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Biotechnol. Agron. Soc. Environ. 2008 **12**(1), 47-55

Uses and commercialization of *Borassus akeassii* Bayton, Ouédraogo, Guinko non-wood timber products in South-Western Burkina Faso, West Africa

Joséphine Yaméogo [1,2], Mamounata Belem/Ouédraogo [2], Jules Bayala [2], Makido Bertin Ouédraogo [1], Sita Guinko [1]

[1] Université de Ouagadougou. Laboratoire de Biologie et Écologie végétales. 01 BP. BF-7021 Ouagadougou (Burkina Faso). E-mail: finayame@yahoo.fr
[2] Centre national de la Recherche scientifique et technologique. Institut de l'Environnement et de Recherches agricoles (CNRST/INERA/DPF). 03 BP. BF-7047 Ouagadougou (Burkina Faso).

Received on March 21, 2006, accepted on September 4, 2007.

Borassus akeassii called " rônier " in French marks the South-Western landscape of Burkina Faso and plays an important role in local people livelihood. The present article is about this species uses and its socio-economic roles. Investigations have been made in three villages and in Banfora markets. The interviewed people were the villagers, extractors and retailers of sap, the outfitters and retailers of handicraft products. Some quantifications of sap and handicraft objects produced and sold have been conducted with the actors of the sector. Financial fallout has been also studied taking into account the high and low production periods. The results revealed that five parts of the tree were used as food, six as medicine and three in handicraft. Product prices varied with the period of production, the category of the seller and the object dimension. In dry cold period, from November to February, sap trading yielded net incomes of 277347 ± 94653 FCFA for the extractors whereas the incomes amounted to 319368 ± 163969 FCFA from March to October. A craftman could get a net income of 277933 ± 2787 FCFA during the high production period and 110383 ± 25371 FCFA during the low production period. Due to such an importance, there is a need for research program on the resource base, the improvement and management of the species. A better organization of the actors of the sector will improve their access to market information, to know the requirements of the market and to be aware of the impacts of product quality on the profit of the actors of the sector.
Keywords. *Borassus akeassii*, uses, commercialization, agroforestry parkland.

Usages et commercialisation des produits non ligneux de *Borassus akeassii* Bayton, Ouédraogo, Guinko dans le Sud-Ouest du Burkina Faso, Afrique de l'Ouest. *Borassus akeassii*, appelé " rônier " en français, est une espèce qui marque le paysage agraire du Sud-Ouest du Burkina Faso et qui joue un rôle important dans la vie des populations. Le présent article porte sur les usages et le rôle socio-économique de cette espèce. Des enquêtes ont été menées dans trois villages et dans les marchés de Banfora. Les personnes interrogées étaient les ressortissants de ces villages, les extracteurs et revendeuses de sève, les confectionneurs et revendeurs d'objets artisanaux. Des quantifications de sève et d'objets artisanaux produits et vendus ont été faites auprès des acteurs de la filière. Les retombées financières ont été également évaluées en fonction des périodes de forte et de faible production. Les résultats ont révélé que cinq parties de l'arbre entrent dans l'alimentation, six dans la pharmacopée et trois dans l'artisanat. Les prix des produits fluctuent en fonction des périodes de production, du type de vendeur et de la taille de l'objet. En saison sèche froide, de novembre à février, le commerce de la sève procure à l'extracteur des bénéfices de 277347 ± 94653 FCFA tandis que ce bénéfice s'élève à 319368 ± 163969 FCFA pour la période de mars à octobre. Un artisan peut avoir un bénéfice de 277933 ± 2787 FCFA en période de forte production et de 110383 ± 25371 FCFA en période de faible production. Du fait d'une telle importance, il s'avère nécessaire d'élaborer des programmes de recherche sur la ressource, l'amélioration et la gestion de cette espèce. Une meilleure organisation des acteurs de la filière permettrait d'améliorer leur accès à l'information sur le marché et d'aider à connaître les exigences du marché ainsi que l'impact de la qualité des produits sur le profit des acteurs de la filière.
Mots-clés. *Borassus akeassii*, usages, commercialisation, parc agroforestier.

1. INTRODUCTION

Preservation of trees in farmed fields in arid and semi-arid zones of Africa constitutes a common practice to alleviate climatic risk because of the products provided by preserved trees to local people and also because of their ecological functions (Lamien et al., 1996; Boffa, 1999). Thus these trees play a key role in the daily life of people who, in some circumstances, tend to overuse them. Due to this tendency of overusing, the sustainable use of trees in farmed lands is the main objective of the national strategic and action plan for biologic diversity conservation of Burkina Faso (Co. na.ges.e, 2000).

In general diverse species composition, some farmed fields are exclusively composed of one species. *Borassus akeassii* previously called *Borassus flabellifer* (Bayton et al., 2006) is one of the species that can form such type of parklands. This species occurs in many countries of Sub-Saharan Africa like Senegal, Mali, Ivory Coast, Niger and Burkina Faso (Aké et al., 1996). The intensity of the exploitation of this species in its range of distribution varies in accordance with the uses known by local people where it occurs. For instance this species, widespread in South-Western Burkina Faso, appears to be well exploited in this zone by the local population contrary to the little use made by Eastern population of the same country (Guinko et al., 2004). Despite such importance in the South-Western part of Burkina Faso, up to date no specific assessment of the socio-economic impacts of this species has been done in a way to show its real contribution to the livelihood of people exploiting it. A rather broader study was conducted by Hasberg et al. (1989), which revealed that a total of 40 products of the species were encountered in the markets of Banfora (the biggest town of South-Western Burkina Faso) out of which 15 cost more than 200 FCFA[(1)].

Thus, apart from self-consumption and uses, the products of *B. akeassii* are also sold in market places and may constitute an important income generating resource provided appropriate policy is adopted (Lamien et al., 1996). However, in the absence of proper information, there is a need to generate data with this respect to serve as base of measures to ensure a sustainable exploitation of this resource by people who rely on it. The main objective of the present study is to contribute generating such data that can be used to elaborate some options of a better management of this important resource for the South-Western population of Burkina Faso.

[(1)] 550 FCFA = 1 USD (valeur 2002-2003).

2. SITE OF STUDY

The three villages (Siniéna, Kiribina, Tékouna) where the study was carried out belong to Comoé Province in the South-Western Burkina Faso (13°38' latitude W and 4°46' longitude N). These villages are respectively located at 10 km, 3 km and 5 km from Banfora, the biggest town of the region. The climate of this area is Sudano-Guinean type characterized by one humid period running from May to October and one dry period from November to April (Guinko, 1984). The mean annual rainfall is 1200 mm and the temperature varies between 24°C and 37°C. *B. akeassii* is the main dominant species of agroforestry parklands of the studied sites followed by *Blighia sapida, Vitellaria paradoxa, Parkia biglobosa, Tamarindus indica* and *Faidherbia albida* (Ouédraogo, 1995).

3. METHODS

3.1. Surveys

The study was carried out during one year from November 2002 to October 2003, in order to capture the variations of prices, quantities of products made and sold during the two periods of the year. A group survey according to the MARP, i.e. Méthode Accélérée de Recherche Participative (Gueye, 1994) and individual interviews were combined in the present study. Group interviews were conducted with all the assembly of each village, including old men, to investigate the different uses of *B. akeassii*, the periods of sap production and the quantities produced. Questionnaires were submitted to 75 persons per village who practice sap extraction and 75 craftsmen who produce handicraft objects, using materials from *B. akeassii*. We studied sap commercialization issues with two groups of vendors at Banfora: 10 holders of small stations, 10 holders of big ones. These station holders were all women. The small stations received per day 55.6 ± 13.3 liters of sap and the big stations 225.4 ± 70.5 liters. Additionally to the station holders, 75 retailers of handicraft objects have been interviewed. Let's note that 60% of handicraft objects retailers were women. Data collection included also the provenance of the products and the factors influencing the prices.

3.2. Data handling considerations

On average 100 trees·ha^{-1} of *B. akeassii* were registered in agroforestry parklands of the study area. Each sap extractor indicated the number of trees he could extract per day which was 15 ± 3 trees. For sap quantification, two periods were considered, i.e. one

with high availability of the product from November to February (dry cold period) and another with low availability from March to October (hot period). Within each period and during three weeks, we monitored the quantities of sap extracted by the extractors. Based on these data we calculated the daily average production per tree and deducted the monthly average production and the quantities produced for each period. The same method was used to calculate mean quantities of objects made and sold by each craftsman. The monitoring of sap quantities received and sold by the retailers was done during three weeks in each period of production whereas the monitoring of handicraft products received and sold by retailers was carrying out during one month in each period.

The monitoring of sap prices was done with extractors and two categories of dealers comprising big and small stations. A liter of sap costs 50 FCFA with the extractor and 60 FCFA with sap retailers. Similarly, the monitoring of the prices for the handicraft products took into account the outfitters and the dealers.

For financial fallout evaluation, the turnover was considered to be the amount of money the seller obtained after selling without deducting the expenses. By deducting the expenses from turnover, we obtained net income. The expenses were mainly purchase costs of products, costs of material used, labor and taxes. Labor was generally provided by the members of the families. Sap extraction and commercialization for the extractors required two persons. Their salary was estimated at 10000 FCFA per month based on the local cost of labor. To run a small station requires two persons whose salary was estimated at 3000 FCFA per month and per person. To run big stations, three persons were needed, the main seller salary was 10000 FCFA per month while the salary of the two assistants was 5000 FCFA per month and per person. For outfitters, labor varied with the period of production. During high production period an outfitter hired 3 other persons with a salary of 7500 FCFA per month and per person while during low production period (because of field works) only two persons were required and their salary was 3000 FCFA per month and per person. Handicraft products retailers hired two persons for labor at 5000 FCFA per month and per person.

During a year, the expenses of an extractor of sap comprise essentially the costs of bottles, calabashes, canaries, plastic explosive ropes, pulls, knives and bicycle inner tubes (for deliveries in town). On average the amount of money expended for these items is 9996 FCFA (833 FCFA per month). The net incomes could completely belong to the owner of the trees in 77% of the cases in which the extractors worked alone. In some other cases the extractors were not the owners of the trees and therefore have to share half-half the incomes with the owners. We assumed that the expenses made for acquiring bottles, calabashes, canaries, etc. would be recovered from the sale of each year. The above assumptions gave different cost scenarios according to each period and these were used to make the economic evaluation.

4. RESULTS

4.1. Products of *Borassus akeassii* used in the preparation of meals

The results of the survey revealed that in Siniéna, Tékouna and Kiribina mesocarp of ripe fruits, terminal buds, albumen of immature fruits, cotyledons of the walnuts in germination and the ashes from the calcination of the inflorescences are the products of *B. akeassii* used as food (**Table 1**). Some of these products are used raw while others are used in the preparation of meals and some others both raw and in the preparation of meals.

4.2. Medicinal uses

Six components of *B. akeassii* were mentioned in the interviews as medicinal products in the study area (**Table 2**). The components comprise roots, leaves, inflorescences, resin, sap and mesocarp. Diseases treated are male sexual problems, teeth, stomach and earaches, dermatosis and intestinal parasitosis. In this domain, the advices of a specialist are needed to be able to use safely these products to treat diseases because of those problems.

Table 1. Products of *Borassus akeassii* used in the preparation of meals in Siniéna, Tékouna and Kiribina — *Les usages alimentaires de* Borassus akeassii *à Siniéna, Tékouna et Kiribina.*

Part used	States and methods of use	Periods
Leaves	Very young white, tender and sugary leaves from the terminal bud are used to cook soup and couscous	All year long, in particular after the sap extraction
Fruits	Mesocarp of the ripe fruits walls sweetened is consumed raw, grilled or used to cook the mush Albumen of the immature fruits	December to April
Inflorescences	Ashes from inflorescences calcinating constitute a source of potash for food cooking	Rainy season
Cotyledons	Cotyledons of the walnuts at germination stage are consumed as food	Rainy season
Sap	Alcoholic drink	All year long but intens in cold period (December to February)

Table 2. Medicinal uses of *Borassus akeassii* in Siniéna, Tékouna and Kiribina — *Les usages médicinaux de* Borassus akeassii *à Siniéna, Tékouna et Kiribina.*

Part used	Form of the product	Diseases treated	Particular arrangements
Roots	Macerated and mush. The substance (decoction) is drunk	Remedy to the ascent of a baby's testes after first cry (cryptorchidism)	
		Man sexual impotence	
		Stomach aches, sore throats, constipation, bronchitis, intestinal parasites	Preferably the roots of an old plant of « rônier »
	Macerated and mush, to make a bath of steam in the mouth	Teeth aches	-
Young leaves of the young trees (bud)	Crushed, addition of water then hurried	Earaches, beginning of deafness	The crushed leaves must be put in a piece of clay pot
	Substance		
	Boiled and drink substance	Cold	-
Male inflorescences	Charred, kneaded to the butter of shea tree (karité)	Dermatosis	The collector must descend with inflorescences without throwing them on the ground
Resin	Liquid	Delay of the dental thrust	-
Sap	Liquid (drink)	Sexual impotence (aphrodisiac)	-
Mesocarp	Boiled (mush)	Intestinal parasitosis	Only the mesocarp of the mature fruits

4.3. Handicrafts

Several types of handicraft objects are produced and sold in the three villages of the study as well as in the biggest town of the area (Banfora). The confection of these objects is mainly done during the dry season and involves men, women as well as the young and the old men. Different parts (leaflets, leafstalks and leaves ribs) of the tree are used according to the type of the object to be realized.

Objects made of leaflets and ribs. The leaflets and ribs are the raw material mainly used to outfit baskets, sieves, nattes and fans. These objects have various shapes and volumes. The baskets can be classified according to their uses as:

– Linen baskets used for the storage of linen with those of babies having lids. These baskets are made of leaflets and ribs, often reinforced at their basis and wrist by leafstalks. Multicolored dyes confer them an extraordinary looking and beauty;
– Stack baskets are made of leaflets, reinforced by leafstalk and sometimes by strong twigs of other woody species. These baskets are bought by the girls and ladies to store their make-up objects, jewelry, ointments, etc. They are also bought by beauty shop possessors to store set materials and combs. In churches, small baskets are used to collect offerings;
– Provisions baskets/decoration: they are used by women for condiment purchases in the markets and merely to stock them. Various domestic uses are done with them. This type of baskets can be used like decoration objects in the scrubs. They play also a protective role of electric lamps;
– Wastebaskets, with plastic baskets shape, serve to store domestic garbage mainly in town;
– Small and circular objects playing the role of carpet maintain the canaries and the calabashes in balance and attenuate heat effect on table.

The sieves are generally made of ribs and are used to sieve flour. The confection of nattes constitutes a specific feminine activity, especially for women aged of about 50 years and more. We distinguished small nattes of one place to those of at least two places. The dimensions and colors of nattes are closely related to the circumstances of their use: baptism, marriage, funeral ceremony, birth, etc. Contrary to nattes, weaving of aviaries is mainly done by men of all ages. The aviaries are generally sold by the craftsmen themselves. Finally, the fans are produced with the leaflets and their wrists reinforced using woody materials of another species. They are very valued by the population in hot periods, by women during fresh corn periods, and used daily by women to activate fire. They are sold by itinerant merchants who are in majority children and women.

Objects made of leafstalks. The objects produced with leafstalks are strainers, sifters and sponges. The strainers are sometimes cylindrical measuring 1 m long and are used by millet beer brewers to decant the beer. Some other strainers have the form of baskets and are used to dry cereals or wash seeds (corn, beans, seeds of *Acacia macrostachya*, etc.) and the dishes. The activity of producing sifters has lately induced the development of the trade of leafstalks alongside the main roads leading to the three villages of the present study. The confection of the sifters is generally done in town and different forms exist. The sponges, to clean dishes and even to take bath, are produced with fibers of leafstalks after pounding them.

4.4. Other uses

To build houses, trunks are used like roof rafters, doors and windows frameworks, posts of fences and parks for livestock. Leaves are used to make doors. Let's note that 100% of interrogated people have used different parts of *B. akeassii* to build their houses. The hollow trunks serve to protect walls against rain degrading effects.

Various other uses are known by population in making benches, constructing bridges, as hives and as electric posts using the trunks. Generally, these objects (except hive) are realized for common interest but not for commercialization.

4.5. Commercialization of the products of *Borassus akeassii*

Productions in cold and hot periods and sap extractor net incomes. During dry cold periods, from November to February, the mean sap production was 4.1 ± 0.8 liters per tree and per day. **Table 3** presents the evaluation of sap quantities and the corresponding turnovers during the dry cold period (4 months). The results showed that the net income of the extractor was 284708 ± 96585 FCFA in normal conditions. With a slump of 2%, the net income was 277347 ± 94653 FCFA. During the hot period (8 months) corresponding to the low production, one tree produced 1.75 ± 0.82 liters per day. Contrary to what we observed during the dry cold period, no slump of the product occurred because of its lower availability. The net income of the extractor was 319368 ± 163969 FCFA.

Quantities acquired and the retailer's net income. Sap retailers were all women dwelling close to the main roads leading to Banfora city as well as in the city of Banfora. Generally, every dealer is in relation with two or more extractors of sap of the surrounding villages. Every morning, the extractors deliver to their retailers the quantities of sap extracted and received in general their payment after the sap has been sold. The expenses of each retailer include the costs of bottles, calabashes, cans and sometimes the expenses for renting the cabaret as well as the taxes collected by the public service. These taxes collected from sap dealers during the year 2000 cost 200000 FCFA according to public treasure office of Banfora. **Tables 4** and **5** present the quantities of sap received and the net incomes of small and big cabaret managers.

Table 3. Quantities of sap produced (in liters) and incomes (FCFA) by extractor in period of high production in Siniéna, Tékouna and Kiribina — *Quantités de sève extraites (en litres) et revenus (FCFA) par extracteur en période de forte production à Siniéna, Tékouna et Kiribina.*

Parameter	Mean value
Number of trees	15 ± 3
Daily production per tree	4.1 ± 0.8 liters
Total daily production	61.3 ± 16.1 liters
Monthly production per tree	121.8 ± 23 liters
Total monthly production	1840.2 ± 68.1liters
Quantity produced from November to February	7372.9 ± 272.3 liters
Daily turnover per tree	203.1 ± 38.3 FCFA
Total daily turnover, 0% of slump	3072.1 ± 113.5 FCFA
2% of slump	3005.7 ± 788.8 FCFA
Monthly turnover per tree	
0% of slump	6090.0 ± 1250.0 FCFA
2% of slump	5968.2 ± 1126.8 FCFA
Total monthly turnover	
0% of slump	92032.6 ± 24138.5 FCFA
2% of slump	90169.8 ± 23663.3 FCFA
Turnover from November to February	
0% of slump	368040.0 ± 96585.0 FCFA
2% of slump	360679.2 ± 94653.3 FCFA
Labour	
2 persons x 10000 FCFA x 4 months	80000 FCFA
Other expenses (833x4)	3332 FCFA
Net income from November to February	
0% of slump	**284708.0 ± 96585.0 FCFA**
2% of slump	**277347.2 ± 94653.3 FCFA**

550 FCFA = 1 USD.

The financial gains in the trade of handicraft products. Handicrafting is mainly a dry season activity from November to April even though it continues during the rainy season but at much lower intensity. The prices of the products vary according to these two production periods as well as according to the nature of the vendor who can be either an outfitter or a retailer. The size of the objects sold has also an influence on the price.

Table 6 presents the average numbers of articles produced by an outfitter, sold and the corresponding prices during the high production period. The most sold objects were the baskets, the sieves and the objects of

Table 4. Quantities of sap received (in liters) and incomes (FCFA) of an administrator of small stations in Siniéna, Tékouna and Kiribina — *Quantités de sève reçues (en litres) et revenus (FCFA) d'un gestionnaire de petites stations à Siniéna, Tékouna et Kiribina.*

Parameter	Mean value
Quantity received per day	55.6 ± 13.3 liters
Quantity received per year	20016.0 ± 4875.0 liters
Turnover per day	3336.0 ± 812.0 FCFA
Turnover per year	1200960.0 ± 292500.0 FCFA
Sap purchase cost per day	2780.0 ± 677.0 FCFA
Sap purchase cost per year	1008000.0 ± 243750.0 FCFA
Taxes + various expenses per year	3800.0 ± 1005.0 FCFA
Labour	2000.0 FCFA
2 persons x 12 months x 3000 FCFA	
Total expenses per year	1076600.0 ± 389383.0 FCFA
Net income per year	**136622.2 ± 39865.1 FCFA**

550 FCFA = 1 USD.

Table 5. Quantities received (in liters) and incomes (FCFA) of an administrator of big stations in Siniéna, Tékouna and Kiribina — *Quantités de sève reçues (en litres) et revenus (FCFA) d'un gestionnaire de grandes stations à Siniéna, Tékouna et Kiribina.*

Parameter	Mean value
Quantity received per day	225.4 ± 70.5 liters
Quantity received per year	81144.0 ± 25372.0 liters
Turnover per day	13524.0 ± 4229.0 FCFA
Turnover per year	4868640.0 ± 1522326.0 FCFA
Sap purchase cost per day	11270.0 ± 3524.0 FCFA
Sap purchase cost per year	4057200.0 ± 1268605.0 FCFA
Taxes + various expenses per year	10750.0 ± 1687.0 FCFA
Labour	240000.0 FCFA
1 person x 12 months x 10000 FCFA	
2 persons x 12 months x 5000 FCFA	
Total expenses per year	4606833.3 ± 899397.8 FCFA
Net income per year	**620366.7 ± 178009.4 FCFA**

550 FCFA = 1 USD.

decoration. The net income was 277933 ± 2787 FCFA for the high production period (**Table 6**) while the amount for the low production period was 110383 ± 25371 FCFA (**Table 7**).

Retailers who are mainly women sell their goods in markets or alongside the roads. They purchase the goods directly in the villages of the craftsmen from one or many persons. **Table 8** shows the prices of purchase and resale during the two periods of production. Among all the actors of the sector, retailers have the most diverse goods but do not sell aviaries and nattes. A retailer could sell per year 743 ± 100 baskets, 205 ± 61 nattes, 379 ± 61 fans and 715 ± 72 decoration objects. Taking into acount labor and expenses, his net income was 280983 ± 62837 FCFA during high production period and 89200 ± 11667 FCFA during low production period.

B. akeassii tree cutting down for commercial reasons is not a widespread practice in our study sites. Sap extraction technique is enough mastered in a way to avoid cutting down the tree unless it becomes an old tree or a dead tree. Then, the tree can be cut down and the trunk sold at 1500 FCFA to 7500 FCFA according to the quality of the wood.

5. DISCUSSION AND CONCLUSION

From the results it can be concluded that *B. akeassii* is a multipurpose species for the population of South-Western Burkina Faso who rely on it for food, handicraft, medicine, building houses, etc. Due to the fact food and handicraft are the main uses, sap extraction and leaves cutting are the main forms of exploiting *B. akeassii* as reported by previous researchers (Bellouard, 1950; Guinko et al., 2004). Besides food, *B. akeassii* gives many other products that are traded and generate net income for local people and people living in town particulary women. The availability of the products varies in time and together the nature and the size of the product influence their prices. Similarly, prices are different according to the actors whether they are outfitters or retailers in town.

Indeed, the quantities of sap extracted and sold are in relation with the periods of the year, with the dry cold period yielding the highest production. In turn, during the hot period, the outflow of the sap is low because the heat acts negatively on the cells carrying the sap as reported by Yaméogo (1999).

The rainy season is the period of low activity for handicraft objects due to the time consuming of cropping activities. Lamien et al. (1996) and Nikiema (1997) reported similar negative influence of cropping activities on trading of non-wood timber forest products in the Western and Northern regions of Burkina Faso.

B. akeassii is a source of monetary net income for local populations and can withstand the comparison with species like *Parkia biglobosa, Vitellaria paradoxa, Detarium microcarpa*, etc. (Belem et al. 1996; Belem et al., 1998). In sap trading the price of the liter does not vary according to the period but rather according to the type of vendor (extractor or retailer). Therefore, extracted quantities constitute the most important parameter determining the net incomes of any extractor whereas the incomes were more variable among retailers. The products of *B. akeassii* showed less storage and conservation problems compared to those of some species like *Vitex doniana, Diospyros mespiliformis, Ziziphus mauritiana* (Nikiema, 1997). Fruits and products used as medicines were less traded. Thus sap was the product that yielded the highest incomes followed by baskets, sieves and objects of decoration and nattes.

Table 6. Mean number of articles sold and corresponding incomings (FCFA) of an outfitter in high production period in Siniéna, Tékouna and Kiribina — *Nombre moyen d'articles vendus et recettes correspondantes (FCFA) d'un confectionneur en période de forte production à Siniéna, Tékouna et Kiribina.*

Articles	Mean number sold	Sale price per unit (FCFA)	Total sales (in FCFA)
Baskets			
Big	109 ± 11	1000.0	109000.0 ± 11000.0
Medium	122 ± 29	600.0	73200.0 ± 17213.0
Small	508 ± 20	125.0	63500.0 ± 2462.0
Nattes			
Big	36 ± 7	650.0	23183.3 ± 4791.2
Small	76 ± 6	350.0	26483.3 ± 2109.7
Fans			
Big	179 ± 10	75.0	13450.0 ± 676.0
Little	203 ± 16	25.0	5075.0 ± 393.0
Sieve			
Big	97 ± 7	350.0	34066.7 ± 2458.3
Small	560 ± 15	125.0	70000.0 ± 1875.0
Aviaries			
Big	78 ± 5	300.0	23500.0 ± 1249.0
Small	50 ± 6	200.0	9933.3 ± 1137.2
Small sieve and decorative objects			
Small	112 ± 13	150.0	16750.0 ± 1887.0
Very small	312 ± 10	25.0	7791.7 ± 260.2
Turnover from November to April			475933.3 ± 2787.6
Labour (4 persons x 6 months x 7500 FCFA)			180000
Dyeing, other expenses (3000 FCFA x 6 months)			18000
Net income			**277933.3 ± 2786.6**

550 FCFA = 1 USD.

Table 7. Mean number of articles sold and the corresponding incomings (FCFA) to an outfitter in low production period in Siniéna, Tékouna and Kiribina — *Nombre moyen d'articles vendus et recettes correspondantes (FCFA) chez un confectionneur en période de faible production à Siniéna, Tékouna et Kiribina.*

Articles	Mean number sold	Sale price per unit (FCFA)	Total sales (FCFA)
Baskets			
Big	28 ± 6	1500.0	42500.0 ± 8660.0
Medium	59 ± 6	750.0	44500.0 ± 4394.0
Small	142 ± 16	175.0	24791.7 ± 2812.7
Nattes			
Big	26 ± 12	800.0	21333.3 ± 9375.1
Small	29 ± 5	450.0	13050.0 ± 2381.0
Fans			
Big	21 ± 8	100.0	2067.0 ± 814.0
Small	128 ± 6	50.0	6416.6 ± 288.7
Sieve			
Big	47 ± 7	450.0	21000.0 ± 3437.0
Small	143 ± 11	175.0	25025.0 ± 1893.0
Aviaries			
Big	40 ± 10	400.0	15733.0 ± 3885.0
Small	20 ± 8	300.0	5900.0 ± 2291.0
Small sieve and decorative objects			
Small	36 ± 11	250.0	8917.0 ± 2673.0
Very small	69 ± 16	75.0	5150.0 ± 1233.0
Turnover from May to October			236383.3 ± 25370.6
Labour (2 persons x 6 months x 3000 FCFA)			36000
Dyeing, other expenses (1500 FCFA x 6 months)			90000
Net income			**110383.3 ± 25370.6**

550 FCFA = 1 USD.

Table 8. Purchase and resale prices (FCFA) of the articles of a retailer in Siniéna, Kiribina and Tekouna in high (A) and low (B) production periods — *Prix d'achat et de revente (FCFA) des articles d'un revendeur à Siniéna, Kiribina et Tékouna dans les périodes de forte (A) et de faible (B) production.*

Articles	Purchase price per unit (A)	Resale price per unit (A)	Purchase price per unit (B)	Resale price per unit (B)
Baskets				
Small	125	250	175	350
Medium	600	1000	750	1250
Big	1000	2000	1500	2500
Sieves				
Small	125	250	175	325
Big	350	425	450	525
Small sieves and decoration objects				
Small	25	75	75	100
Very small	150	225	200	275

550 FCFA = 1 USD.

If *B. akeassii* products trade is to be developed, there is a need for an integrated approach at all stages of the food chain and handicrafting activities from initial research to final consumption as recommended by Casadei (2005) for the products of *Vitellaria paradoxa*. It is now being recognized that the high value of products is critical to the success of agroforestry innovations (Russell et al., 2004). A research program is then required to generate quantitative data on the resource as well as for its improvement in a way to be able to develop also new products for specific demands of the market. The lack of programs developed to address these requirements may result in a lack of pertinent information with this respect and can translate into lost of economic opportunities in the long run (Russell et al., 2004; Bonkoungou, 2005; Elias et al., 2006). Additionally, the instability of the supply, as shown by two different production periods, does not favor exploitation activities stressing the need of an improvement and management program.

If well organized, the actors of the sector with the support of the forestry agents can better defend their interests while improving the access to market information at all levels (Elias et al., 2006). Access to market information will help the actors to know the requirements of the market. A good training system should also be put in place to make farmers aware of the importance of the quality of the products (Elias et al., 2006). All these efforts should aim at an optimal development and long-term sustainability of this important nutritional and economic resource.

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