Agroforestry and socioeconomic potential of a non-conventional liana: *Tetracarpidium conophorum* (Müll. Arg.) Hutch. & Dalz. in Cameroon

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Photograph 1.
Immature fruit of *T. conophorum* found in Mouko village during assessment, each of them bears three seeds.
Photograph R. B. Tafokou Jiofack.

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RÉSUMÉ

POTENTIALITIES AGROFORESTIÈRES ET SOCIOÉCONOMIQUES D'UNE LIANE NON CONVENTIONNELLE : *TETRACARPIDIUM CONOPHORUM* (MÜLL. ARG.) HUTCH. & DALZ. AU CAMEROUN

La valorisation des produits forestiers locaux est entravée faute de connaissances précises sur leur potentiel et de pouvoir évaluer leur impact sur l'économie nationale. En outre, le manque de connaissances sur la disponibilité des produits des arbres agroforestiers (Paaf) au sein de leur biotope ne permet pas d'élaborer une planification fiable pouvant assurer une gestion durable des produits forestiers non ligneux (Pfnl) et ainsi contribuer à combattre la pauvreté. Une enquête menée dans le département du Mbam et Inoubou, région du centre du Cameroun révèle que les potentialités agroforestières de la liane conophor, *Tetracarpidium conophorum,* ne sont pas négligeables. Cette liane est considérée être une importante espèce associée aux formations agroforestières de cacao. Au regard des résultats obtenus, elle s'avère être abondante au sein des agroforêts, couramment plantée et exploitée et peut ainsi faire partie du système d'exploitation/valorisation, en vue d'améliorer les revenus des ménages aux niveaux local, national et même régional. Les enquêtes socio-économiques conduites dans le cadre de ce travail révèlent que la commercialisation des produits issus de cette liane fournit d'estimables revenus. De ce fait, un effort devrait être consenti par les différents acteurs concernés pour améliorer la distribution de ces produits, en fournissant un maximum d'informations. Ce faisant, la promotion de la noix de conophor, de l'huile extraite et d'autres nouveaux produits serait assurée par intégration dans la chaîne du commerce national, voire international.

Mots-clés : conophor, *Tetracarpidium conophorum*, produits des arbres agroforestiers, agroforêts de cacao, potentialités agroforestières, Cameroun.

ABSTRACT

AGROFORESTRY AND SOCIOECONOMIC POTENTIAL OF A NON-CONVENTIONAL LIANA: *TETRACARPIDIUM CONOPHORUM* (MÜLL. ARG.) HUTCH. & DALZ. IN CAMEROON

The development of local forest products is hampered by insufficient knowledge about their potential and inadequate assessments of their impact on the national economy. Furthermore, lack of knowledge on the availability of agroforestry tree products (AFTPs) in their biotope prevents effective planning for sustainable management of non-timber forests products (NTFPs) to contribute to poverty reduction. A survey conducted in the Mbam-Inoubou region in central Cameroon shows the significant agroforestry potential of African walnut, *Tetracarpidium conophorum*, a vine considered as an important associated species in cacao agroforests. The survey results indicate that this vine is fairly abundant in agroforests and commonly planted and used, and could therefore be included in the processing chain to improve household incomes at local, national and even regional levels. The surveys conducted for the study show that sales of products from this liana species can earn creditable incomes. Given this finding, an effort should be made by the different players concerned to improve the distribution of these products by supplying as much information as possible. Doing so would ensure the promotion of African walnuts, oil extract and other new products by bringing them into the national and international marketing system.

Keywords: African walnut, *Tetracarpidium conophorum*, agroforestry tree products, cacao agroforests, agroforestry potential, Cameroon

RESUMEN

POTENCIALIDADES AGROFORESTALES Y SOCIOECONÓMICAS DE UNA LIANA NO CONVENCIONAL: *TETRACARPIDIUM CONOPHORUM* (MÜLL. ARG.) HUTCH. & DALZ. EN CAMERÚN

El desarrollo de productos forestales locales resulta estar entrabado por la falta de conocimientos sobre su potencial y de poder evaluar su impacto en la economía nacional. Además, la falta de conocimientos sobre la disponibilidad de productos de árboles agroforestales (PAAF) en el seno de su biotopo, no permite una planificación precisa para garantizar un manejo sostenible de los productos forestales no maderables (PFNM) y poder luchar contra la pobreza. Una encuesta realizada en el departamento de Mbam y Inoubou, región del centro de Camerún, revela que las potencialidades agroforestales de la liana conofor , *Tetracarpidium conophorum,* no son nada despreciables. Esta liana está considerada ser una importante especie asociada a los agrobosques con cacao. De acuerdo con los resultados obtenidos, es abundante en sistemas agroforestales, ampliamente plantada y valorada, por lo que se la puede integrar en la cadena de aprovechamiento con el objetivo de mejorar los ingresos de los hogares a nivel local, nacional e incluso regional. Las encuestas socioeconómicas realizadas en el marco de este trabajo revelan que la comercialización de productos resultantes de esta liana proporciona razonables ingresos. Ante esta realidad, los diferentes actores implicados deberían llevar a cabo un real esfuerzo para mejorar la distribución de estos productos, proporcionando un máximo de información. De facto, la promoción de la nuez de conofor, del aceite extraído y de otros nuevos productos, estaría garantizada con su integración en el sistema de marketing nacional e internacional.

Palabras clave: conofor, *Tetracarpidium conophorum*, productos de árboles agroforestales, agrobosques con cacao, potencialidades agroforestales, Camerún.

Introduction

Wet tropical Africa is known for its rich biodiversity, in terms of forest timbers and agroforestry trees potential. The Congo basin, great world reservoir of biodiversity, include within it a multitude type of lands use, which are the results of several transformations and ecological mutations about which, man originally, knew how to train for his way to satisfy his wellbeing. Today testifies the birth of forest exploitation, research, recreation, processing, agroforests, food plantations, orchards, etc. In spite of the major role that can play each of these lands use, the profits, which result from, are the strength undertaken in their management and conservation. The case highlighted in this study concerns an agroforestry tree products, *Tetracarpidum conophorum*, as a non-timber agroforest product within this environmental context. Its agroforestry potentialities are presented taking into account that peasants really lack for propagating methods to adequately manage this vine. Since the 1992 Earth Summit held in Rio de Janeiro on biodiversity, more attention is being paid to Non-Timber Forest Products (NTFPs) globally. They have several names: Non Wood Forest Products (NWFP) (Tchatat *et al*., 1999; Tchatat, Ndoye, 2006), local products or special products (MINEF, 1994), minor products or secondary forest products (Peters, 1997). According to the FAO (1999), all these terms refer not only to products of a biological origin, but also to timber, forest further-processed products, woodlands and trees beyond the forest and bush meat. Non-timbers forest products include fruits, seeds, exudates, nuts, barks and their derivative products used as food supply, medicine, ornamentation plants, shade trees, for improvement of the living environment (Vivien, Faure, 1996; Ndoye *et al*., 1997; Awono *et al*., 2009). These products constitute an undeniable source of income for the local peoples. A non-conventional agroforestry tree product (AFTPs) refers by this term to the products, which are still minor or under exploited, not yet classified or not very common, consequently less known or ignored on the market chains. Nowadays, agroforestry practices are a major solution to the growth of many unconventional forest products. These opportunities are offered by many research institutions including the International Centre for Agroforestry Research (ICRAF) which has developed effective techniques to improve production and productivity of forest and agroforest fruits. The main priority species of this centre are among others *Irvingia* spp., *Ricinodendron heudelotii*, *Garcinia kola*, *Cola* spp., *Allanblackia* spp., *Chrysophyllum albidum*, *Dacryodes edulis* (Tchoundjeu *et al*., 1998; Mollet *et al*., 1995). All these fruits are local tropical species, *Tetracarpidium conophorum* can be associated. Preferences for products of one kind or another are linked to the strong market demand nationally and even internationally (Vodouhe *et al*., 2011; Tchoundjeu *et al*., 2002). *Tetracarpidium conophorum* commonly known as African walnut or ukpa (Igbo and Awusa) or asala (Yoruba) or conophor nut in Nigeria (Ajayeoba, Fadare, 2006) and African walnut, kaso or ngak in the centre and western Cameroon (Dalziel, 1937) is a big and strong vine of the tropical forests of Central Africa (Vivien, Faure, 1988); seeds produced are very rich in organic fats commonly use for local oil extraction (Jiofack, 2003). The fat rate is over 50% of dry matter and polyunsaturated fatty acid (79.4% of total fatty acids) (Tchiégang *et al*., 2005). Cholesterol-loweringand triglyceride-lowering properties have also been proved (Kapseu, 2009). The nutritional properties of seeds have been demonstrated (Edem *et al*., 2009; Adebona *et al*., 1988; Akpuaka and

Photograph 2.
Branch portion showing leaves and immature flowers.
Photograph R. B. Tafokou Jiofack.

Nwankwo, 2000; Mezajoug Kenfack, 2010). The seeds are dried and crushed to a powder that is used in the preparation of foodand porridge. Seeds can be also consumeraw or boiled as a tonic kola or fruit of mouth (Vivien, Faure, 1985). The bark and leaves are used in traditional medicine to alleviate several diseases (Jiofack, 2003). In Nigeria, the seeds are used to cure infertility problems in men, while the leaves are used to relieve dysentery (Ajayeoba, Fadare, 2006; Babalola, in press). Therefore, exploitation of some organs of this vine produces significant revenue and is a weapon or a potential alternative to fight against poverty and improving the living environment. In planting, the vine from its foliage is a major asset for the cocoa. It becomes a great climber, compact crown, constituting not only a characteristic size, but also plays an important role with its surface, one related to light interception (Ogawa *et al*.,1965). Tchiégang *et al*. (2000) suggest that the problem of development of local products is offset by the lack of knowledge about their potential and in the evaluation of their impact on the national economy. There are also many sub-markets at the base that prolong the marketing chain and the loss of huge amounts. The seeds harvested are sold to retailers and resellers at very low prices directly in farms, while at the urban level, the prices are quite significant because the national resellers sell more expensive to the sub-regional buyers. It is therefore important to assess the reluctance of local producers of African walnut. In the natural environment, are there mechanisms to boost the production level broad spectrum? To achieve this goal, this article evaluate the potential first established in the cocoa agroforests in Bafia and Kiiki districts, Department of Mbam and Inoubou and their socio-economic value and/or market will be presented later.

Study site

The study was conducted in the districts of Bafia and Kiiki, Department of Mbam and Inoubou, Cameroon Central region (figure 1). Both districts are in a transition zone between forest and savannah, where one encounters a permanent degradation of the ecosystem (Ngaba Zogo, 2005). However, there are witnessing a dynamic development of cocoa cultivation in the savannah.

The rainfall gradient is high in the northern part of the region (1,500 mm) and goes to 1,400 mm in the south and east. The average annual temperature is relatively high and constant (25.5 °C) and minima are located between 19.7 °C and 19.8 °C. The maximum relative humidity throughout the year varies between 95 and 98 %, with lows between 51 and 74 %. The reason for choosing this site is that it is located near the capital Yaoundé, which includes several markets where the collected products are routed, and secondly, it is classify among the high productivity areas of *T.conophorum* fruit in Cameroon.

Methodology

Materials and harvest method

In order to carry out this study, an inventory was conducted in cocoa agroforests. The various plots were materialized in cocoa-based agroforestry plantations. A 100 m long decametre was used to measure surfaces area of 4000 m^2, a rectangular device of 100 m x 40 m enclosed by poles (figure 2), a girth tape to measure the DBH (Diameter at the Breast Hight) of the trees inventoried, a machete for weeding and setting up plots, three rolls of 100 m long binding thread each to mark off the surfaces to be inventoried. All wood (DBH › 10 cm) were inventoried, this in perspective to evaluate the structural typology of the cacao based agroforestry plots containing vine. This study was carried out in two stages. Firstly, quadrats were set up with a size of 100 m x 40 m subdivided into two 50 m x 20 m subquadrats on an area of 10.4 ha in the cocoa agroforests. This total area was representing by 26 sample plots of 4,000 m^2 each. Next, the tree DBH were effectively counted and measured following by a floristic survey of all timber species with a view to estimating the proportion of AFTPs in comparison with all the timber found in the agroforests inspected.

All the stems of *T.conophorum* were inventoried without the required diameter. Preference has not been made on the minimum diameter of stems of this vine just because the study also aims to assess their transplants dynamic into agroforests. Wild plants are not found anywhere due to predation phenomenon, that is why plants to be transplant into agroforest are usually provided by earliest farmers to the newest who are interested by the vine production. No local plant nursery is yet initiated to produce breeding, but some farmers sometimes germinate seeds and share offspring plants. During introduction in farm, the better choice of the host is necessary due to the final heavy weight of the vine that is why farmers usually select mangoes trees, *Mangifera indica*, and plumbs trees, *Dacryodes edulis*, as most important hosts (Jiofack, 2003). With reference to this inventory plots, 26 surveys were conducted in six villages, two in the Bafia subdivision and four other in Kiiki. In each village, a guide was recruited in addition to the field owner. All sizes of timber were measured at breast height(1.30 m above ground), and all climbers at 50 cm of the soil. This difference is due to the rambling nature of the liana.

Socio-economic studies were conducted in the markets of Yaounde and its surroundings, where 93 traders (wholesalers and retailers) were interviewed at the same time. A questionnaire was pre-established for this purpose and the direct semi-structured surveys were conducted with various actors of the liana products chain.

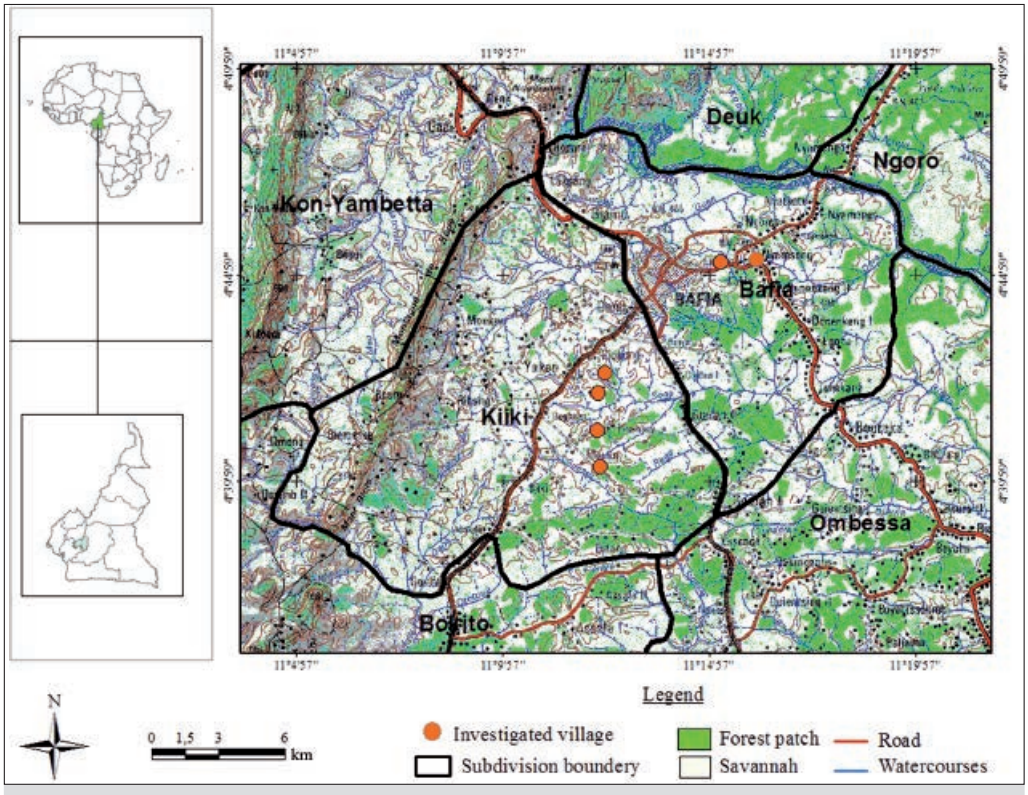

Figure 1.
Location map of the study site.
R. B. Tafokou Jiofack, 2012.

Data analysis

For data analysis, Excel and SPSS were used. For inventories, the following indexes were used:

- The total number of individual (N) species within a community. This is the total number of trees of this species in that community;
- The density (D) of the species which is the total number of trees/ha;
- The area in ha (S); D = N/S. The liana's diameters were grouped into different classes (Parren, 2003; Penko, 2005).

Results

Inventories

Inventories conducted in six villages covered a total area of 10.4 ha in which 143 stems of *T. conophorum* were surveyed in all 26 statements. These results reveal an abundance of about 14 stems per hectare, proof that the species is most representative in the region. Overall, the inventory has identified 1,642 taxa, including 609 taxa of cocoa trees and 1,033 taxa of others trees and lianas. These taxa belong to 59 species, grouped in 41 genera and 25 families. These results show an overall specific density of 172.16 shoot per hectare. The relative abundances (RA, in %) of each species found in the majority of the present inventories were calculated thereafter (figure 3).

Given this figure, *Mangifera indica* is the most common species, with 19 individuals per hectare, followed by *T.conophorum* (14 stems/-ha), *Elaeis guineensis* and *Dacryodes edulis* each have 12 individuals/ha, whereas *Persea americana* has 8 stems/ha. However, does it common to introduce this vine in cacao agroforest in all sample villages? The results of the regeneration dynamics and growth are illustrated in the following variation of class's diameter (figure 4). Any class represents the variation of vine growth in their sample site. According to Parren (2003), the classification of vine is grouped in four ways as follow: class 1 grouped vine from 2 to 3 cm of diameter; class 2 (3-6 cm); class 3 (6-9 cm) and class 4 (above 9 cm). This is possible whith smallest vines, but in the present research work, *T. conophorum* is a thickness vine and we wanted to illustrate their growth dynamic as deep as possible, that is the reason why it was decided with the present classification to continue until diameter of 15 cm and above. It can be appreciated the variation of growth in diameter of vine in any village. Mouko village record five diameter classes. Note that the diameters reported here are cumulative averages of all diameters recorded in all surveyed and identified by village. Overall the stems of *T.conophorum* in this village are clustered between [4.33 to 17.28[cm. It can be serve as an example of African walnut growth dynamic and regular planting in farms (photograph 2), due to the representation of any class of diameter. Nyamsong village as that of Mouko also has good growth momentum. So three of five classes of diameter are found there; the first class representing by young vine and the highest class, those of oldest plants. Regarding the Gnouka and Lable villages, there are not young shoots, but old one while Doguem village present only those belonging to intermediary classes.

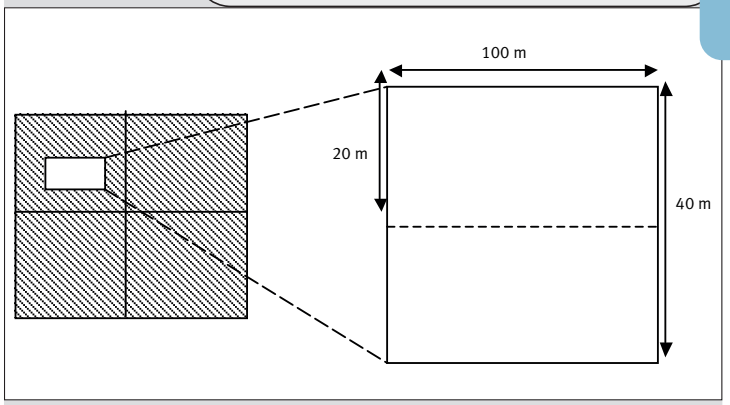

Figure 2.
Cocoa agroforests device Inventory in the Mbam et Inoubou division.

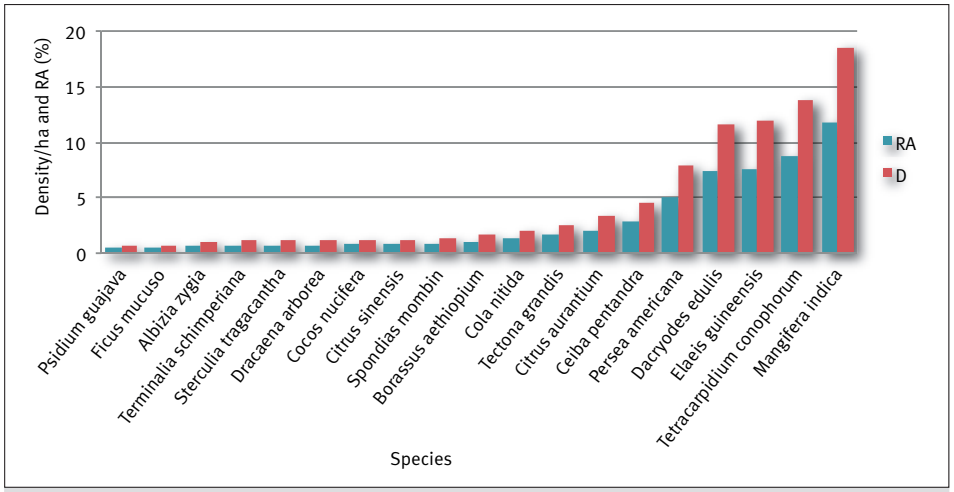

Figure 3.
Relative abundances (RA) and density (D) per hectare of *T. conophorum* and other major species.

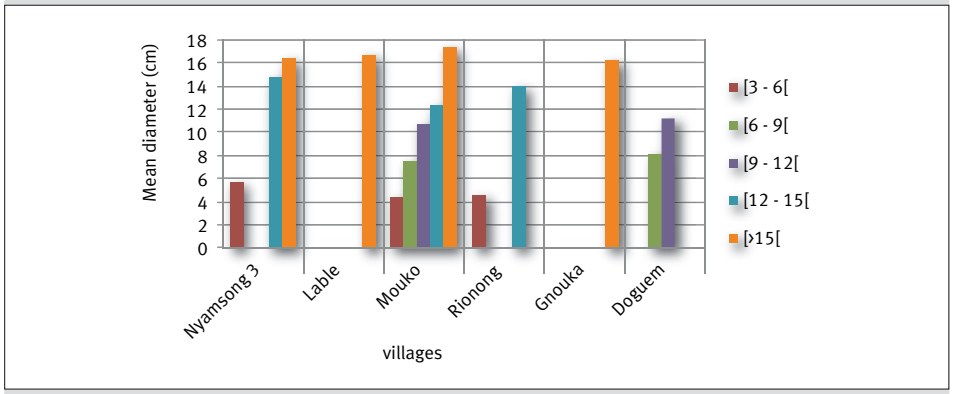

Figure 4.
Structuring in diameter classes of *T. conophorum* in villages.

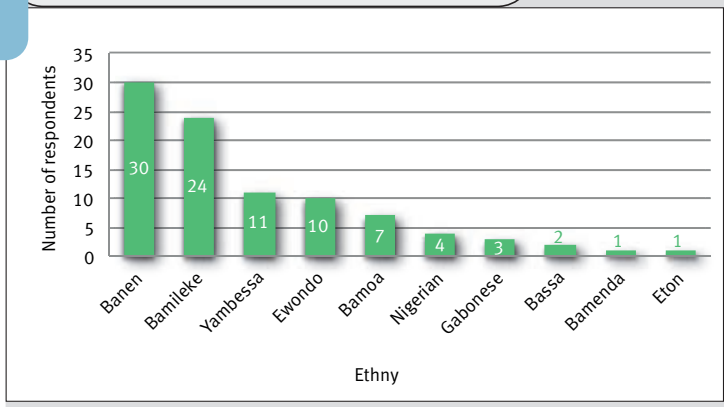

Figure 5.
Frequency distribution of respondents according to ethnic.

Socioeconomic inquiries

The survey forms have been previously designed for traders in different markets in Yaounde, Ndikinimeki, Nomena, Ombessa, Nefante and Bafia. Thus, 93 people made up of retailers, whole salers, students, school children and foreigners were interviewed.

In view of the above figures, the Bamileke and Banen are two ethnic groups involved commonly in the marketing channel of African walnuts. However, it has been observed that Gabonese and Nigerian women also travel toward Yaounde and Bafia markets to purchase african walnut seeds (figure 5). Interviewed traders in the surveys are mostly women (60) and men are not many (33). This demonstrates the place of gender in the marketing of AFTPs and also the role they can play in the economy. Under the marketing chain of *T. conophorum* seeds, the investigations shows that 44 genuine traders and 39 students are involving. These implicated actors are dispatched into retailers, wholesaler's vendors and temporary vendors. However, in other hand, there are found locally 35 farmers comprising 84 % men and 16 % women. The percentage of men can reflect their desire to produce conophor nut widely. Seed production of *T.conophorum* begins in July and availability in local markets and rural areas is up to the end of October. Seeds are thus sold during 3 to 4 months a year. August is recognized as a period of abundance of fruits (photograph 1) and seeds in themarket, while periods of low production are recorded during the months of July and October. Locally, the bucket of 15 kg coast 7,000 FCFA and the same bucket is retailed at 12,000 FCFA in Yaounde market (photographs 3). Collected products are regularly sold locally in Bafia markets and/or to resellers who request to purchase either in farm or by appointment in town. Nevertheless, some of them will gather in neighboring villages where appreciated quantity of seeds are bought and will sell directly to the urban market in order to widen their profit margin. Meanwhile, harvested seeds are conserving in bag or sold sometimes in buckets of 5 liters. For merchants who do not have a considerable trade fund, and sell occasionally, seeds are purchased in buckets of 5 liters to 6,000 FCFA, boiled and sold in small lots of 8 to 10 seeds to 100 FCFA during the abundance period of harvesting. During the shortage one, 100 CFA piles contain only 4-5 seeds. This other form of seeds trade may allow these women to benefit on average from 2,500 to 3,000 FCFA per bucket of seeds sold.

Following the example of the best seller in this region, the average annual expenditure relative to seed production is about 625,000 FCFA when sold in Yaoundé market, and less than 230,000 FCFA when sold locally. During the three average month of fruiting abundance, his production card can showed an annual of 5 bags of 100 kg, mean 500 kg of seeds per years. Calculate using the kg price of 1,250 FCFA, he can sold 625,000 FCFA. If the product is sold locally, it can provide an income of 225,000 FCFA. The net different value easy calculated is 400,000 FCFA. In Yaoundé market, the bag sold is retailed at 175,500 FCFA to Gabonese and Nigerian customers. Interviewed, these sub-regional retailers can generate up to 250,000 FCFA and 350,000 FCFA/bag respectively in Gabon and Nigeria. In Yaoundé, when the seeds are sold in buckets of 15 kg, it coast 12 to 15,000 FCFA. Student concerned by this activity during holidays can sold more than 5 buckets/week, mean 20 buckets/-months and up than 60 buckets during the three holiday's months. A student retailed a bucket at 16,000 FCFA. The gross marketing margin is then 4,000 FCFA/bucket. The average marketing margin can be 16,000 FCFA /month, then at less 48,000 FCFA profited during its holidays. This is an accurate case involved, the interview done show an average marketing margin varies from 12,000 to 600,000 FCFA[1] respectively from the smallest retailer to the biggest one (figure 6).

[1]Exchange rate :
1 € = 656 FCFA and more or less 1 $US = 524 FCFA.

Photographs 3.
The selling measurements used by retailers. Price varied from 3,000 to 4,000 FCFA (4.58 to 6.10 €) while the basin down coast 10,000 to 12,000 FCFA (15.26 to 18.32 €). Photograph R. B. Tafokou Jiofack.

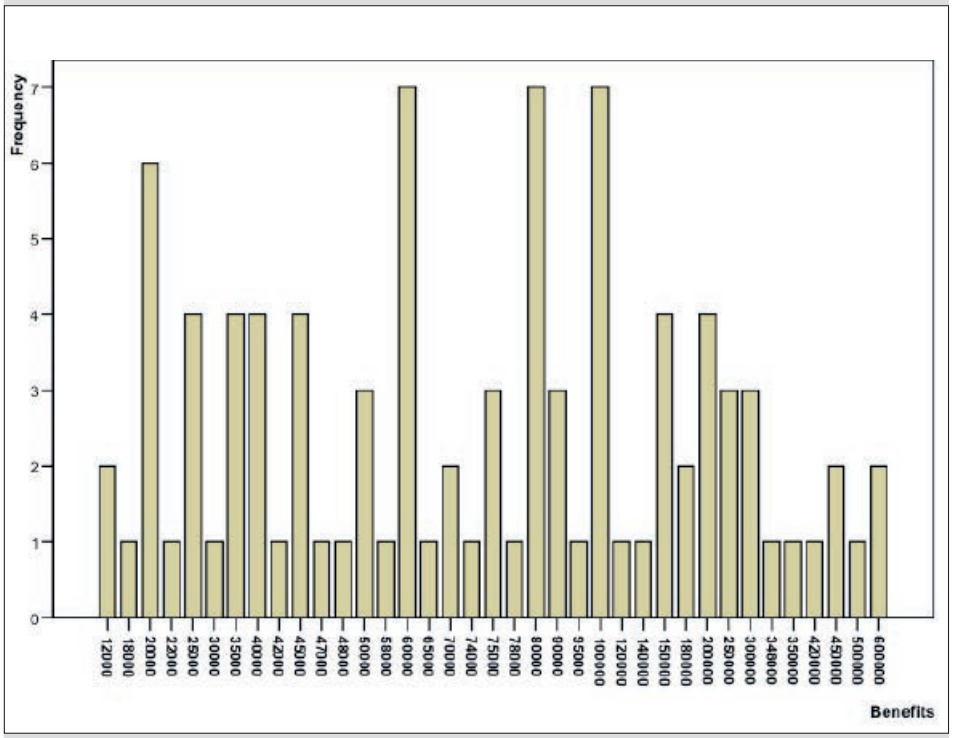

Figure 6.
Change in frequency of individual benefits realized by production season and trader.

Photograph 4.
Plantation of young stems of *T. conophorum* in cocoa based agroforest. The young stem hosted by mangoes tree.
Photograph R. B. Tafokou Jiofack.

Discussion

The natural area where are found the vine is the forest, but due to higher predation in this ecosystems, it is not easy for peasant to harvest fruits from there, that is why they decide to integrate the vine in their agroforests where they can put eyes on its behaviour and control the harvest of fruits. Regarding this, it was important to know how can be the variation of vine density in this ecosystem. Despite the data presented, a density of 5 stems/ha was found in Nigeria in forest areas (Ndaeyo, 2007) and abundances of 0.03 and 0.60 respectively in the primary and secondary disturbed forests (MIPELDA, 2000). The difference is clear, the forest ecosystem is a relatively closed ecosystemswhere many seeds are suffering from a remarkable lighting problem and tend to die (Kémeuzé *et al.,* 2009). In other hand, consulting figures recorded, and compared to studies in other cocoa agroforests of Cameroon and elsewhere, we realize that these systems do not always abound extreme biodiversity. In cocoa agroforests of Kumba, Konye periphery (southwestern Cameroon), Eyoho (2009) counted 58 species of trees and shrubs associated with cocoa. The results of the study are slightly higher than those of Laird (2007) who surveyed 50 species of trees and associated shrubs in cocoa agroforests around Mount Cameroon, while Bobo *et al*. (2006) have counted 204 species associated around the Korup National Park in Cameroon. Sonwa (2004) meanwhile has listed 206 species of trees involved in cocoa agroforestry systems in Southern Cameroon while Zapfack *et al*. (2002) had counted 116 species in the same South-Eastern Cameroon.

Species richness observed (172 average) in the districts of Bafia and Kiiki is very high compared to 14 found by Eyoho Ewane (2009) in South-Western Cameroon, and 17.02 found by Bobo *et al*. (2006) close to the Korup National Park.

The relative abundances of *T. conophorum* classify it among specific peasant choice in terms of species associated with cocoa agroforests. Most other listed species consists of introduced fruit that play an important role in food and economic needs of these farmers. Despite the negative role that can play the vine on its host, such as light shifting, and photosynthesis limit, the impact is negligible because the vine can play in other hand an important role in the cocoa plantation which do not need enough light to growth. This is a positive role play by *T. conophorum*, and the most reason of its integration in cacao agroforest in this region. Peasant are not using shrub as host, but old and mature tree supporting the vine to create shade in their farm. This can also explain the choice of Mangoes and plumbs trees as main hosts. According to this fact, *T. conophorum* can be considered as specie associated in cacao agroforest, then is an agroforestry potential vine which fostering increasingly interests farmers. Besides its food and medicinal potentialities (Jiofack, 2003), this liana during growth extends its branches and wraps trees or hosts up to finally creates at their top, shade which is favourable for cocoa plantation (photograph 4).

Photograph 5.
Mangifera indica tree cut down hosting a liana *T. conophorum*.
Photograph R. B. Tafokou Jiofack.

Photograph 6.
Old stem suffering from parasites attacks. this is the consequence of alterations during crops farming, cutting by inadvertency during cocoa farm cleaning.
Photograph R. B. Tafokou Jiofack.

Mouko village reflect a perfect example of good growth speedwith young and old individuals, with intermediate individuals. This determines the craze that agricultural workers have for the plantation and integration of this vine in the cocoa agroforests. Each household in this village has at least two stems of this vine or in an agroforestry planting, in home garden found behind the house. In Nyamsong village, the presence of young plants is resulting in their integration into new agroforests. At this point, the plants are from seedlings. They are transplanted and staked or planted on various hosts. The presence of young plants (photograph 2) also reflects the clear desire of some peasants in this village to introduce this vine in their agroforests. In Rionong and Doguem villages, cocoa agroforestry plantations are being renewed. The old stems of cocoa have been cut and the owners are proceeding now to replenished. During this phase of cultivation, more trees are also cut down because the cocoa seedlings need a substantial illumination to maintain their vitality and their growth. Some stems of *T. conophorum* hosted by these trees are therefore eliminated ((photograph 5) or themselves due to parasites infection (photograph 6).

At the level of Gnouka and Lable village, cocoa agroforestry plantations are very old and less maintained. The stems encountered are very old stems, particularly in Lable where a rod of 33.44 cm diameter was recorded, nearly 105 cm of circumference (photographs 7 and 8).

Socioeconomic survey results shows that Banens peoples are most involved in the marketing of the vine seeds, this is justified by the way that they belong to this region of origin and major distribution of the species. Product availability has forced people to give him a strong socioeconomic and commercial value. Bamileke peoples are following deemed to be the purveyors of the Cameroonian economy; they are characterized to be great traders and farmers. The presence of Nigerian and Gabonese can be explained by the exportation of this product in the market supply chain. According to Vivien & Faure (1985), African walnuts are distributed from Central Africa until West Africa, proof that the product is consumed and traded in both countries listed, hence their incentive. Many students also focus on the sale of fruits (photographs 3) of the vine during holidays for their tuition and other personal needs as well as others AFTPs (Kemeuze *et al.,* 2009; Jiofack *et al.,* 2010).

Temporary actors here include both those belonging these first three categories (traders, wholesalers and retailers) who are only interested by selling seeds of this vine during their production and market availability, while those deeply belonging to this group of sellers, are not concerned only by the liana products, but also sold more other AFTPs in the local and national markets. From these results, profits observed are used to satisfy personal needs, buy school supplies, bank account, meetings commissions, education and family care.

Conclusion

This study has been conducted to characterize the structural and floristic of cocoa agroforests, specifically those of Bafia and Kiiki districts within Department Mbam and Inoubou. The interest of this work lies in the assessment of the potential availability of African walnuts, *Tetracarpidum conophorum*, terms of species richness and level of integration as associated species with cocoa agroforests. This study was also focalized on the production and use to contribute to the wellbeing of households, strengthening socio-economic balance, fighting against poverty and food security, locally in particular and in the sub region in general. The frequency of African walnuts in cocoa agroforests proved to be high. This species plays an important role in the lives of the people and in the economy of households, within Centre Region of Cameroon. This situation underscores the necessity to integrate these and other important local species into different cropping systems in order to improve their genetic variation in the cocoa agroforests. The African walnut, provides various agroforestry tree products such as leaves, fruits, barks, which are useful to the people as medication and food. The fruit is the most important part because of its seeds and its further-processed products: cake and oil.

The socioeconomic data collected from the producers of such a vine indicate that the market demand is increasingly growing; people are unable to meet all orders, which take some wholesalers to buy fruit up in the Mbam villages. The profits are likely to boost the purchasing power of families, improve their living environment and the fight against rural poverty. However, despite its importance and the strong market demand, the producers want more naturally regenerate the vine and attach to their hosts in cocoa agroforests, but even if they have mastered seed germination, available technics of multiplication to large scale cannot boost crop yield nor the quantities and organoleptic qualities of the seeds of this vine. It is therefore important to raise awareness and strengthen their capacities through adequate training in agroforestry. The lipid content in seeds can trigger off the process of lignification after two months of storage, so it would be desirable to develop a suitable technique for seed long term storage to ensure resource availability and stability of a production on the one hand and the extraction oil on the other. An effort should be made by the different actors to improve the distribution of the derivative products, supplying as much information as possible. It is by this means that the promotion of new products may be ensured. Many analyses of these further-processed products (oil extract) should run its course, especially the one relating to their conservation for long time, as well as other for their fruits. Finally, peasants should try to make African walnut ecologically sustainable, economically viable and attuned to their socio cultural practices.

Photograph 7.
Some oldest stems of vine occupying the cocoa base agroforest in Ngouka village. This stem is 30 years old and above.
Photograph R. B. Tafokou Jiofack.

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Photograph 8.
One of the biggest specimens of *T. conophorum* found in Lable village.
Photograph R. B. Tafokou Jiofack.

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