



INDIGENOUS KNOWLEDGE AND TRADITIONAL MANAGEMENT OF CASHEW
(*Anacardium occidentale* L) GENETIC RESOURCES IN BENIN

Chabi Sika K¹, Adoukonou-Sagbadja H², Ahoton L E³, Adebo I¹, Adigoun F A², Saidou A⁴,
Kotchoni S O⁵, Ahanchede A³, Baba-Moussa L^{1*}

¹Laboratoire de Biologie et de Typage Moléculaire en Microbiologie, Faculté des Sciences et Techniques, Université d'Abomey-Calavi, Bénin.

²Laboratoire des Ressources Génétiques & Amélioration des Espèces, Faculté des Sciences et Techniques, Université d'Abomey-Calavi, Bénin.

³Laboratoire de Biologie Végétale, Faculté des Sciences Agronomiques, Université d'Abomey-Calavi, Bénin.

⁴Laboratoire des Sciences du Sol, Faculté des Sciences Agronomiques, Université d'Abomey-Calavi, Bénin.

⁵Department of biology and Center for Computational and Integrative Biology, Rutgers University, 315 Penn St., Camden, NJ 08102, USA.

Received: September 09, 2013; Revision: November 04, 2013; Accepted: November 08, 2013

Available Online November 21, 2013.

KEYWORDS

Cashew

Ethnobotany

Genetic diversity

Plantation management

Benin

ABSTRACT

In order to evaluate producers' knowledge level on cashew tree production and its socio-cultural importance, present an ethnobotanical study has been conducted from January to March 2013 in three ecological zones of Benin. A total of 347 cashew producers of seven ethnic groups have been interviewed from 21 villages. Data were collected by using participatory research approach through group discussions followed by individual investigations. The results of this study showed that farmers have very good knowledge about the fructification, the length of the flowering period, the different varieties grown and their level of productivity through time. Traditionally, many varieties are recognized and diverse criteria such as the color, the form and the shape of the apple, the form and the shape of the nut were used by the producers for the identification and the description of the cashew varieties. Besides the shape of the nut and the plant productivity are the two main selection criteria of cashew varieties for the installment of their plantations. On the other hand, the leaf, the bark and the roots are used in the traditional medicine for the treatment of some diseases. Cashew is the second important cash crop after cotton in the study area because of its contribution to the income of the producers. These findings are important for the management and exploitation of cashew genetic resources for a better production in Benin.

* Corresponding author

E-mail: laminesaid@yahoo.fr (Baba-Moussa L)

Peer review under responsibility of Journal of Experimental Biology and Agricultural Sciences.

1 Introduction

The cashew (*Anacardium occidentale* L.) is an important tropical nut tree native to Centre and Southern America Behrens (1998). It belongs to Anacardiaceae family which includes about 75 genera and 700 species among which the well economically known ones are mango and pistachio (Nakasone & Paull, 1998). According to Azam-Ali & Judge (2001), cashew is widely cultivated in many tropical countries and has been introduced in India, Asia and Africa between the 15th and 16th centuries Ohler, (1979). In South Saharan Africa, cashew is cultivated in agricultural areas degraded by extensive farming such as that of cotton, yams or other cash crops destructive of forest lands Tandjiekpon, (2005). The agroforestry system based on cashew, as practiced in many countries of Africa (Tanzania, Mozambique, Nigeria, Guinea Bissau, Côte d'Ivoire and Benin), enable to solve important problems of development in economic, social and environmental levels Tandjiekpon (2005). Besides its interest for forest plan, cashew is mainly grown for nuts and apples. It provides food, employment and additional incomes to producers. The cashew apples are eaten fresh or processed into alcohol or food products; Morton (1987) while the kernel of the cashew nut is consumed in roasted form. The cashew wood is used for carpentry mainly, firewood or turned into charcoal Akinwale (2000). Cashew resins are used in the manufacture of natural insect repellents and insecticides and the different tree parts have medicinal value because they are used to treat various diseases Cavalcante et al. (2003). Nowadays, the growing interest of cashew is increasing because of the high commercial value of its nuts at international market level.

In Benin, the cashew production system (cultivation, processing and marketing of the products) and the socio-economic impacts on the local populations have been well described Tandjiekpon (2005). Research on traditional knowledge in Côte d'Ivoire showed the effectiveness of these methods in the management of shea genetic resources Diarrassouba et al. (2008). Knowledge of local communities on the management of some perennial trees such as shea, baobab, jatropha, was assessed in Benin by Assogbadjo et al. (2009). But little data exist on the ethno-botanical knowledge of cashew and the management of its genetic resources. The objective of this study was then to document the indigenous knowledge of local people related to the production of cashew, its use and how the genetic resources of this important species are traditionally managed by farmers in local agriculture system in Benin.

2 Material and Methods

2.1 Study area and target groups

According to PADSE (2003), the suitable area for cashew production in Benin lies between 0°52'11" and 3°46'58" East

longitude and 7°13'34" and 10°27'51" North latitude. This delimited area includes three sub-areas (zones) viz the Centre, North-East and North-West zones of Benin. In the present study, three districts from each production zone were selected on the basis of their level of production and their accessibility (Figure 1).

2.2 Data collection methods

The data were collected from January to March 2013 following the combined methods described by Adoukouonou- Sagbadja et al. (2006) and Diarrassouba et al. (2008) adapted to our research axes. Shortly semi-structured interviews using a predefined list of topics or issues and occasional free discussions were conducted at group or individual farmer level in two to three randomly selected villages per district (in total 7 villages per zone). Besides, the producers interviewed were selected based on the degree of involvement in cashew production and trading. The data collected during the study were related to the socio-demographic characteristics of farmers and their indigenous knowledge, the plantation history, socio-cultural values of the species, traditional management of the crop diversity in rural land systems agronomic performances and organoleptic quality of identified cultivars, the habits and the cultivation techniques.

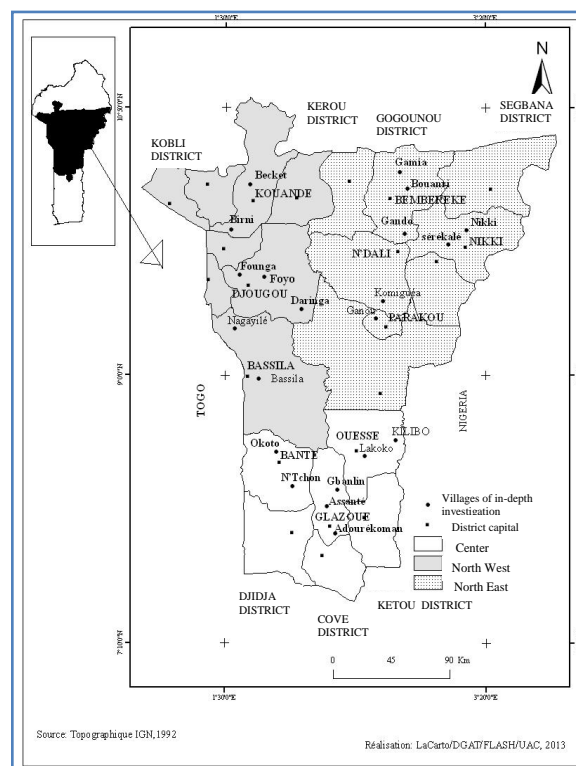


Figure 1 The geographic map of the study area showing the districts and villages surveyed

2.3 Data Analysis

SPSS (Statistical Package for the Social Sciences) Version 16.0 software was used for the determination of descriptive statistics and the SAS software for the analysis of quantitative data.

3 Results

3.1 Socio-demographic characteristics

Socio-demographic characteristics of the respondents have been illustrated in the Table 1. Among all the studied zones, most of the respondents (89.68% in average) are men against only 10.32% of women. It was also reported that majority of cashew producer were between 30 and 60 years of age (66.67% in average) and most of them were married (95.42% in average). At educational point of view, most of them were not literate (57.88%). However, 55.43% of the North-East farmers were instructed comparatively to the two other areas (<40%).

The interviewed respondents belong to seven ethnic groups namely Baatombou, Itcha, Yom, Mahi, Idaactha, Lokpa and Fulani. The most representative ethnic group was Baatombou (39.48%), strongly represented in North-East and North-West whereas Itcha (18.44%) is the most represented in the center.

3.2 History and evolution of land allocated to cashew plantations

From the information gathered from cashew producers, the tree has been introduced in the surveyed areas since 1960s just after independence of the country. Diverse opinions have been received on the introduction of this species in the study area. In the Centre and North-West for instance, cashew was introduced in these areas for reforestation and economic reasons while in the North-East, along with these two reasons, this fruit tree has been introduced as an alternative for cotton and groundnut.

Most of the respondents recognized the increase of the total areas devoted to cashew cultivation compared to the previous years. Several factors have been reported to be in favor of this fact. Indeed in previous year, approximately 35% of the respondents showed poor knowledge about the plant, especially in Centre and North-West. In the North-East, 52.81% of farmers believed about their lack of knowledge on the benefices provided by the cashew tree. On the other hand, about 5% of the producers also indicated that the decrease of cotton production promoted the cashew plantations. Finally, according to 27% of the investigated farmers, the awareness of the producers on the production techniques by the NGOs played an important role in the development of cashew plantations.

Table 1 Socio-demographic characteristics of the respondents.

Socio-demographic characteristics	Modality	Percentage of respondents		
		Centre	North-East	North-West
Sex	Female	18.66	03.26	06.50
	Male	81.34	96.74	93.50
Age	< 30 years old	05.97	01.09	06.50
	Between 30 and 60 years old	67.81	72.82	59.35
	≥ 60 years old	26.22	26.09	34.15
Marital status	Unmarried	0	0	0.81
	Married	94.78	97.82	94.31
	Divorced	0.74	01.09	02.44
	Widowed	04.48	01.09	02.44
Education level	illiterate	67.81	44.57	56.91
	Elementary	23.88	30.43	30.64
	Secondary	08.31	25.00	12.45
Experiences in cashew production	< 10 years	17.91	27.78	23.08
	Between 10 and 20 years	50.75	66.67	56.41
	≥ 20 years	31.34	05.55	20.51

3.3 Varietal diversity and folk taxonomy

From the surveyed area, all the respondents have a perfect knowledge on the cashew tree. The plant is frequently known by various vernacular names; these vary mainly with ethnic groups and could have or not clear meaning in local languages. Indeed, the name cashew has been known as *Cajou* by Mahi and Ditamari, *Emê oyimbo* by Itcha and Nagot groups, *Egui cajou* by Tchaabè and Idatcha, *Attian (Atchian, Atiama)* by Ani, Cotocoli and Yom people, *Gmassi* by Lokpa and Soola people, *Yibo* by Baatonou group and *Légué manka (Yico)* by Peulh tribal group.

Several varieties have been recognized by all the ethnic groups. Table 2 presents the information about the common names of these varieties, farmers' description and their correspondences between ethnic groups. The number of varieties distinguished by each ethnic group varies from 2 in Mahi ethnic group (central Benin) to eight in Yom ethnic group (North-West). The correspondence between names based on peasant description allows us grouping these varieties into 9 morphotypes of which 4 were defined on the basis of nut characteristics and 5 were on the basis of the apple characteristics (Table 2).

In total, four criteria were mainly used to assign common names to cashew varieties. These are color & size of the apple and size & shape of the kernel. These results shows that the color of the apple is the most common character (99.4%) which is used for identification of varieties by local community, this character was followed by the size of the nuts and the shape of the apple (about 38% of respondents). Use of nut shape for identifying the variety is least common (15 % of respondents) in the ethnic groups.

The Factorial Analysis of Correspondence (FAC) of collected ethnic data and traditional description features of cultivars shows that the first two lines express 94% of the baseline information (Figure 2). The axis1 opposes Fulani, Baatombou and Idaatcha ethnic groups to Mahi group while there is a convergence between three ethnic groups namely Fulani, Baatombou and Idaatcha in description modalities of cashew cultivars. Besides, Baatombou, Fulani and Idaatcha recognized cashew producers mostly from the shape and size of the nuts while Mahi recognize them merely based on the color of the apple. On the axis 2, we can see an opposition between the ethnic groups Yom, Lokpa and Itcha on the one hand and the trait shape of the apple on the other hand, suggesting that the Yom and Lokpa less recognize cashew cultivars from the apple shape in contrast to Itcha which recognize them on this character.

3.4 Farmers' perceptions on the agronomic performances and organoleptic quality of identified cultivars

Table 3 summarizes the data collected on the agronomic productivity, resistance to disease, flowering cycle the organoleptic quality of the apples (sugar, juice astringency) of

the cashew cultivars. Briefly, about 27% of farmers believed that the yellow apple cultivar had short production cycle and a good performance (36.47%), displays more resistance to disease (25.64%) and also had apples with good organoleptic quality (64.27%).

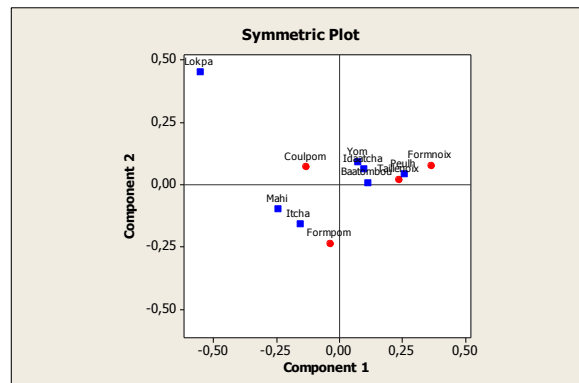


Figure 2 Factorial Analysis of Correspondence showing the correlations of axes 1 and 2 with traditional description criteria of cashew cultivars.

Other producers reported that the cultivar with small nut has a short production cycle (6.63% respondents) and produces more than the others (11.55% respondents). The same answers were given for the large nut cultivars that are reported to have a short production cycle (2.02% respondents) and high yield (2.74% respondents).

Moreover, in contrast to these perceptions, some interviewed persons relate these variations of agronomic and organoleptic characteristics to the environment and soil quality. The day from planting to the first fruiting of the plantations were also collected (Figure 3). For all the ethnic groups, the day from planting to the first fruiting is often 3 years, except the Mahi and the Idaatcha people who reported 4 years. Several uses are made of the various organs of the cashew tree in Benin. Thus, apples and nuts are all consumed by the populations, but apples are the most consumed (96.54%). About the nut consumption in the three investigated areas, they are more consumed in the Center and the North-West zones than in the North-East one.

3.5 Traditional uses of cashew in Benin

Uses of cashew products in traditional medicine / pharmacopoeia are very common in Benin for the treatment of many diseases. The plant parts used in traditional medicine include the bark (97.7% respondents), leaves (63.7% respondents), roots (30.5% of respondents), stalk (78% respondents) and apples (2.6% respondents).

The Correspondence Analysis (CA) of ethnic data and different parts of the tree used shows that the first two axes express 90.34% of baseline information (Figure 4).

Table 2 Local name of cultivars, farmer description and their correspondence between ethnic’s groups in Benin.

Type	Ethnic groups						Farmer description
	Yom	Mahi	Idaatcha	Lopka	Itcha	Baatonnou	
1	Attiamkpakpawa	*	*	GmassiKiyassilassi	*	Yibosombabaga	Bignuts
2	Attiamfêfèyanssi	*	*	*	*	*	Nuts and flat close
3	Attiamyôyora	*	*	Gmassisikpéssi	*	Yibosombayingui	smallnuts
4	Attiamkpata	*	Orôlakon	*	OrôLakon	Yibonimbaga	Apple round and big
5	Attiamfitissi	*	Orôkikéré	Gmassikoukouloutassi	*	Yibonimpibu	smallapple
6	Attiamvovoâ	*	*	Gmassikidallassi	*	*	long apple
7	Gnadôbônôm	Wéwé	Cajou founfoun	Gmassikouhouloumassi	Cajou Founfoun	Yibonimpiga	yellowapple
8	Gnatchrom	*	*	*	*	*	via apple
9	*	Vôvô	Cajou kpiqpa	Gmassikissèmassi	Cajou Kpiqpa	Yibonimsuanu	redapple

Table 3 Traditional knowledge of farmers on agronomic and organoleptic characteristics of cashew varieties in Benin. :No difference

Agronomic and organoleptic characteristics	Varietal effect				Environment Soil quality	No difference	No answer
	Yellow apple	Red apple	Small nut	Big nut			
Short production cycle	27.09%	9.8%	6.63%	2.02%	4.61%	12.10%	37.75%
Disease resistance	25.64%	18.73%	0%	0%	8.35%	14.72%	32.56%
Best productivity	36.47%	27.66%	11.55%	2.74%	6.26%	10.13%	5.19%
Organoleptic characteristics	64.27%	12.39%	-	-	4.03%	7.21%	12.10%

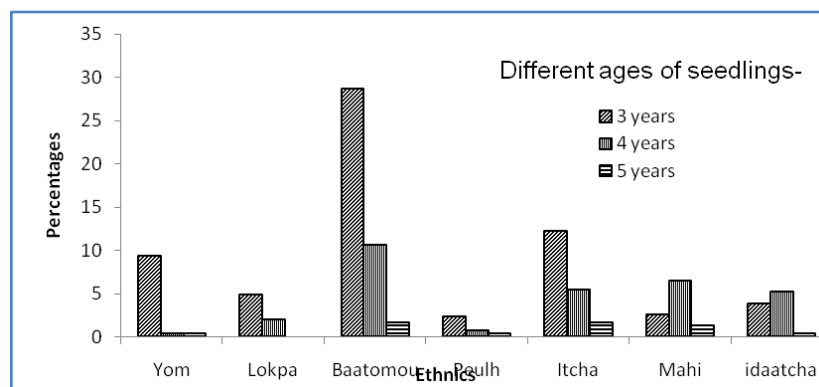


Figure 3 Proportion (%) of the respondents on the first-time planting–fruiting period.

The analysis shows that the bark is used by all ethnic groups, but stem used by the Mahi, Itcha and Idaatcha while Baatombou ethnic group used apple as a fertilizer for an unproductive cashew trees.

The organs of cashew tree are used by traditional healers to treat about 30 diseases (Table 4). The medicines are administered either orally or externally (bath). Some plant parts are used in combination for the treatment of certain diseases. Among the most treated diseases, it used against there are children allergy (79.2%), diarrhea (45%), hemorrhoids (40%), cough (39.2%), pains related to teeth diseases (38, 3%), malaria (38.3%), tooth decay and stomach pain (35.8% each), hypertension (29.2%) and diabetes (28.3%). Less than 10% of farmers use this plant to treat other affections.

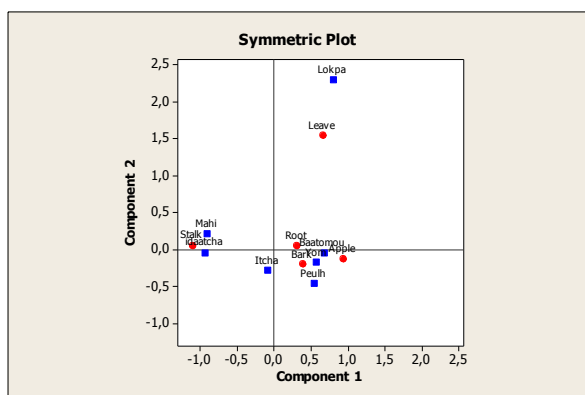


Figure 4 Factorial Analysis of Correspondence showing the correlations of axes 1 and 2 according to the plant parts used and ethnic groups.

After these two categories, other traditional uses were also registered. For examples, the bark is used for the conservation of yam chips whereas the stems and branches are used as fire wood by women. Besides, apples are used for feeding pigs and rabbits, in the preparation of local alcohol (sodabi) and as a fertilizer for cashew plants.

3.6 Management system of cashew seed in Benin

As a plantation material, the seeds are very important input in cashew agricultural production. Majority of the producers in the study areas (92.84%) made the selection of seeds from specific trees among the old plantations base on their agronomic performances. The other farmers (7.16%) reported to have obtained their planting seeds from national extension centre (CARDER), NGOs and Projects.

Two major criteria were used by the producers in the seed selection system: (i) the size of the nuts and (ii) the productivity of the tree. Indeed, during seasonal hunting or when visiting pair plantations, producers observe and select most productive trees with large nuts. It is important to note here that the color of the apple is not a selection criterion in seed selection by the producers though it is important for the

identification of the cultivars. The most dominant criteria remain the nuts size.

3.7 Management of traditional agro-forestry system based on cashew

In all the areas surveyed, almost all the responded producers (93.22%) were indigenous tribal people; in the North-West 14.29% of respondents were alien. Most producers (97%) are landowners, among them 91.07% have inherited the land of their parents and 6.05% of the respondents obtained lands by gift (especially women from their husbands). Nearly 3% are tenants of land and are concentrated in the North-West but they reported not paying seasonal renting fees to the owners.

In cashew plantations, there are also woody species among which the most dominant were the shea (*Vitellaria paradoxa*) and the African locust (*Parkia biglobosa*) observed in both northern zones. In the Centre, in contrast, only a quarter of respondents conserve these two woody species in cashew plantations.

4 Discussions

4.1 Development of cashew production and its valorization in Benin

Cashew played an important role in the development of socio-economic status of local populations in Benin. In the surveyed area, many ethnic groups are involved in the cultivation of the cashew tree.

A total of seven major ethnic groups are involved in the production. Similar type of study was conducted by Tandjiekpon (2005) and reported that five ethnic groups were mostly involved cashew production in Benin. But in present study the involvement of seven ethnic groups was reported this indicates the increased interest of local populations in the production of this tree.

Moreover, although cashew planting is still dominated by men, the present study revealed the involvement of women owning cashew plantations, suggesting a broad development of the actors involved in cashew production in the country.

The lack of women in cashew cultivation until now can be explained by the fact that they are not landowners. Indeed, in the study area, only men can inherit land from their parents. The few women farmers involved in cashew production have acquired the land from their husbands. The same observation about the low proportion of women as leaders operating cashew plantations has been reported by Topper and Kasuga (2003) in Tanzania.

According to the agricultural statistics, the production of cashew is increasing in Benin Tandjiekpon (2005).

Table 4 Traditional medicinal and pharmacological uses of different parts of the cashew trees documented in the study area in Benin.

Parts used	Affections Treated	Method of preparation or use
Bark	allergy for children, yellow fever, eye pains	Bath.
	external and internal wounds, stomach ache (dysentery, diarrhea of children), Cough, teeth pains (teeth bleeding, caries),hypertension, diabetes, hemorrhoid, , sexual weakness,	Administration of decoction
	Food poisoning and diarrhea of animal cattle	the extracted liquid, administered to animals
Leaf	Children fever, malaria,,	Bath
	Hypertension, dysentery, teeth's caries, cough	Administration of decoction
Root	hypertension, malaria	Bath
	Cough,, stomach pain,tooth decay	Administration of decoction.
Apple	Scorpion and bee sting	Application of the juice at the sting
Stalk	Teeth's caries	Toothpick
Liquid nuts	Tinea	Ointment

This finding was supported by the present survey, which showed a significant change in the growing areas. According to them, many people are now interested in the production. Several reasons were given to justify this evolution. In previous years, cashew plantations were neglected by people due to their interest in the production of annual crops limiting the availability of land. But recently cashew production is growing because of the awareness of NGOs on the economic value of this plant, on the production techniques but also because of the recent dysfunctions of the cotton sector.

In all the study areas, apple is locally more consumed than the nut because this latter is essentially sold. Consumption of apples enrich the diet of the population as it is high in sugar (10-12%), minerals, vitamin C and β -carotene Lautié et al. (2001). Besides, cashew products and especially the nut are a great source of income and allow producers to solve the problem of poverty and reach the objectives of food security. Similar observations were made on the Shea tree Diarrassouba et al. (2008) indicating these fruit trees constitute a real tool for poverty alleviation in developing countries.

Finally, the present study also revealed that many parts of the plant are used in the treatment of several diseases. These results were also obtained by Cavalcante et al. (2003) which showed that cashew is used to cure various diseases. The commonly used plant parts are bark, leaves, roots, apple and stalk but leaves are the mostly used as a traditional medicine in the study area. Present observations are in conformity with the findings of Salhi et al. (2010) who reported the frequent use of leaves in traditional medicine. Several methods of preparation are used among which the plant decoction and infusion are the most commonly used. Similar type of observation was made by Diarrassouba et al. (2008).

The decoction can contain the most active principles and reduces or cancels the toxic effect of certain substances Salhi et al. (2010).

4.2 Farmer knowledge and dynamic management of cashew genetic resources in Benin

The traditional use of morphological traits in the identification, description and classification of plant by indigenous people is reported on many crops such as fonio Adoukonou-Sagbadja et al. (2006), traditional leafy vegetables Dansi et al. (2009) and also the perennial plant such as shea tree Diarrassouba et al. (2008). In the present study, almost all respondents recognized the existence of several morphotypes within the species. They distinguished cultivars from four characters viz: color, shape (size) of the apple, shape and size of the nuts. Rarely the character shape of the leaf is used in the classification of morphotypes. These results partially contrast those of Tandjiekpon (2005) which showed that the main criterion for classification is the color of apples. There is therefore a significant change towards a better knowledge of the plant by the producers. According to Caribbean Technological Consultancy Services Network (1993), the cashew plant has large variations in capacity growth, quality and quantity of nuts produced. The outcrossing mode of reproduction of the species contributes strongly to this variability. The cashew varieties used in the study area are from diverse sources and have different generic names according to the ethnic group of the farmers. For example, the Baatonnou farmers called the plant *yibo* which means "the tree of Nigeria" while Fulani people named it *léguélmanka* which literally means "the tree found in the fallow or abandoned fields". The same observations were made on the shea Ivory Coast and the locust in Burkina Faso by Diarrassouba et al. (2008).

Conclusion

This study assessed the level of producers' knowledge on the cashew production in Benin. It also determined the socio-cultural and economic importance of cashew in the three production zones of the country. Producers have differentiated and classified trees and cultivars essentially based on

morphological traits. The day to first fruiting, the different cultivars and their agronomic performances and other parameters were documented. In economic terms, only the nut is sold by producers and this constitutes for them an important source of income. This investigation has also allowed us to know the mode of planting, cultivation techniques that influence cashew production but also the effect of cashew on associated annual crops. Different parts of the plant are used for the treatment of several diseases but also for other purposes. Further research on the pharmacological and medicinal value of this species is necessary to verify the information on the potential of the plant and also to know which parts of the tree that is most effective in healing diseases.

Acknowledgements

The authors thank the producers and other actors encountered during the survey for their valuable and fruitful collaboration. The work in this study is funded by the University of Abomey-Calavi through the project 'PROANAC'

References

- Adoukonou-Sagbadja H, Dansi A, Vodouhe R, Akpagana K (2006) Indigenous knowledge and traditional conservation of Fonio millet (*Digitaria exilis* Stapf, *Digitaria burua* Stapf) in Togo. *Biodiversity and Conservation* 15:2379–2395
- Akinwale TO (2000) Cashew apple juice: Its use in fortifying the nutritional quality of some tropical fruits. *European Food Research and Technology* 211: 205-207.
- Assogbadjo AE, Amadi G, GlèlèKakaï R, Mama A, Sinsin B, Van Damme P (2009) *Evaluation écologique et ethnobotanique de Jatropha curcas L. au Bénin*. *International Journal of Biological and Chemical Sciences* 3: 1065-1077.
- Azam-Ali SH, Judge EC (2001) Small-Scale Cashew Nut Processing. ITDG Schumacher Centre for Technology and Development Bourton on Dunsmore, Rugby, Warwickshire, UK.
- Behrens R (1998) About the spacing of cashew nut trees. *Proceedings of International Cashew and Coconut Conference – Dar es Salaam*. pp. 48-52.
- Caribbean Technological Consultancy Services (CTCS) Network (1993) Information package on cultivation, processing and marketing of cashews. St Michael, Barbados, Caribbean Technological Consultancy Services Network.
- Cavalcante Ana AM, Rübensam G, Picada JN, Silva EG, Moreira FJC, Henriques JAP (2003) Mutagenic evaluation, antioxidant potential and antimutagenic activity against hydrogen peroxide of cashew (*Anacardium occidentale L.*) apple juice and cajuina. *Environmental and Molecular Mutagenesis*. 41: 360-369.
- Dansi A, Adjatin A, Adoukonou-Sagbadja H, Falade´ V, Adomou AC, Yedomonhan H, Akpagana K, de Foucault B (2009) Traditional leafy vegetables in Benin: folk nomenclature, species under threat and domestication. *Acta Botanica Gallica* 156: 183–199
- Diarassouba N, Kouablan EK, N'Guessan KA, Patrick VD, Sangare A (2008) Connaissances locales et leur utilisation dans la gestion des parcs à karité en Côte d'Ivoire. *Afrika focus* 21: 77-96
- Lautié E, Dornier M, de Souza Filho M, Reynes M (2001) Les produits de l'anacardier : caractéristiques, voies de valorisation et marchés. *Fruits* 56: 235-248.
- Morton, J. (1987) Cashew Apple. In: *Fruits of warm climates*. Julia F. Morton, Miami, FL. pp. 239–240.
- Nakasone HY, Paul RE (1998) *Tropical Fruits*. CAB International, Oxford, UK.
- Ohler JG (1979) Cashew. Koninklijk Instituutvoor de Tropen Teskin, Zutphen Co., Amsterdam, The Netherlands, pp.260.
- PADSE (2003) Diagnostic global de la filière anacarde au Bénin. MAEP/PADSE 2003, pp. 60.
- Salhi S, Fadli M, Zidane L, Douira A (2010) Etudes floristique et ethnobotanique des plantes médicinales de la ville de Kénitra (Maroc). *Lazaroo* 31: 133-146.
- Tandjiekpon A (2005) Caractérisation du système agroforestier à base d'anacardier (*Anacardium occidentale* Linnaeus) en zone de savane au Bénin. *Diplômé d'Etudes Approfondies (DEA), FLASH/UAC*: 104p
- Topper CP, Kasuga LJ (2003) Knowledge transfer for sustainable tree crop development. A case history of the Tanzanian integrated cashew management programme. *Bio Hybrids Agrisystems Ltd*. UK.