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Full Length Research

Contributions of *Parkia biglobosa* (Jacq.) Benth to community livelihoods in Jema'a Local Government Area of Kaduna State, Nigeria

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Parkia biglobosa **have been identified to contribute to community livelihoods. Information on the contributions of *Parkia biglobosa* to community livelihoods is crucial to their sustainable management; however, this contribution has not been properly documented in the study area and hence the need for this study. A multistage sampling technique was adopted in this study. 102 questionnaires were administered to the respondents to elicit their responses with only 95 retrieved due to the relocation of seven respondents. Data generated were analyzed using simple percentages. The findings of the study showed that most of the respondents are females, married and at their active age with large household sizes with low educational status. Also, an income of ₦10,000.00 to ₦100, 000,00 could be gotten from the sales of *Parkia biglobosa.* Similarly, *Parkia biglobosa* are utilized traditionally in various forms by all sex and across all ages in the study area. Based on the findings above, the followings are recommended; growing more *Parkia biglobosa*, use of sustainable harvesting methods, harvesting only matured trees, inhabitants of Jema`a should plant *Parkia biglobosa* on their farms and around their houses to reduce pressure on the wild ones.**

Keywords: Contribution, Community, Livelihoods, Jema'a, Parkia.

INTRODUCTION

Parkia biglobosa commonly known as the African locust bean tree grows in the savannah region of West Africa up to the southern edge of the Sahel zone. It is an important indigenous multipurpose fruit tree in many countries of sub-Saharan Africa. The locust bean tree is native to West Africa and it is also called by different local names in different localities; for instance, it is referred to as "kinda" in Serria Leone, "kpalugu" among the inhabitants of Northern Ghana, "Nere" in Burkina Faso, "Igilgba" in Yoruba land and "worku" in Ghana (Jimoh and Adedokun, 2005; Babalola, 2012; Bahru et al., 2012). The seeds (kalwa- Hausa; Iyere- Yoruba) are traditionally used as food condiments (dawadawa- Hausa; Iru- Yoruba; soumbala in Burkina Faso, Mali, Cote d'Ivoire and Guinea, Ogiri in Eastern Nigeria). Dehydrated "tempeli" is an equivalent fermented product in Indonesia. The tree is the source of a natural nutritious condiment that features frequently in the traditional diet of both rural and urban dwellers in at least seventeen West African countries including Nigeria. *Parkia biglobosa* is a deciduous perennial

tree that grows to between 7 and 20 meters high in some cases up to 30 meters. The tree is fire-resistant and is characterized by a thick dark grey-brown bark. The pods of the tree, commonly referred to as locust beans, are pink in the beginning and turn dark brown when fully matured. The locust beans pods are 30-40 centimeters long on average, with some reaching lengths of about 45 centimeters. Each pod can contain up to 30 seeds (Zaku, 2013a, 2013b; Adejumo, 2013, 2014).

The most important use of the African locust bean is found in its seed, which is a grain legume, although it has other food and non-food uses, especially the seeds which serve as a source of useful ingredients for consumption, the locust beans is made up of 39-47% of protein, 11.7-15.4% of carbohydrate. A matured locust bean tree can bear more than a ton of fruits to be harvested. Where the tree is grown, the crushing and fermenting of these seeds constitute an important economic activity. Various parts of the locust bean tree are used for medicinal purposes. As a standing tree, locust bean may have a positive effect on the yield of other nearby crops. Annual production of seeds in northern Nigeria is estimated at around 200, 000 tons approximately ₦200,000.00 only. While the products of the tree are not common in international trade, they form an important part of local and regional trade in West Africa (Babalola, 2012). Alabi et al. (2005) reported that the locust bean is rich in lipid, protein, carbohydrate, soluble sugars and ascorbic acid. The cotyledon is very nutritious with low fiber and ash contents. The oil content is suitable for consumption since it contains very low acid and iodine contents. The oil has a very high saponification value and hence would be useful in the soap industry. It has essential acids and vitamins and serves as a protein supplement in the diet of poor families. Dawadawa is used in soups, sauces and stews to enhance or impart meatiness. The fruit pulp of the African locust bean is sweet to the taste, which indicates the presence of natural sugars and thus a potential energy source. The attractive yellow color indicates the presence of phytonutrients such as carotenoids, which are important precursors of retinol (vitamin A). It has a sour taste which indicates the presence of ascorbic acid (Alabi et al., 2005; Abdallah, 2007; Abubakar, 2009).

It is a multipurpose tree that provides domestic products such as fuelwood, seeds, fruits, medicine, timber and income for many rural people, especially women (Akande et al., 2010). The major income-generating products from Parkia are made from the fruits of the tree and include seeds, pulp, and a product made from the fermented seeds, locally called Soumbala in Burkina Faso (Bahru et. al., 2013). Soumbala has a high protein content of 38.4 g per 100g (Akintan et al., 2014), and is a traditional and integrated food product consumed throughout West Africa, often in 80% of all meals (Akintan et al., 2014) According to Zaku, (2013a) economically, the tree provides income and employment to many household members and particularly women who are more involved in processing and marketing of locust bean products. Trading activities are in raw seeds, fermented food condiments, charcoal and firewood. Ecologically, the African locust bean tree plays a vital role in nutrients recycling and erosion control. The tree acts as a buffer against the effect of strong wind or water runoff that usually causes damage to crops and soil (Amusa and Jimoh, 2012). Locust bean is a leguminous plant and so it fixes Nitrogen to the soil thereby enriching the soil nutrients content (Zaku, 2013b). Despite all this, it is not documented in the study area and hence the need for this study.

METHODOLOGY

The study area (Jema'a Local Government Area) is located between latitude 9^0 11^1 and 9^0 30^1 N and longitude 8^0 00^1 and 8^0 30^1 E. The Local Government is bounded in the East by Kagoro in Kaura Local Government, in the North by Zonkwa and Ungwa Rimi District of ZangonKataf Local Government, to the West by Jaba Local Government and in the South by Nassarawa State and in the South-East by Sanga Local Government Area respectively (Figure 1). The study area has witnessed tremendous growth in population in the last 30 years. It has a population of 278,735(NPC, 2006). Presently it has twelve wards, namely: Jagindi, Godogodo, Atuku, Gidan-Waya, Maigizo, Kaninkon, Kagoma, Asso, Kafanchan 'A', Kafanchan 'B' Barde and Takau. The study area is characterized by wet and dry seasons. Rainfall occurs between April to October and the dry season occurs from November to March. The mean annual rainfall is 1800 mm, the mean monthly temperature is 25^0c, and the relative humidity is 62% (Kaduna State Diary, 2020).

Sampling Technique

A multistage sampling technique was adopted in this

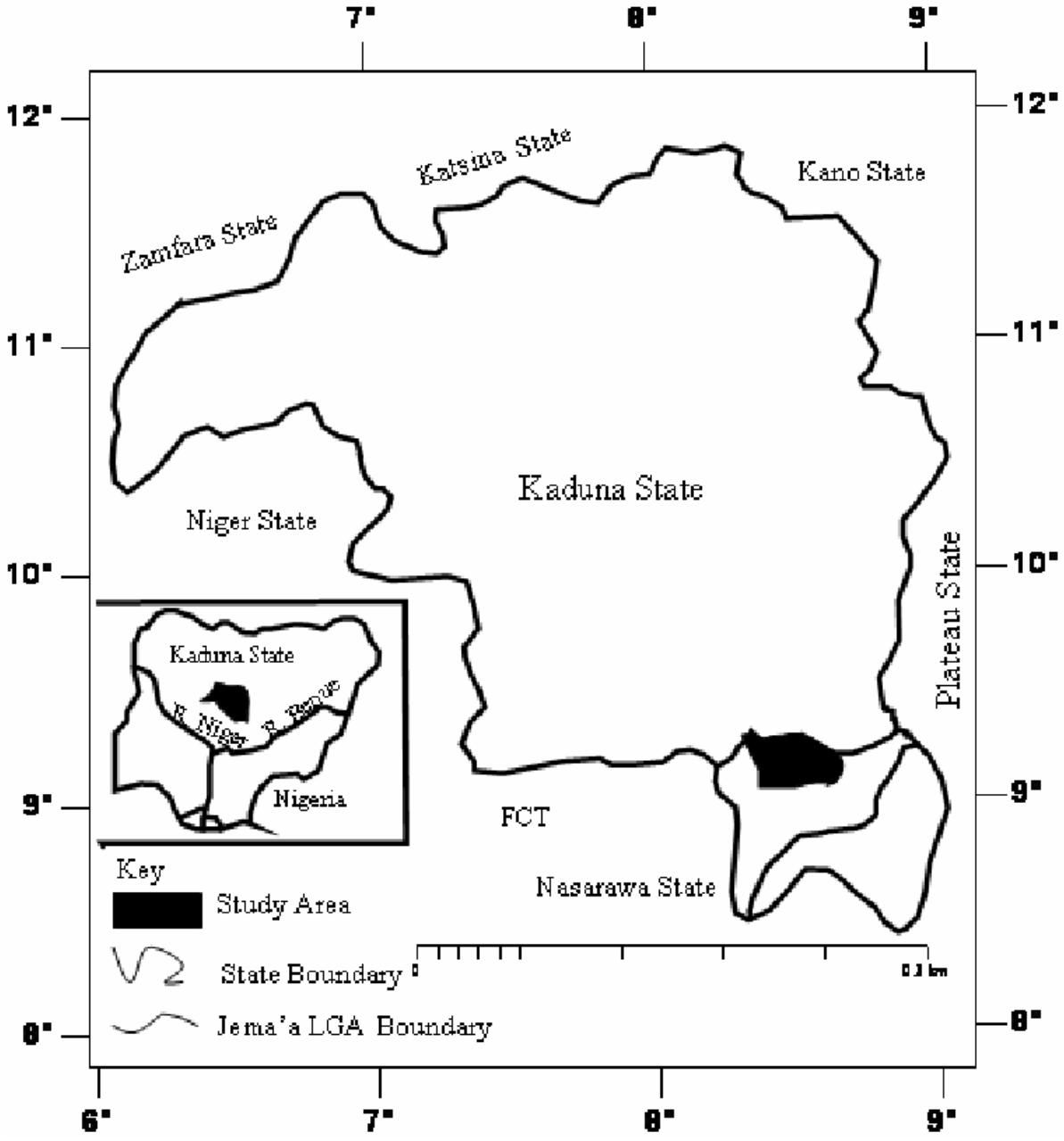

Figure 1. Map of Kaduna State showing Jema'a Local Government.

Source: Kaduna State Diary, (2020).

study. The first stage involved the division of Jema'a Local Government into two existing constituencies as follows; Constituency 1(Jema'a 1) and constituency 2 (Jema'a 2) respectively. The second stage involved a random selection of 3 wards from each of the existing constituencies as follows: Constituency 1: Jagindi ward, Asso ward and Barde. Constituency 2: Kagoma ward, Kaninko ward and Godogodo bringing the total to six (6) wards for this study. The third stage involved a random selection of 17 respondents from the 6 wards selected thereby bringing the total to 102 respondents for this study. Adopting the method of Diaw et al. (2002) and Adesoye, (2004), a total of 102 questionnaires were developed, and validated outside the study samples before being administered to the respondents in the study area. Data generated

from the study were analyzed using simple percentages.

RESULT AND DISCUSSION

Socio-Economic Characteristics of the Respondents in the Study Area

The result on the age of the respondents revealed that the majority (45) respondents representing 47.4% were within the age group of 31-45years, 26.3% of the total respondents were within the age group of 16-30years, 15.8% of the respondents were within the age of 46-60years, 6.3% of the respondents constitute those within the age group of 1-15years and 4.2% of the total respondents constitute those that attained the age of 61years and above. This implies that those involved in harvesting, processing and utilization of *Parkia biglobosa* were within the age of 31-45years since they are more in number and percentages. The result on the sex of the respondents indicated that 60 (63.2%) are females while 35(36.8%) are males respectively. Similarly, the result on the marital status of the respondents in the study area shows that the majority (55) of the total respondents representing 57.9% were married, 26.3% of the respondents were single, 6.3% were widows, 5.3% were single mothers and 4.2% constitute those that were divorced.

Also, the result on the educational qualification of the respondents revealed that 40 respondents which are the majority representing 42.1% have primary education, 31.6% had Adult education, 10.5% of the total respondents constitute those that have quranic education, 10.5% also have secondary education and 5.3% constitute those with tertiary education. The result on a household size of the respondents shows that the majority (65) of the total respondents representing 68.4% have 4-6 household size, 21% of the respondents have 1-3, 5.3% have household size of 7 and above while another 5.3% of the respondents have zero (0) household size (Table 1). The high number recorded respondents between the age of 31-45years implies that most of the respondents are at their active age and are full of energy. This result agreed with that of Alabi, et.al. (2005) who described age 31-45 years as the active age group, thus respondents within this age bracket can withstand the vigor involved in the harvesting, processing, marketing and utilization of *Parkia biglobosa*. The high number of females recorded on the sex of the respondents shows that most of the respondents are females. This implies that, most of those involved in the harvesting, processing, marketing and utilization of *Parkia biglobosa* are females. Similarly, the high number recorded of married respondents implies that most of the respondents are married. This agrees with the findings of Jimoh and Asinwa (2012) who reported that most married women are into one form of forest resources exploitation or utilization because they depend on the income realized to finance their children's education and to meet other household needs. Also, the high number recorded in primary education implies that most of those involved in the harvesting, processing, marketing and utilization of *Parkia biglobosa* are those with lower education. This corroborate Adejumo et al., (2013, 2014) respectively.

Similarly, the high number recorded of 4-6 household size implies that most of the respondents come from farming families and use family labour for their farming. It also implies that most of them are polygamous. This agreed with Zaku (2013a, b) who concluded that a large household size provides family labour, cultivation of large acres of land, high harvest and income from the sales of the surplus from the farm. While this is true only if members of the household partake in the family farm business, a large household with many members could get involved in other livelihoods that could be sources of wealth to aid the household with income which could be used to purchase farm inputs for farm production, purchase of food, payment of children school fees, ease the ability of payment of hospital bills, purchase of household items and some other household needs.

Contributions of *Parkia biglobosa* to household income in Jema'a Local Government Area of Kaduna State.

The result of this finding on the income generated from the utilization and sale of *Parkia biglobosa* in the study area shows that the majority of the respondents (30) representing 31.6% generate ₦100,000 from the utilization and sale of *Parkia biglobosa*, 21.1% of the respondents generate ₦50,000, 15.8% of the respondents generate ₦40,000, 10.5% generate ₦60,000, another 10.5% generate ₦30,000, 6.3% of the respondents generate ₦20,000 and 4.2% of the total respondents generate ₦10,000 respectively (Table 2). The high number recorded of ₦100,000

Table 1. Socio-Economic Characteristics of the Respondents in the Study Area.

Variables	Number of Respondents	Percentages (%)
Age		
1-15 years	6	6.3
16-30 years	25	26.3
31-45 years	45	47.4
46-60 years	15	15.8
61 years and above	4	4.2
Total	**95**	**100**
Sex		
Female	60	63.2
Male	35	36.8
Total	**95**	**100**
Marital Status		
Single	25	26.3
Married	55	57.9
Divorce	4	4.2
Widows	6	6.3
Single Mothers	5	5.3
Total	**95**	**100**
Educational Status		
Quranic Education	10	10.5
Adult Education	30	31.6
Primary Education	40	42.1
Secondary Education	10	10.5
Tertiary Education	5	5.3
Total	**95**	**100**
Household Size		
0	5	5.3
1-3	20	21.0
4.6	65	68.4
7 and above	5	5.3
Total	**95**	**100**

Source: Field Survey, (2021).

implies that the highest amount of ₦100,000 could be gotten from harvesting, processing, utilization and sales of *Parkia biglobosa* in the study area. This agreed with the submission of Babalola (2012) that, *P. biglobosa* provides income and employment to many household members in the savannah region. Trading activities in the raw seeds, powdered fruit pulp, the fermented food condiment (known as Dawadawa), charcoal and firewood among others provide reasonable income and employment. Trading in other small products like knife handles and of hoes, axes and cutlasses also provide additional income respectively.

Various forms of Traditional Utilization of *Parkia biglobosa* in the Study Area

The result on the traditional utilization of *Parkia biglobosa* by the respondents indicated that the majority 90 (94.7%) of the respondents are involved

Table 2. Contributions of *Parkia biglobosa* to household income in Jema'a Local Government Area of Kaduna State.

Variables	Number of Respondents	Percentage (%)
How much did you generate from harvesting, processing and utilization of *P. biglobosa* in Naira per year?		
₦10,000	4	4.2
₦20,000	6	6.3
₦30,000	10	10.5
₦40,000	15	15.8
₦50,000	20	21.1
₦60,000	10	10.5
₦70,000	0	0
₦80,000	0	0
₦90,000	0	0
₦100,000	30	31.6
Total	**95**	**100**

Source: Field Survey (2021).

Table 3. Various forms of Traditional Utilization of *Parkia biglobosa* in the Study Area.

Variables	Number of Respondents	Percentages (%)
Do you use *P. biglobosa* traditionally?		
Yes	90	94.7
No	5	5.3
Total	**95**	**100**
List the various forms of *P. biglobosa* utilized traditionally?		
Fruits/seeds	15	15.8
Fibers	10	10.5
Fish poison	10	10.5
Medicine	20	21.1
Soup ingredient	20	21.1
Timber	20	21.1
Total	**95**	**100**

Source: Field Survey (2021).

in the traditional utilization of *Parkia biglobosa* while 5 (5.3%) are not involved in the traditional utilization of *Parkia biglobosa* in the study area. Also, result on the traditional utilization of *Parkia biglobosa* in the study area revealed that 21.1% of the total respondents use it as medicine, another 21.1%, as soup ingredients; 15.8%, fruit; fiber,10.5%; fish poisoning, 10.5%; building, 10.5% and timber, 10.5% respectively (Table 3).

The high number of respondents that said yes to the traditional utilization of *Parkia biglobosa* implies that they are all involved in the traditional utilization of *Parkia biglobosa* in the study area. The high number recorded on soup ingredients, medicine,

timber, fish poison, fibers, fruits and seeds implied that they are the various forms by which *Parkia biglobosa* were being traditionally utilized in the study area. The findings of the study corroborate Abdallah, (2007); Abubakar, (2009); Adejumo et al. (2013) respectively.

CONCLUSION

The findings of the study show that most of the respondents are females, married and at their active age with large household sizes and very low educational status. An income of ₦10,000.00 to ₦100, 000,00 could be gotten from *Parkia biglobosa*. Similarly, fruits and seeds, fibers, fish poison, medicine, soup ingredients and timber were the various forms of utilizing *Parkia biglobosa* traditionally by all sex and across all ages in the study area.

RECOMMENDATIONS

Based on the major findings above, the followings are recommended;

- Plantation establishment should be encouraged by relevant government authorities given locust bean economic viability and potential for poverty alleviation.
- Plantation of *Parkia biglobosa* should also be established by the government and individuals to prevent the extinction of the species.
- Awareness about the nutritive and medicinal value of *Parkia biglobosa* should be publicized to boost the health condition of the populace.
- *Parkia biglodosa* is threatened in its alternative uses as fuelwood and charcoal. Efforts should therefore be directed towards growing more of the tree to increase its population.
- Sustainable harvesting methods should be used.
- Harvest only the mature trees (selective exploitation)
- Inhabitants of Jema`a should be encouraged to plant *Parkia biglobosa* in their farms and around their houses to reduce the pressure on the wild ones.

Conflict of interest

There is no conflict of interest.

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