Open Access Journal of Chemistry
Volume 4, Issue 1, 2020, PP 17-25
ISSN 2637-5834

Markets and Marketing of African Locust Bean (*Parkiabiglobosa* Benth.) in Nasarawa State, Nigeria

Rotowa Odunayo James*

Department of Forestry, and Wildlife Management, Nasarawa State University Keffi, Shabu-Lafia

***Corresponding Author:** Rotowa Odunayo James, Department of Forestry, and Wildlife Management, Nasarawa State University Keffi, Shabu-Lafia. Email: odunrotowa@yahoo.com., babaaru92@gmail.com*

ABSTRACT

The study was conducted to analyze marketing activities of Parkia biglobosa in Keffi and Lafia Local Government Areas of Nasarawa state with the aim of assessing the structure of parkia marketing system, Identifying the marketing channels for parkia, determining the marketing efficiency and to Identify the constraints to Parkia biglobosa in the study areas,The data was collected using structured questionnaire from a sampling of 60 wholesalers. Data analysis was done using marketing efficiency ratio, market concentration ratio and simple descriptive statistic analysis. Result of all respondents showed that 51.66% of the farmers sell their produce as wholesalers to retailer. The Parkia marketing in the study areas have (4) channels with the principal route of 8.52 the wholesalers marketing cost are the same (N610) per 100kg bag in channel 1 and 3. However 50.0% of the wholesalers were affected by problem of poor transport network faced with other constraints like lack of good storage facility, therefore, provision of roads, storage facilities will go a long way in improving the market structure and the income of the farmers.Furthermore, adequate storage facilities should be provided to aid the production of perkia by the producers.

***Keywords:** Parkia biglobosa, Market strcuture, constraints,Marketing efficiency ratio and Marketing chanels.*

INTRODUCTION

Parkia biglobosa commonly known as locust bean, is a perennial deciduous tree belonging to the family fabaceae, grown in both temperate and tropical areas (Sabiiti and Cobinna, 1992)**.** Parkia biglobosa is an essential spice in most African dishes as result of its abundant nutritional value of vitamin A, protein (Amino-acid) and its pleasant aroma(Hong, *etal*, 1996)**.**The high cost of animal protein has directed interest towards several leguminous seed proteins as potential sources of vegetable protein for human food and livestock feed. Among the plant species, grain legumes are considered as the major source of dietary proteins. They are consumed worldwide, especially in developing and under developed countries where consumption of animal protein may be limited as a result of economic, social, cultural or religious factors (Sabiiti and Cobinna, 1992)**.**

It is quite disheartening to note that the producers and marketers of this product live below poverty line most especially, in the south western part of Nigeria (AAUA, 2011) it has beenobserved that there were many factors responsible for their low economic standard they live below 1$ per day (Kopell, 1993) the larming factors militating against are:

Poor ethical business practices, Unhygienic conditions of the production and marketing site, Absence of proper packaging and preservation techniques, Lack of saving and investment culture (Nwoboshi, 1982).

Locust bean marketing is done locally in rural market for domestic consumption inform of snacks. In Nigeria the supply of locust bean for marketing is through suppliers (rural assemblers) buyers who principally use midlemen located in small town to obtain the product (Morris, 2004). This research work is therefore aimed at improving the social, economic and enveronmental wellbeing of producers, retailers and consumers of locust bean.

BOTANIC DESCRIPTION OF *Parkiabiglobosa*

Parkiabiglobosa is a perennial deciduous tree with a height ranging from 7 to 20m, although it can reach 30m under exceptional conditions.

Crown large, spreads wide with branches low down on a stout bole; amber gum exudes from wounds; bark dark grey brown, thick, fissured. Leaves alternate, dark green, bipinnate to 30cm long, pinnae up to 17 pairs with 13-60 pairs of leaflets, 8-30mm x 1.5-8mm, of distinctive shape and venation. Leaflets held on a long rachis. Peduncles 10-35cm long; capitula 4.5-7cm long and 3.5-6cm in diameter, Hermaphrodite flowers orange or red in colour: calyx 10-13 (16 max.) mm; corolla 10-14 (17 max.) mm long, lobes very short 1-3 mm long, connate in the middle and free or connate at base; filaments exerted about 4mm beyond calyx mouth. Nectar-secreting flowers: calyx about 6-7 mm long. Staminodial flowers: calyx about 5.5-7 mm long, filaments exerted 2-3 mm beyond calyx mouth. Pods, pink brown to dark brown when mature, about 45cm long and 2cm wide; may contain up to 30 seeds embedded in a yellow pericarp. Seeds have a hard testa, are large (mean weight 0.26 g/seed) with large cotyledons forming about 70% of their weight (Sabiiti and Cobinna, 1992).

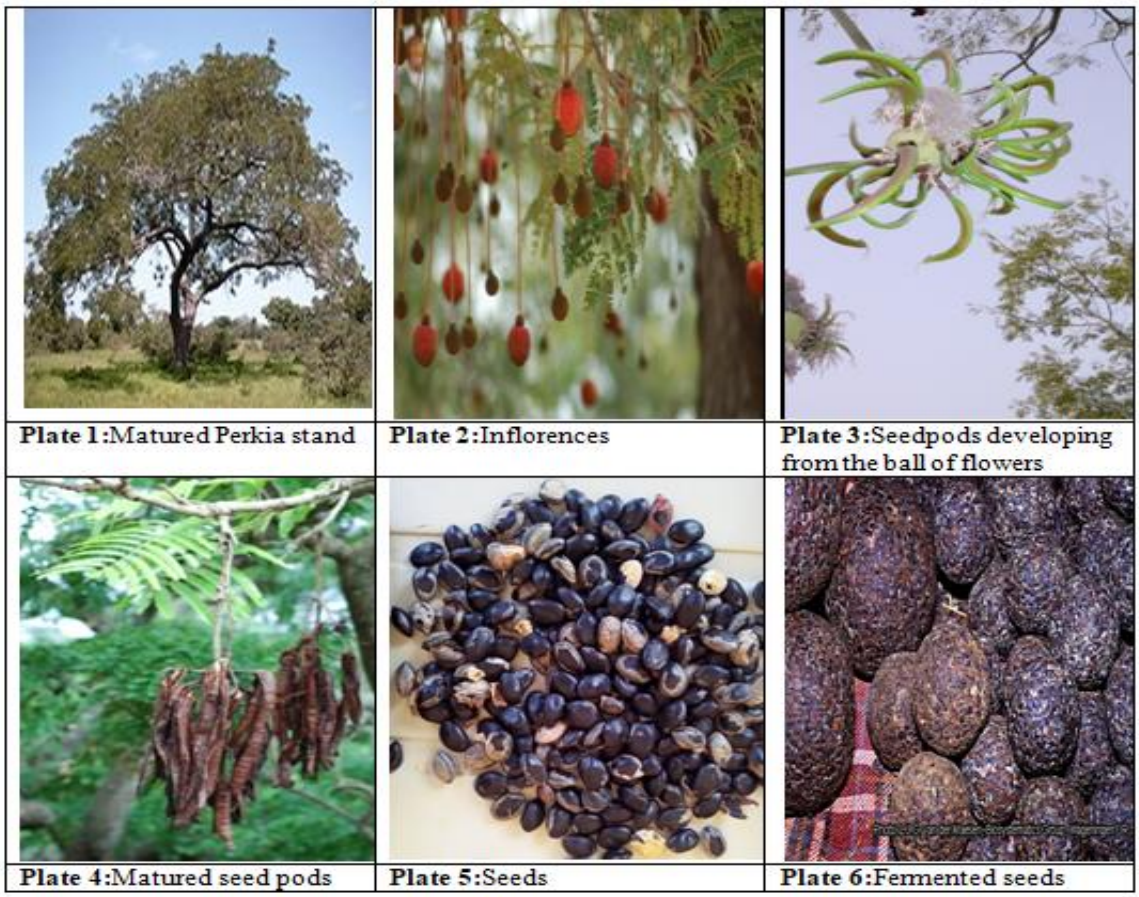


Plate 1: Matured Perkia stand | **Plate 2:**Inflorences | **Plate 3:**Seedpods developing from the ball of flowers

Plate 4: Matured seed pods | **Plate 5:**Seeds | **Plate 6:**Fermented seeds

Biology

Anthesis is at dusk; large quantities of nectar and pollen are produced, and capitula may smell foetid and fruity like cow manure(Booth and Wicken, 1988)**.**Pollination is by bats including *Eidolinhelvum, Epomophorusgambianus, Micropteropuspusillus and Nanonycherisveldkampi;* seed set can occur in the absence of bats; honeybees, flies, wasps, ants, tenebrionid beetles and tettigometid bugs may be involved; sunbirds also visit the capitula but contribute negligibly in pollination; it is possible that some degree of self-incompatibility may also occur(Bonkougou, 1999).

Trees 1st fruit at 5-10 years; they vary in precocity; fruits start to ripen just before the 1st rains and continue over most of the season; each hermaphrodite flower is potentially capable of producing a single pod, but this does not happen; up to 20 pods may develop per head, but there are usually fewer dispersed by animals and birds eating fruits or seeds; pods are eaten by chimpanzees (which sometimes spit out the seeds), baboons, parrots and possibly hornbills; seeds have a thick, resistant testa that can possibly pass through the animal gut unharmed and dormant (Christiana,*etal.*, 2008).

Ecology

Parkiabiglobosa occurs on a wide range of natural and semi-natural communities such as open savannah woodlands, but it is most conspicuous and abundant in anthropic

communities, principally bush fallow and wooded farmland where cultivation is semi-permanent (Trayore, 1998). The tree can also grow on rocky slopes, stony ridges or sandstone hills. It is a fire-resistant heliophyte (Orwa, *etal.*, 2009).*P. biglobosa* occurs in a diversity of agro ecological zones, ranging from tropical forests with high and well-distributed rainfall to arid zones where mean annual rainfall may be less than 400 mm. It has a capacity to withstand drought conditions because of its deep taproot system and an ability to restrict transpiration (Orwa, *etal.*, 2009).

OTHER PRODUCTS OF *Parkiabiglobosa*

Food

Seeds are fermented to make dawadawa as called by Hause and Iru in Youba (Fig 6), a black, strong-smelling, tasty food high in protein. Dried fermented seeds keep for more than a year in traditional earthenware pots without refrigeration, and small amounts are crumbled during cooking into traditional soups and stews that are usually eaten with sorghum- or millet-based dumplings and porridges (Ikenebomeh, andKok, 1984). Because of the savoury taste and the high protein and fat values of the seed, it is sometimes described as a meat or cheese substitute, but it is not usually eaten in large amounts. Dawadawa is rich in protein, lipids and vitamin B2. Parinaricuratellifolia is deficient in the amino acids methionine, cystine and trytophan, but fermented beans are rich in lysine (Ikenebomeh, 1986). The fat in the beans is nutritionally useful (approximately 60% is unsaturated). Seeds are used as a coffee substitute. Seeds are embedded in a mealy pulp sometimes called dozim, which is high in energy value. It contains up to 29% crude protein and up to 60% saccharose, is rich in vitamin C and high in oil content. The pulp is eaten raw or made into a refreshing drink and is used as a sweetener (Dike, and Odunfa, 2003). For storage, it is pressed into a cake. The fruit provides emergency food during severe droughts (Plate 5 and 6).Young pods are sometimes roasted on embers and eaten. Leaves are edible but not commonly eaten. The leaves are mixed with cereal flour and eaten or fermented into balls and used in sauces (Ikenebomeh, 1986).

Fodder

Whole pods are eaten by domestic stock, including cattle. The young seedlings are nutritious and heavily browsed by livestock (Ogbeibu, 2005). An important attribute of *P. biglobosa* trees is that most of their leaves remain green throughout the dry season and branches are lopped and used as fodder (Omafuvbe,*etal*, 2004). Seeds are rich in calcium, sodium, potassium and phosphorus (El-Adawy, 2002).

Apiculture

P. biglobosa attracts bees and is a popular tree among beekeepers (Ogbeibu, 2005).

Fuel

Branches are sometimes lopped for firewood.

Fibre

Pods and roots are used as sponges and as strings for musical instruments (Ogbeibu, 2005).

Timber

Wood is whitish, moderately heavy, 580-640 kg/cubic m when air seasoned, relatively hard and solid; it smells unpleasant when newly felled, but seasoning does not take long and only occasionally causes shape distortion; easily worked by hand or power tools; nails, glues, varnishes and paints well; mainly useful as a light structural timber, for example, for vehicle bodies, agricultural implements, boxes, crates and barrels, furniture, mortars and pestles, bowls (Christiana., *etal*, 2008)

Planks and Carvings

Twigs are used to clean teeth; bark stains mouth red and contains saponins that clean teeth (Alder and Roessler, 1997).

Gum or Resin

Mucilage from part of fruit is made into a fluid and used for hardening earth floors and to give a black glaze in pottery; gum exudate is protein aceous and contains as the constituent sugars galactose, arabinose, glucuronic and 4-0-methyglucuronic acid. (Osman, 2007)

Tannin or Dyestuff

Husks of pods mixed with indigo improve the lustre of dye products. Seeds and bark contain tannin, and bark is used in tanning (Osagie, 1998)

Alcohol

Fruit pulp can be fermented into an alcoholic beverage (Hopkin, 1983).

Poison

Bark and pods contain piscicides; the alkaloid parkine that occurs in pods and bark may be responsible (Osagie, 1998).

Medicine

Bark is used as a mouthwash, vapour inhalant for toothache, or for ear complaints (Weiss, 1984). It is macerated in baths for leprosy and used for bronchitis, pneumonia, skin infections, sores, ulcers, bilharzia, washes for fever, malaria, diarrhoea, violent colic and vomiting, sterility, venereal diseases, guinea worm, oedema and rickets, and as a poison (Mbajunwa, 1995)

Antidote

Leaves are used in lotions for sore eyes, burns, haemorrhoids and toothache. Seed is taken for tension, and pulp for fevers, as a diuretic and as a mild purgative. Roots are used in a lotion for sore eyes.Other products: Burnt husks are added to tobacco to increase its pungency. Pulp is supposedly a water purifier but possibly just sweetens and disguises taste of foul water (Mbajunwa, 1995; Ajala and Adeseyinwa, 2008).

SOCIAL-ECONOMICAL SERVICES OF *Parkiabiglobosa*

Shade or Shelter: *Parkiabiglobosa* is a useful windbreak and shade tree.

Soil Improver: Soils under *Parkiabiglobosa* trees are improved by leaf fall.

Agro-Forestry and Taungya System: Intercropping It is common practice to grow several crops such as maize, cassava, yams, sorghum and millet under *Parkiabiglobosa* canopy (Alonso and Mazo, 1998).

Pests and Diseases of *Parkiabiglobosa*

Insects, small rodents or livestock may damage the seedlings, but they survive easily and the leaves are quickly replaced (Addy, *etal*, 1995). A weevil and the pyralid moth have been observed on the fruits; the moth eats both pulp and seed. Leaves are attacked by Lepidoptera of 4 families, and timber is readily attacked by insects such as termites, by marine borers and by fungi. Fungal attacks cause discolouration and considerably reduce the value of the tree and it products, (Odunfa, 1986).

MATERIAL AND METHODS

Description of the Study Area

Keffi Local Government Area (LGA) is located in the western part of Nasarawa State. It lies between latitude 7^{o} and 9^{o} North and Longitude 7^{o} and 10^{o} East, it shares boundaries with Kokona LGA to the South and Karu LGA to the west. Keffi LGA has a distance of 50km from Federal Capital Territory (FCT) Abuja and 121km from Lafia, the State Capital. The area has mean annual tenmperature ranging between 25^{0}C – 36^{0}C and mean annual rainfall of 1500mm. The major occupation of people in the area is farming while the dominant ethnic groups are Hausa Afo, Gbagyi, Gwandara, Mada and Eggon. (Nasarawa State Ministry of Information, 2006). Lafia, (08^{0} 35’^{N}, 08^{0} 33’^{E}), located in the Guinea Savannah zone of North Central Nigeria at an altitude of about 177m above sea level. The mean monthly maximum temperature range is between 35.06^{0C} to 36.40^{0C} and 20.16^{0C} to 20.50^{0C} respectively while the mean monthly relative humidity and rainfall are 74.67% and 168.90mm respectively (Jayeoba, 2013).Agriculture is the most important occupation of the people in the areas. Land cultivation is purely the work of men while the women and children are saddled with the responsibilities of selling the farm produce. Some members of the communities are Civil Servants (Rotowa.,*etal*, 2018)

Sample and Sampling Techniques

A preliminary survey was conducted to determine the number of various agents involved in marketing of *Parkia biglobosa*products in the selected villages and markets the result of the survey showed that on the average, 30 wholesaler participate on each market during the market days. Based on the above result, in each of the villages and markets, (5) five wholesaler was randomly sampled for the study which gives a total of 30 respondents for the study.

Data Collectionand Analysis

The primary data for the study was collected using structured questionnaire, the data were collected from respondents using (1) one sets of questionnaire for the wholesalers. The data collected were analyzed using descriptive statistics like marketing efficienct ratio, market concentration ratio, and frequency percentage and mean.

- Marketing efficiency of the various channels for the marketing of Parkia products. the marketing efficiency ratio is specified as follows.

$$\text{Market efficiency ratio (MER)} = \frac{\text{Ratio of consumer price}}{\text{Marketing cost} + \text{margin}} \ldots\ldots\ldots 1$$

Where the ratio of consumer price is the price consumer paid for one 1kg of Parkia biglobosa marketing cost is the cost incurred when conducting marketing activities

Marketing margin = Mm 2sp – sp2.

Where:

Mm = Marketing margin

Sp1 = Selling price

Sp2 = Supply price

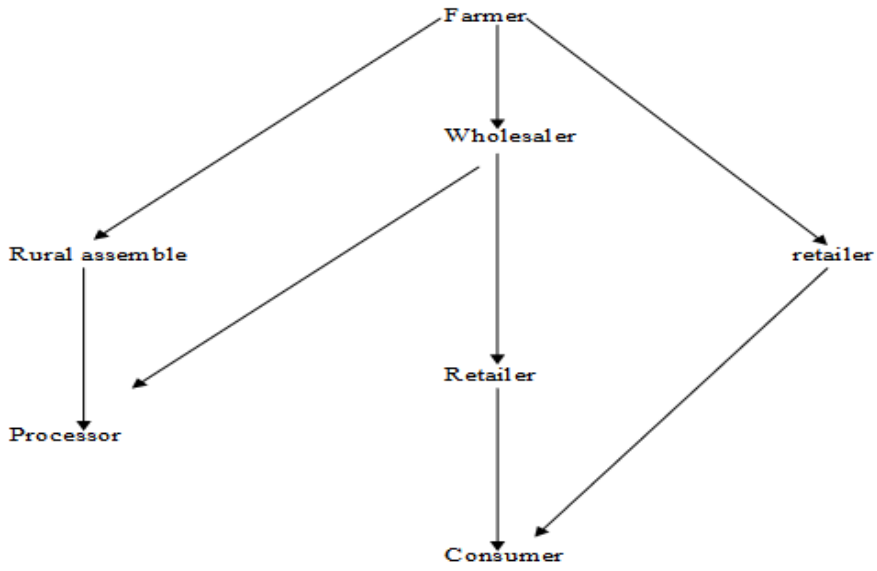
The most efficient marketing channel will have the highest Marketing Effieiciency Ratio (MER). The identified channels were therefore ranked based on the value of market effieincy ratio computed.

- The market concentration ratio according to (Ajala and Adesehinwe, 2008) was used to assess the market structure for parkia biglobosa.

$$\text{Market concentration ratio (CR)} = \frac{\text{Sales volume of largest four firm x 100}}{\text{Total sales volume}} = \cdots \ldots .2$$

If the result of market concentration ratio is less than 33%, the market is said to be unconcentrated or perfect competitive, if between 33% and 50% the market is oligopolistic in nature, if is greater than 50% it is monopolistic in nature(Ajala and Adesehinwe, 2008).

Fig 1: Chat showing the market channels of Parkia in Keffi and Lafia Local Government of Nasarawa State



RESULTS

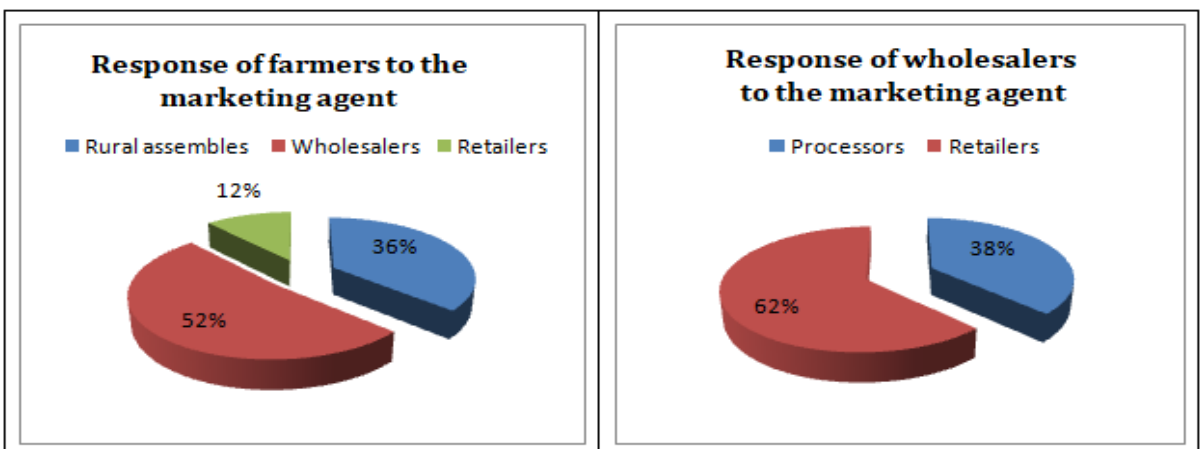


Chart 1 and 2: ShowingMarketing Channels of Respondent

Marketing Channels of Respondent

Majority of the farmers (51.66%) sell their product to wholesalers, (36.66%) of the farmers sell to rural assemblers while (11.66%) sells to retailers. It was also revealed that most of the wholesalers (71.66%) sell to processors and (28.33%) of the wholesalers sell to the retialers.(Chart 1 and 2). This shows that there is free flow of markrting information in the study area and that there is sufficient and good knowledge of price information among the respondents.

Furthermore, from the feild intervew, it was duduced that price fixing was by bargaining due to quantity traded, to current price, and from group decision.Although Asogwa and Okwoche (2012) reported tharprice fixing among sorghum sellers in Benue state is majorlly by bargaining.

The result of marketing price spread, marketing cost, and distribution channels of parkia further shows the producers prices in the four channels, cost incured and margin of the various market participants in each of the channels that is; in all the channels the farmers (Producer) price was N13,000per 100kg bag and as well paid by the producers in channel 1 and 3, whie the processors pays N14,500 in chenels 3 and 4 while consumers pays 15,000 in chanes 1 and 2 respectively. The wholesaler marketing cost are the same (N610) per 100kg in channel 1 and 3(Table 1) .The result of market efffiency ratio reveled that of all the 4 channels of marketing *Parkia biglobosa*, channel 4 (8.52) is more effient followed by channel 3 with 6.87 while channel 1 had the least value of 4.16.The low marketing efficiency ratio in parkia marketing in channel 1,2 and 3 are attributed to cost of marketing activities and numbers of middlemen involved (Table 2). This result is inline withsorghum marketers in Benue state where the producer sells their sorghum mostly to marketing agents accounting for over half of the populusion while retailers, wholesalers and individuals are other means. Asogwa and Okwoche (2012). This is largely responsible for the low level of market margin earned by the respondents.

Table 1: Marketing price spread, marketing cost, and distribution channels of parkia

Particulars	Channel 1 (N)	Channel 2 (N)	Channel 3 (N)	Channel 4 (N)
Price recieved by farmer	N13,000	N13,000	N13,000	N13,000
Price paid by rural assemblers	-	-	-	N13,000
Cost in cured	-	-	-	N200
Margin	-	-	-	N1500
price paid by wholesaler	N13,000	-	N13,000	-
Cost incured	N610	-	N610	-
Margin	N2000	N2000	-	-
Price paid by processor	-	-	N14500	N14500
Price paid by consumer	N15,000	N15000	-	-

Table 2: marketing efficiency ratio accross various channels

Channels	Marketing efficiency ratio	Rank
Channel 1	4.16	4
Channel 2	5.93	2
Channel 3	6.87	3
Channel 4	8.52	1

The result of the constrains of marketing *Parkia biglobosa*shows that (50.0%) of the wholesalers were affected by the problems of poor transportation network (20.0%) inadequate storage facilities and (8.33%) lack of market information (Chart 3). This result agrred with that of Asogwa and Okwoche (2012) who also reported thatthe common obstacle faced by sorghum marketers in benue state is majorly from hightaxes during transportation, poor rural roads, lack of central market, robbery. This indicates that the hig expenditure incurred by the marketers especiallydue to poor roads, high or multiple taxes during transportation increase the market costs which seriously reducethe market margin coupled with the exploitative activities of the middlemen.

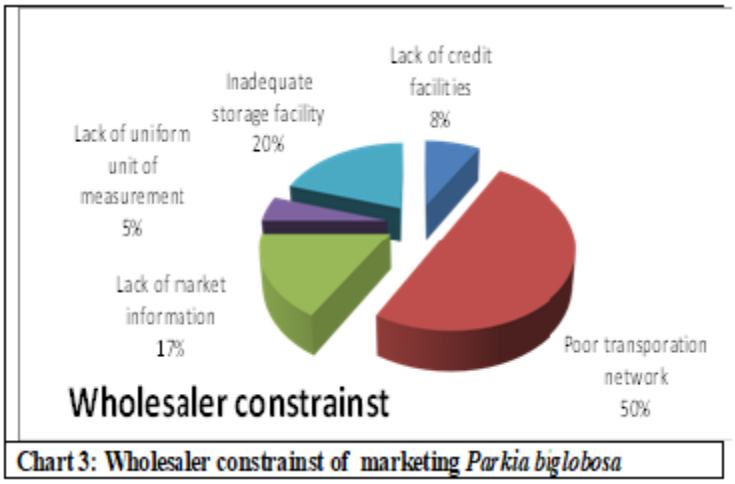


Chart 3: Wholesaler constrainst of marketing *Parkia biglobosa*

The marketing efficiency of all the four identified channels in Keffi and Lafia Local Government Areas of Nasarawa state are computed as follows:

- Marketing efficiency ratio for channel 1

$$ME_1 = \frac{\text{Ratio of consumer price}}{\text{Marketing cost + margin}} = \frac{15500}{610 + 2000} = 5.93 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

- Marketing efficiency ratio for channel 2

$$ME_2 = \frac{\text{Ratio of consumer price}}{\text{Marketing cost + margin}} = \frac{15500}{610 + 2000} = 5.93 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

- Marketing efficiency ratio for channel 3

$$ME_3 = \frac{\text{Ratio of consumer price}}{\text{Marketing cost + margin}} = \frac{14500}{610 + 1500} = 6.87 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

- Marketing efficiency ratio for channel 4

$$ME_1 = \frac{\text{Ratio of consumer price}}{\text{Marketing cost + margin}} = \frac{14500}{200 + 1500} = 8.50 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6$$

CONCLUSION

The study analysed the market and marketing activities of Parkia in Keffi and Lafia Local Government Areas of Nasarawa State. An illustrration of marketing channels, marketing efficiency ratio and simple discriptive statistics. Channels revealed that the flow of Parkia occur through four recognizzed channels

Fig2. *Marketing Channels of Parkia in the study areas*

Channels	Route
1	-Producers → Wholesalers → retailers → consumers
2	-Producers → retailers → consumers
3	-Producers → Wholesalers → processors
4	-Producers → Rural assemblers → processors

The study revealed that farmers and marketers are faced with quite a lot of problems such as poor transport network, lack of market information, and inadquate monopolistic in nature.

RECOMMENDATION

Base on the result of the study, it is recommended that govermet should improved the performance of farmers and marketers in the marketing of Parkia through rehabilitation of feeder roads in order to link the rural producing areas to the urban market centre to help address the problem of transportation. Furthermore, adequate storage facilities should be provided to aid the production of perkia by the producers. Extension agents should extend their services to the farmersin providing relevant market informations asmany farmerslacks relevant market information.

REFERENCES

[1] AAUA Site (2011). Agro forestry Database of *Parkiabiglobosa*

[2] Addy, E.O.H., L.I. Salami, L.C. Igboeli and S.H. Remawa, (1995). Effect of processing on nutrient compositionand anti-nutritive substances of African locust bean (*Parkiafilicoidea*) and baobab seed (*Adansoniadigitata*). Plant Foods Hum. Nutr., 48: 113-117.

[3] Ajala, M.K. and Adersehinwa A.O.K. (2008). Analysis of pig marketing in Zango Kataf Local Government Area of Kaduna State, Nigeria tropiculture, Vol. 4, Pp. 229 – 339

[4] Alder, H.L. and E.B. Roessler, 1977.Introduction to condiments. Pak. J. Nutr., 3: 140-145. Probability and Statistics (6th edition). Freeman W.H., San Francisco, pp: 1-426.

[5] Alonso, R., E. Orue and F. Marzo, (1998).Effects of extrusion and conventional processing methods on protein and anti-nutritional factor contents in peaseeds. Food Chem., 63: 505-512.

[6] Asogwa B.C and Okwoche V.A (2012): Marketing of Agricultural Produce among Rural FarmHouseholdsinNigeria: The Case of SorghumMarketing in Benue State international Journal of Business and Social Science Vol. 3 No. 13; July 2012 pp 269- 277

[7] Bonkougou E.G, Djimde M, Ayuk E.T, Zougrana I, Tchoundjeu Z. (1999). The market potential of parkland trees: Agroforestry Today. 11(1-2):13-15.

[8] Booth F.E.M, Wickens G.E. (1988). Non-timber uses of selected arid zone trees and shrubs in Africa. FAO Conservation Guide. No. 19. Rome.

[9] Christiana N. Esenwah, Marcel J and Ikenebomeh (2008): Processing Effects on the Nutritional and Anti-Nutritional Contents of African Locust Bean (*Parkiabiglobosa* Benth) Seed. Pakistan Journal of Nutrition Vol 7 (2): 214-217, 2008 ISSN 1680-5194 Asian Network for Scientific Information, 2008.

[10] Dike, E.N. and S.A. Odunfa, (2003). Microbiological and biochemical evaluation of a fermented soyabean product-soyadawadawa. J. Food Sci. Tech., 40: 606-610.

[11] El-Adawy, T.A., (2002).Nutritional composition and anti-nutritional factors of chickpeas (*Cicerarietinum L.*) undergoing different cooking methods and germination. Plant Foods Hum. Nutr., 57: 83-97.of some processing techniques on the anti-nutrient contents of baobab seeds (*Adansoniadigitata*). Biores Tech., 59: 29-31.

[12] Hong T.D, Linington S, Ellis R.H. (1996). Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4.IPGRI.

[13] Hopkins H.C. (1983). The taxonomy, reproductive biology and economic potential of Parkia (Leguminosae: Mimosideae) in Africa and Madagascar. Botanical Journal of the Linnean Society. 87:135-167.

[14] Ikenebomeh, M.J., (1986). African locust bean fermentation-some physico-chemical parameters .Nig. J. Appl. Sci., 4: 101-108.

[15] Ikenebomeh, M.J. and R. Kok, (1984). Mass balance of the processing and fermentation of the African locust bean (*Parkiafilicoidea* Welw.). J. Can. Inst. Food Sci.Tech., 17: 48-50.

[16] Jayeoba, O.J (2013). Land suitability elevation for arable agriculture in Nasarawa state using Geo-information. A Ph.D thesis department of geography, Nasarawa StateUniversity Keffi. Pp. 247

[17] Kopell, C. (1993). Establishing marketing information system field test sites in the philippines and the Solomon Islands June 1993 (Trip report) FAO Rome.

[18] Moris, N.J. (2004) Bennisseed maiden edition. Raw material research development council report on survey of Agroc raw material in Nigeria.

[19] Nasarawa State Ministry of Information (2006)

[20] Nwoboshi, L.C. (1982). Tropical Silviculture: Principles and practice. Ibadan University Press, Ibadan, Pp: 333.

[21] Ogbeibu, A.E., (2005). Biostatistics, a Practical Approach to Research and Data Handling. Mindex Publishing Company Ltd. Benin City, Nigeria, pp: 264.

[22] Mbajunwa, O.K., (1995). Effect of processing on some anti-nutritive and toxic components and on the nutritional composition of the African oil bean seed (*Pentaclethra macrophylla* Benth.). J. Sci. FoodAgric., 68: 153-158.

[23] Odunfa, S.A., (1986). Dawadawa. In: Reddy, N.R., M.D. Pierson and D.K. Salunkhe (Eds.), Legume Based Fermented Foods. CRS Press, Boca Raton, Florida,pp: 173-189.

[24] Omafuvbe, B.O., O.S. Falade, B.A. Osuntogun and S.R.A. Adewusi, (2004). Chemical and biochemical changes in African locust bean (*Parkiabiglobosa*) and melon (*Citrullusvulgaris*) seeds during fermentation

[25] Osagie, A.U., (1998). Anti-nutritional factors. In: Osagie, A.U. and O.U. Eka (Eds.), Nutritional Quality of Plant Foods. Post-harvest Research Unit, Department of Biochemistry, University of Benin, Benin-City, Nigeria, pp: 221-244.

[26] Osman, M.A., (2007). Effect of different processing methods on nutrient composition, anti nutritional factors and *in vitro* protein digestibility of Dolichoslablab bean [*Lablab purpuresus* (L) Sweet]. Pak. J.Nutr., 6: 299-303.Pearson, D., 1970.The Chemical Analysis of Foods (7thedition). Churchhill Livingstone, Edinburgh, pp: 6-25.

[27] Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. (2009) Agroforest tree Database:a tree reference and selection guide version 4.0 http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp)

[28] Rotowa, O. J., Falade, L. O., Ugonma, D. A., and Bhadmus, H. B. (2018). Effects of Human Activities on Wildlife: The Nigerian Situation and Way-Forward. *International Journal of Applied Research and Technology. 7(9)*: 30 – 38.

[29] Sabiiti EN, Cobbina J. (1992). *Parkiabiglobosa*: a potential multipurpose fodder tree legume in West Africa. The International Tree Crops Journal. 7:113-139.

[30] Traore F. (1998). Use of woody and non-woody products for the preparation of foods in Konodimini in Segou region. Bamako, Mali: University of Mali. 42p.

[31] Weiss, E.A. (1984). Oil seed crop Longman Inc. New york Pp. 282 – 287.

Citation: *Rotowa Odunayo James "Markets and Marketing of African Locust Bean (Parkiabiglobosa Benth.) in Nasarawa State, Nigeria", Open Access Journal of Chemistry, 4(1), 2020, pp. 17-25*