* in Zaria Local Government Area of Kaduna State, Nigeria. Twenty (20) questionnaires were randomly administered in each of the six (6) districts to make a total of one hundred and twenty questionnaires (120). Ninety (90) were retrieved. The results show that the species is a multipurpose tree that can be subjected to various indigenous uses such as: root decoction in

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treatment of coccidiosis in poultry (100%), green pod of the fruit use as a fish poison to catch fish in the rivers (100%), seeds, pods, and fruits use as a drinking ingredients (75%), mature wood of the species are use in light construction of mortars and pestles, different kinds of furniture and utensils (75%) and so on. The result further, revealed that the plant parts (leaves; stem; bark, root, exudates (gum) seed and yellow pulp) is used in treatment and prevention of various diseases such as small pox; pile; malaria; dysentery; diarrhea; leprosy; snake bite; fever; measles, convulsion in infant, liver problem, headache, ear, skin diseases and so on. Demographic characteristic of the respondents was also examined. The percentage of male was (43.34%) while that of their female counter part was (56.66%). Majority (43.33%) of the respondents were between 31 – 40 years' age bracket and majority (44.44%) are married with majority (37.78%) having 1-5 house hold size. 45.56% of the respondents had secondary education while 2.22% had no formal education and majority (51.11%) are traditional healers. The regression analysis showed significant relationship between age, household size, educational status, occupation and the indigenous and medicinal utilization of African locust bean tree($P<0.05$) level of significant. However, it is recommended that sustainability of biological resources should be ensured so that medicinal plants such as *Parkia biglobosa* do not go into extinction. Also, enforcement of the forestry act with regards to illegal and indiscriminately felling of trees like *Parkia biglobosa* are highlighted.

*Keywords: Parkia biglobosa; indigenous; sustainability; Zaria; extinction; utilization.*

## 1. INTRODUCTION

*"Parkia biglobosa. Jacq Benth",* commonly known as African locust bean, is a tree legume that belongs to the family *Mimosoideae,* it is a wide spread savannah tree. The locust beans are the mature seed made up of husk which is embedded in dark brown pod. A lot of research work has been done on the production of African locust bean seeds and related aspects such as storage, preservation, processing, time taken to be cooked, packaging and other areas [1,2]. Also efforts have been made to scientifically study the traditional processing, marketing, physical and chemical changes, and the micro-organisms involved in the processing of African locust bean [3,4,5]. The pods are harvested and processed into the fermented product known as Iru', 'Dawadawa" and Ogiri "in the Yoruba, Hausa and Igbo Languages respectively [6]. It is characterized by its fruits, which are elongated pods, 5-11 inches long and found in clusters [7, 2]. It flowers from December to March and brings out fruits from February to July. The immature fruits are green and brown when it is mature [8]. In the arid and semi-arid regions of Africa, *Parkia biglobosa* (locust bean) is very important for food security particularly during food shortage and drought periods [9]. *P. biglobosa* (named after the famous Scottish botanist and surge on Mungo Park by Robert Brown in 1926) has long been widely recognized as an important indigenous multipurpose fruit tree whose uses include food, medicine, manure, tannin, shade, wind-breaks, bee food, stabilization of degraded environment, livestock feeds, fuel, fibre, fish poison and several other domestic uses [10,11]. However, since majority of people in Northern part are not only known to depend on "Dawadawa" for their household delicacies over the years but also the medicinal utilization of the tree is of paramount importance. However, in arid and semi-arid regions of Africa, *Parkia biglobosa* (locust bean) is very important for food security particularly during food shortage and drought periods.

However, there is a growing awareness of the contributions of Non-Timber Forest Products (NTFPs) to household economies, food security, national economies and conservation of biodiversity. In other words, [11] observed that NWFPs play a significant role in addressing the food security and health needs of rural and forest-dependent populations who are suffering from hunger in the world today. It is therefore undeniable that NWFPs provide succor for rural communities in terms of subsistence as well as revenue generation. *Parkia biglobosa* seeds have been identified as typical examples of such NWFPs and this is in conformity with [12] which stated the difference between the commonly used NTFPs and NWFPs. It was clearly stated that the term NWFPs differs from the commonly used NTFPs in excluding all wood while NTFPs include wood for uses other than timber [11,2].

Medicinal plants have been of great value to man in the provision of drugs after the extraction of active ingredients in them in orthodox medicine and for curing several ailments traditionally [13]. Eighty percent (80%) of the world population rely exclusively on plants parts (leaves, roots and the seeds) for their primary health care. In China, for

example, the bulk of traditional medicine is based on about 5,000plant species which are used to treat up to 40% of urban and 90% of patients in rural areas [14]. Out of over 7,000,000 tons of plant material used for medicine in 1991, 80% was collected from wild [15]. Since man began susceptible to diseases and ailments, it had been the desire of man to find a means of guarding or restoring his health. In most cases, man had resorted to the use of one part of a plant or another, boiled or eaten raw to achieve good health [2].

However, with increasing disappearance of forest species and biodiversity, the conservation of forest and plants with potential medicinal value has become an important issue in the pharmaceutical field [16]. Since a large number of present day drugs are produced from plants rather than laboratory synthesis and herbal medicinal practices forms and important stratum of the health services in areas with no health centres, it is therefore important that information should be made available on medicinal plants, such as *P. biglobosa* all year round. This paper therefore examines the indigenous and medicinal utilizations of *P. biglobosa* by identifying the part of the plant used and methods of application to improve the market, plantation establishment and research to other multipurpose uses.

### 1.1 Study Hypothesis

**$H_0$:** There is no significant relationship between indigenous and medicinal utilization of African locust bean tree and the selected demographic characteristics.

**$H_1$:** There is significant relationship between indigenous and medicinal utilization of African locust bean tree and the selected demographic characteristics.

## 2. METHODOLOGY

### 2.1 Study Area

The study was conducted in Zaria Local Government Area of Kaduna State, Nigeria. It has a total land area of 46,053 square km and a projected population of 408,198 [17]. It comprises of six [7] traditional districts which include Birni da Kwaye (Zaria town and its environs); Dutsen Abba; Gyallesu Tudun Wada; Tukar Tukur; Wuchiri and Zaria city. The main ethnic groups are Hausa and Fulani and they are predominantly Muslims.

### 2.2 Data Collection and Source

Primary data was used for the study. The primary data was collected using structured questionnaire. The questionnaire was designed to collect the following types of information.

I. Demographic characteristics of the sample respondents such as sex; age; marital status and so on.
II. Different diseases/ailment the species can cure; part used and mode of preparation.
III. Indigenous utilization of the tree and the parts used.

### 2.3 Sampling Techniques

Simple random sampling techniques were used in selection of the respondents. Twenty [2] questionnaires was distributed in each of these [7] districts base on the availability of the species and reconnaissance survey of the respondents that knows the plants at the time of the survey. The districts sampling includes: Birni da Kewaye; Dutsen Abba; Gyallesu Tudun Wada; Tukur Tukur; Wuchiri and Zaria city to make a sum total of sample size to be 120. However, ninety (90) were retrieved.

### 2.4 Analytical Tools

The following tools of analysis were used to achieve the stated objective.

i. Descriptive statistics
ii. Regression analysis

#### 2.4.1 Simple descriptive statistic

Simple descriptive statistics such as percentage, frequency distribution tables and mean was used.

#### 2.4.2 Regression analysis

This was used to determine whether or not there was any relationship between selected variables and the use of indigenous and medicinal utilization of African locust bean tree. The deficiency was considered significant at $P<0.05$ to interpret the hypothesis formulated.

## 3. RESULTS AND DISCUSSION

### 3.1 Demographic Characteristics of Respondents

Some demographic characteristics are known to compliment the indigenous and medicinal utilization of African locust bean seed *(Parkia*

*biglobosa)* in Zaria Local Government Area of Kaduna State. The variable employed in this study includes: age, sex, marital status, house hold sizes and level of education.

The Table 1 revealed that 43.33% of the sampled respondents were between the age brackets of 31-40 years. This implies that they were at middle and economically active age which could have positive effect on their standard of living. 44.44% of the respondents are married, 41.11% are single, 4.45% are divorced while 10.00% are widow (er). This is an indication that married people know the indigenous value and medicinal utilization of African locust beans tree for curing and prevention of diseases. Gender distribution further revealed that women are the majority (56.66%) in the medicinal utilization and indigenous uses of African locust beans tree against their men counter parts (43.34%). 45.56% of the sampled respondents had Secondary education and 28.89% had tertiary education, 13.33% had primary education, 7.78% had Arabic education, 2.22% had adult education. [18] observed that formal education has positive influence on one's life. Furthermore, 37.78% of the respondents were between the household size of 1-5 while 18.89% of the respondents were in the household above 15.

## 3.2 Indigenous Uses of African Locust Beans Tree (*Parkia biglobosa)*

Over the decades, African locust beans has been subjected to various indigenous uses in Northern Nigeria. However, the most common utilization made of the beans tree in the study area which contains two [3] major ethnic groups is shown in Table 2.

**Table 1. Demographic characteristics of respondents in Zaria local Government area of Kaduna State**

| S/No | Variable | Respondents | Percentage (%) |
|---|---|---|---|
| **1** | **Age in years** | | |
| | 10-20 | 19 | 21.11 |
| | 21-30 | 16 | 17.78 |
| | 31-40 | 39 | 43.33 |
| | 41-50 | 13 | 14.45 |
| | Above 51 | 03 | 3.33 |
| **2** | **Marital status** | | |
| | Married | 40 | 44.44 |
| | Single | 37 | 41.11 |
| | Divorce | 04 | 4.45 |
| | Widower | 09 | 10.00 |
| **3** | **Gender** | | |
| | Female | 51 | 56.66 |
| | Male | 39 | 43.34 |
| **4** | **Educational level** | | |
| | Tertiary | 26 | 28.89 |
| | Secondary School | 41 | 45.56 |
| | Primary School | 12 | 13.33 |
| | Arabic School | 07 | 7.78 |
| | Adult School | 02 | 2.22 |
| | Non Formal Education | 02 | 2.22 |
| **4** | **Occupation** | | |
| | Traditional Healer | 16 | 51.11 |
| | Herbs Trader | 30 | 33.33 |
| | Civil Servant | 10 | 11.11 |
| | Famer | 04 | 4.45 |
| **5** | **House hold size** | | |
| | 1-5 | 34 | 37.78 |
| | 6-10 | 29 | 32.22 |
| | 11-15 | 10 | 11.11 |
| | Above 15 | 17 | 18.89 |
| | **Total** | 90 | 100.00 |

**Table 2. Indigenous uses of locust beans tree in Zaria local Government area of Kaduna State**

| S/N | Part used | Utilization | *Respondents | Percentages (%) |
|---|---|---|---|---|
| 1. | Root | Root decoction use to treat coccidiosis in poultry | 120 | 100 |
| 2. | Green pod | Use as fish poison to catch fish in rivers | 95 | 79.2 |
| 3. | Locust tree | Use in arboriculture | 75 | 62.5 |
| 4. | Leaves | Use in Agroforestry (They are useful soil improvers and their leaves provide green manure) | 120 | 100 |
| 5. | Seeds, pods and fruit pods | Use in drinking ingredients. | 90 | 75 |
| 6. | Seeds | Roasted to make coffee substitute knows as "Sudan coffee" | 90 | 75 |
| 7. | Leaves | Boiled mixed with cereal flour and eaten as vegetable | 82 | 68.33 |
| 8. | Beans | Use as an attractant to bees in establishing new apiary | 120 | 100 |
| 9. | Mealy pulp | Traditionally consumed as fresh food | 120 | 100 |
| 10. | Fruit pulp, foliage and seeds | Used to feed livestock and poultry. | 85 | 70.8 |
| 11. | Wood | Used in light construction: mortars and pestle; different kinds of furniture's and utensils | 90 | 75 |
| 12. | Seeds | Used to make valuable baby food. | 75 | 62.5 |

**Multiple Responses*

The Table 2 shows that majority of the respondents use locust beans root for preventing coccidiosis in poultry (100%), leaves in Agroforestry (100%), Beans seed use in establishing new apiary as an attractant for bees (100%), Mealy pulp traditionally consumed as fresh food (100%). Others indigenous uses include the green pods which is used as fish poison to catch fish in the rivers (79.2%), Locust tree use in landscaping and beautification of parks and gardens in arboriculture (62.5%) and so on. The indigenous uses are in consonant with the work of [9,10] Who observed that African locust beans tree is considered as a valuable asset in many parts of Africa where it can be found because of its array of indigenous uses and medicinal utilization. It is important for the livelihoods of the rural population as it has been for over centuries, almost every part of the tree has its use.

### 3.3 Medicinal Uses of African Locust Beans Tree (*Parkia biglobosa)*

Various parts of the tree were being used for prevention, treatment of different ailments according to the empirical studies made, such ailment include: Rashes, Pile, Dysentery, Diarrhea and so on. Nearly all the parts of the tree (Root, bark, leaves, exudates, seed, seed coat) had been utilized for the treatment of one ailments or the other. The Table 3 shows the summary of the major parts of the tree used how it is utilized for treatment and various illnesses the tree can cure.

The Table 3 that *Parkia biglobosa* is an immeasurable value to man in the treatment of several ailments traditionally. Various parts of the tree (fruits, flowers, leaves, bark and root) were being used for treatment of ailments such as pile, skin rashes, dysentery scorpion sting, leprosy, measles and so on. However, majority of the respondents learn and inherited the practices from their forefathers. Thus, they were very reluctant in disclosing some of the preparation and administration of the plant. Similar observation was reported by [16,19,20]. [10,15] observed that it will be of paramount importance to develop herbal medication as an alternative to orthodox medication as about 75% of Nigerian

population lives in rural settlements who can barely afford orthodox medicine. Therefore, sustainability of biological resources should be ensured so that medicinal plants such as *P. biglobosa* do not go into extinction.

### 3.4 Test for Hypothesis

Table 4 shows that the age, household size, education level and occupation are the most important variables explaining relationship between selected variables and the use of indigenous and medicinal utilization of African locust bean tree and they were all significant ($P<0.05$). This is also emphasized the importance of education, family size, occupation and age in the indigenous and medicinal utilization of African locust bean tree.

**Table 3. Medicinal uses of locust beans tree**

| S/N | Part used | How it is used | Illness |
|---|---|---|---|
| 1. | Bark and fruits | Mix together and Boil | Convulsion in infants |
| 2. | Root | Soak in water and drink | Dysentery |
| | | Mixed with Eucalyptus leaf and boiled, then drink | Pile |
| | | Soak in water for four(4) hours before drink | Small pox |
| 3. | Bark | Boiled in water, then drink | Clears eyesight |
| | | When dry, grind into powder and mixed with water and drink | Rashes |
| | | Boiled and allow to cool, then sit inside | Scorpion sting |
| | | Mixed with *Mangifera indica* (mango) leaves and *Musa spp* (banana) leaves and boil, then drink | pile |
| | | Mix with Mahogany bark *(Khaya senegalensis*) and boil then drink | Leprosy |
| | | Boil and mixed with potash and give animals to drink | Liver problem (in cattle) |
| | | Ground it into powder and mix with milk (Nunu) and drink. | Pile |
| | | Boil with water, then woman that just delivers will bath and sit inside the water | Stop menstruation |
| | | Dry and pound with potash and mixed with animal feed | Increases the animals strength |
| 4. | Scale bark | Soak in water and drink | Worms |
| 5. | Inner bark | Chew | Wound, Scorpion sting, ulcer |
| 6. | Barks and fruits | Mix together and boil | Dyes of White hair, guinea worm |
| 7. | Fleshy leaves | Pound and squeeze the water in the affected part. | Ear problem |
| | | Heat on the fire and press it on the affected parts o f the body | Ribs problem |
| | | Pound and boil allow to cool filter and drink | Fever |
| | | Pound and mix with water for two hours and drink or bath | dysentery |
| 8. | Gum(Exudate) | Use it to rub the affected part | Skin diseases |
| 9. | Yellow pulp | Mix with animal feed | Liver problem |
| 10. | Seed coat and leaf | Boil together and filter it, then drink | High blood pressure |
| 11. | Seed | Cook with water and then drink | diarrhea |
| 12. | Leaves | Grind and mix with water and then drink and bath | Measles |
| | | Pound and mix with little water and drink | Diabetes, Pile |
| | | Boil with water and drink | Pile |

| S/N | Part used | How it is used | Illness |
|---|---|---|---|
| | | Mix with Neem leaves and boil, then apply to the affected part | Measles |
| | | Grind and boil in water and drink | Malaria |
| | | Boil allow to cool and put in the mouth | Tooth |
| | | Pound and soak in water and drink | Headache |
| | | Pound and squeeze the water on the affected part | Arthritis and rheumatism |
| | | Mix with pawpaw , guava, and lemon grass and then boil and inhale the steam | Fever |

**Table 4. Regression analysis on selected demographic characteristics and indigenous and medicinal utilization of African locust bean tree**

| Variables | Regression coefficient | T. values | Remarks |
|---|---|---|---|
| **Constant** | **0.206.07** | **16.54** | **-** |
| Age | 0.2713 | 1.22* | Significant |
| Education Level | 0.265 | 0.12* | Significant |
| House hold size | 0.1505 | 0.56* | Significant |
| Occupation | 0.1231 | 0.68* | Significant |
| S=22.15 | R. Sq. = 51.1% | R. Sq. (Adj.)50.0% | - |

## 4. CONCLUSION

African locust beans (*Parkia biglobosa*) as indicated in this empirical study shows that the species is a multipurpose tree. The seed are edible, the dried bark, leaves, pulp pounded and applied to the affected area to cure several ailments and indigenous utilization of the tree as a whole cannot be over emphasized.

## 5. RECOMMENDATION

Based on the above results it was recommended that for sustainability and conservation, plantation establishment of the species should be encouraged. Federal Government should encourage further research on the species through relevant parastatals. Also, government should enforce the forestry act with regards to illegal and indiscriminate felling of trees, especially *Parkia biglobosa* and those caught should be prosecuted.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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