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Manufacturing Process and Various uses of Savannah Herbal Tea (*Lippia multiflora*) in Côte d'Ivoire

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Abstract

This study aims at determining the manufacturing process of tea from *Lippia multiflora* collected in Côte d'Ivoire and describe its various uses. A survey was conducted among pickers, sellers and consumers in five cities (Abidjan, Yamoussoukro, Toumodi, Katiola and Bondoukou). The results show that (92.11%) of the women harvesting tea, cut leafy stems at tea tree base, (80.65%) carry their harvests on the head and (60.95%) dry their harvest from 1 to 3 days or 7 days. The harvest period ranging from April to August is the most important one (80.15%). In Abidjan, the use of *Lippia multiflora* as food is 79.80 % and in other areas of the country, it is used for both food and medicine with the respective frequencies of 46.56 and 46.44 % and its insecticidal use represents only (6,16%). It appears from this survey that the leaves of *Lippia multiflora* are most used by consumers; the manufacturing of this herbal tea is performed according to traditional process. The savannah tea has nutritional, insecticidal and medicinal values. It would be better to afford the opportunity to transform the leaves of *Lippia multiflora* in tea in order to have a crop with a high added value.

Keywords: *Lippia multiflora*, Savannah Tea, Herbal tea, Tea

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Introduction

Lippia multiflora (Verbenaceae) is a very fragrant perennial herb, which grows wild in savannah areas, on account of this; it holds the common name of savannah tea. It is almost found everywhere in the Sudan savannah of West and Central Africa (Jim *et al.*, 2001). In Côte d'Ivoire, *Lippia multiflora* (verbenaceae) is found in the central and northern part of the country. The leaves of savannah tea are generally consumed in the form of hot drink. They are used for the treatment blood pressure, malaria and diarrhea, in traditional and modern medicine etc. (Ouedraogo, 1986; Benoit-vical *et al.*, 1996; Oussou *et al.*, 2008) and also have insecticidal activities on mosquitos and weevils (Koumaglo *et al.*, 1996). Through its values and commercialization in Côte d'Ivoire (N'guessan and Yao-Kouamé 2010), the use of *Lippia multiflora* it drunk from rural and urban areas. Despite these multiple uses, savannah tea is a harvesting plant. The manufacturing process of the leaves in tea and practices linked to its consumption are not well-known. The present study aims at identifying all practices related to the consumption of *Lippia multiflora*, its use and the manufacturing process of its leaves in herbal tea in order to better know and develop it.

Material and Methods

Study areas and target

The survey was carried out in the central, north-eastern and southern part of Côte d'Ivoire, sellers of *Lippia multiflora* herbal tea, Harvesters and consumers have been the main target. Various investigations were conducted in five cities including: Yamoussoukro, Toumodi (Central region), Katiola (Central-Northern Region), Bondoukou (North-Eastern) which are spontaneously the growing areas of *Lippia multiflora*, and Abidjan (Southern Region) which is not a growing area of this plant, is a center of consumption, particularly in the districts of Yopougon, Abobo, Adjamé and Cocody. 150 people were interviewed, including 50 (sellers and / or harvesters) and

100 consumers per city and in other districts of Abidjan. About, 1200 people were interviewed.

Methods

The information was obtained through interviews with natives or people who spent a better part of their life in the areas of natural production of *Lippia multiflora* such as Bondoukou, Yamoussoukro, Toumodi and Katiola. For this first phase (stage), we conducted an exploratory investigation, with no formalized questionnaire in the purpose (order) to be familiar to the study area (town) and the local language. During meetings with residents, we have attempted to obtain general information about the plant, including its name in the local language, the method of collection and storage, transportation means, drying method, drying time, periods of harvesting, etc. The information obtained through this first phase (stage) allowed us to establish a survey sheet. The second phase (stage) was conducted in the cities of Bondoukou, Yamoussoukro, Toumodi, Katiola and Abidjan and was based on a survey sheet submitted to individuals through interviews. That study lasted four months (June to September 2010). The time spent on each interview was approximately 10 to 20 minutes. The survey sheet was a questionnaire highlighting information related to the origin of interviewed people, the method of harvesting, storage, drying, drying time of savannah tea, harvest time; different uses, the local name and the acquiring method of herbal tea.

Statistical analyzes of data

On a total of 1200 survey sheets, 180 with uncompleted answers had to be eliminated. Thus, 1020 answer sheets collected were statistically analyzed. The information collected was included in an Excel file and then transferred into a database, processed by the Epi Info 3.5.1 software for standardized data. These data were then analyzed using the Statistica 7.1 software.

Results and Discussion

Results

Methods of harvesting, storage, drying tea and savanna harvest periods

The results in figure 1 show that cutting fresh leafy stems at the base of savanna tea tree is the most used collection method by harvesters (92.11 %). The method of collection leaves by leaves and roots stump are respectively very low, 4.64 % and 3.25 %. For storage during harvest, the most common method used is storage on the ground (ground storage) (45.87 %), followed by the storage in plastic bowls (29.42 %) and gunny bags (20.96 %). For the transportation of harvested leaves, the survey showed that the majority of harvesters (80.65%) carry their harvest on the head, and only 19.35 % use motors as transportation means. Concerning the drying method, it should be noted that 38.23 % dry their harvest on cemented areas, 31.50 % on the sidewalks on the ground, 25.46 % harvesters dry leaves

on plastic bag and only 4.69 % dry on roofs. As far as drying time is concerned, most women (60.95 %) dry their harvest for 1 to 3 days, 18.14 % do so for a week (7 days), 9.85 and 10.92 % respectively do it in 4 and 5 days. After drying, 60.39 % of women store the herbal tea in jute bags and 39.56 % in sheds.

This information allowed us to establish the traditional manufacturing process of the savannah herbal tea (figure 2). This figure shows that the leaves (herbal tea) are the most widely used part and is used in three forms (whole leaves, cut and crushed leaves).

Analysis of the information collected (figure 3) shows that the period from April to August is the large harvests (80.15 %), followed by the period from September to December (16.68 %). January to March is the lowest harvesting activity period with a frequency of 3.17 %.

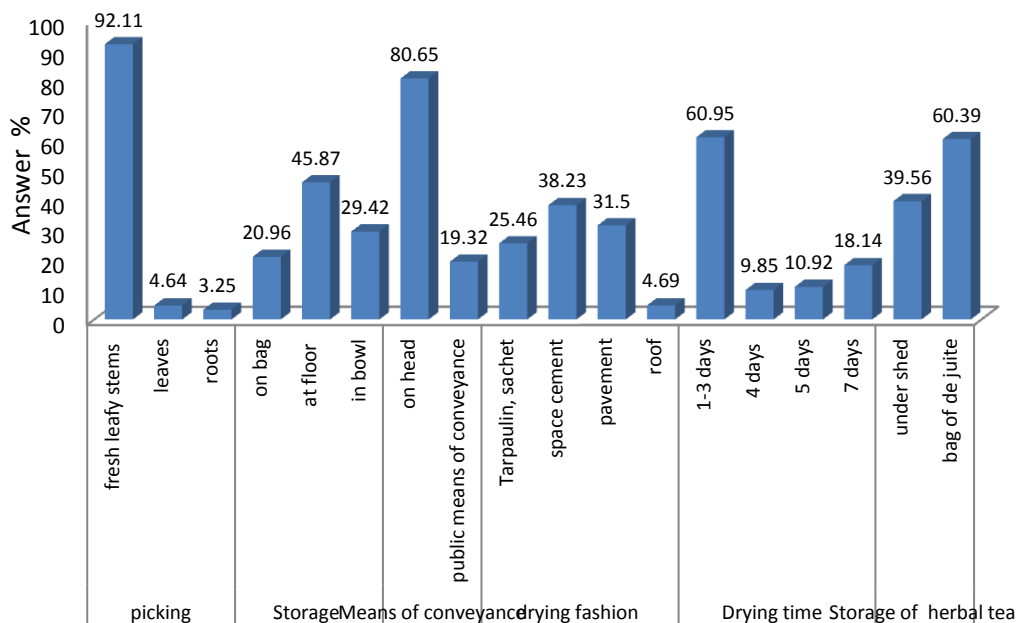


Figure 1: Percentage of responses of harvesting, means of conveyance, storage and drying tea of *Lippia multiflora*

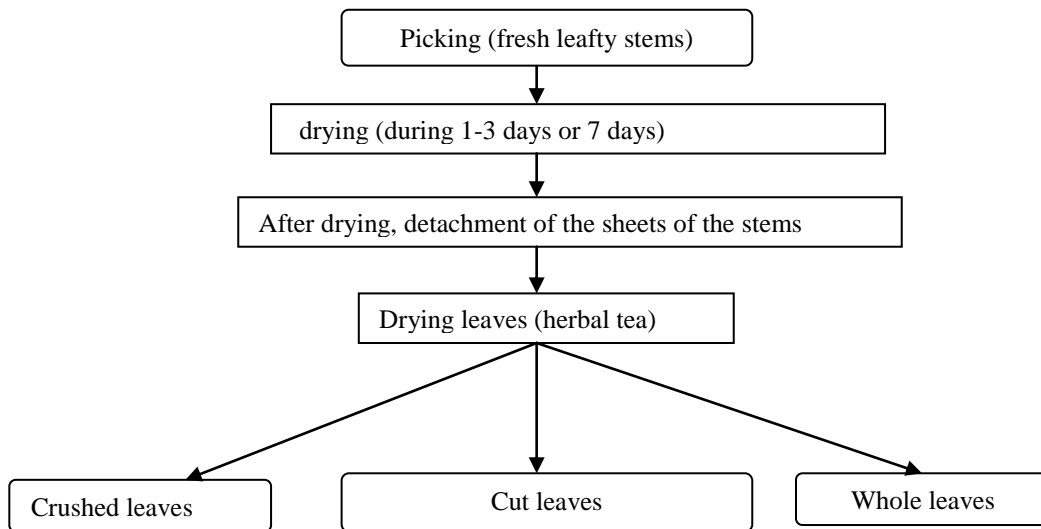


Figure 2: Traditional manufacturing process of the savannah herbal tea of *Lippia multiflora*

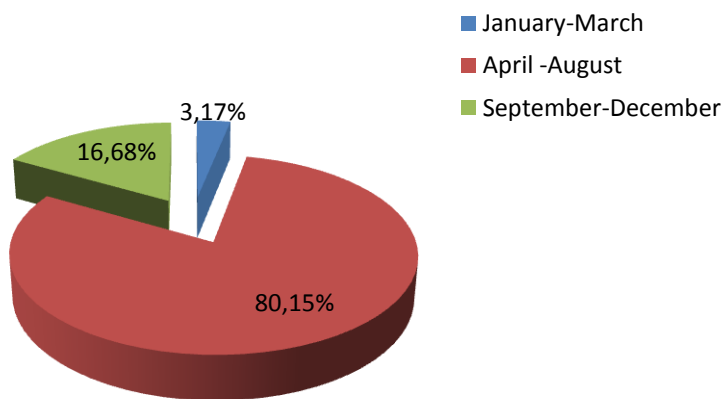


Figure 3: Harvesting periods of Savannah tea tree leaves

The different uses of savannah tea tree

Figure 4 shows the different uses of savannah tea tree. The analysis of this figure outlines three main uses of this plant such as: medicinal, nutritional and insecticidal uses. It should be noted that in cities where savannah tea grows, it is used for food and medicine with identical

frequencies of 46.56 and 46.44 %. The plant is used as an insecticide at a very low rate (6.16 %). In Abidjan, the use of the plant as food is more common with a percentage of 79.80 %, followed by its medicinal use (20.19 %) and its insecticidal use (0.32 %).

Local name and various uses of (*Lippia multiflora*) by ethnic group

Table I indicating the local name and the various uses of savannah tea tree (*Lippia multiflora*) by ethnic group shows that, the vernacular name of the savannah tea tree depends on the ethnic group. Savannah herbal tea is consumed as hot drink (tea). In Bondoukou (North-Eastern), apart from being used as hot drink (tea) the leaves are

used to flavor sauces and are added in fresh meat during cooking. It arises from the information collected that this plant is used to treat several diseases (malaria, cough, bad cold, diarrhea, muscles relaxant, diuretic, headaches, and hypertension) and to drive out mosquitoes by some ethnic groups such as: Gouros and a tribe (gôdè) of Baoulé ethnic groups.

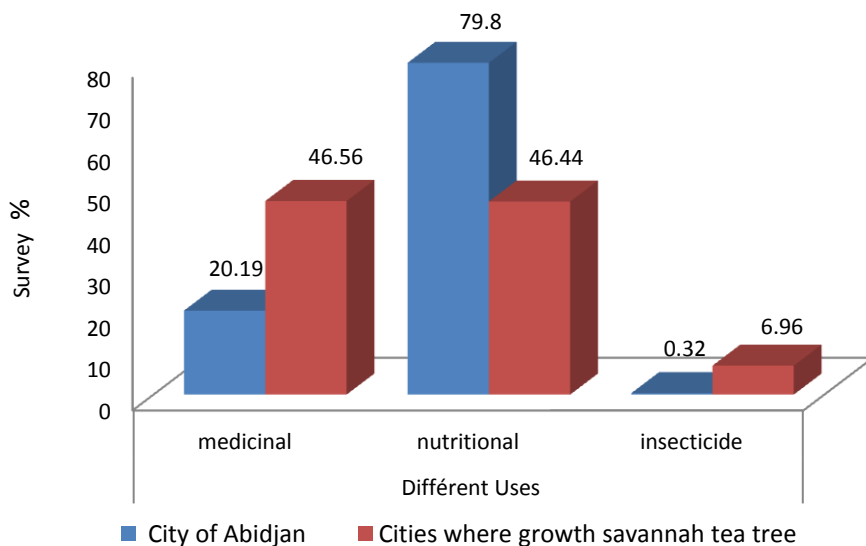


Figure 4: Different use for *Lippia multiflora*

Table 1: Local names and various uses of savannah tea tree (*Lippia multiflora*) by ethnic group

Cities	Ethnics	Local language	Nutritional use	Medicinal Use	Insecticidal use
Yamoussoukro and Toumodi	Baoulé	blomangninin or catchènoumangninin or tchouanmangninin	Hot drink (tea)	malaria, cough et bad cold (add lemon) healing and anti-infectious properties (tummy sore after childbirth (add pepper)), diarrhea, digest, muscle relaxant, diuretic, headaches, stomach- aches and hypertension.	Drive out mosquitoes
Katiola	Tagbana	kpatrenou wêrê or kpatihi	Hot drink (tea)	Malaria, cough and bad cold (add lemon), healing and anti-infectious properties (tummy sore after childbirth (add pepper), diarrhea, digest, stimulates appetite, muscle relaxant, diuretic, headache, stomachaches and hypertension	
Bondoukou	Lobi Koulango	Dobè Ankpaylor or Ankpayin	Hot drink (tea). used to flavor sauces and added in fresh meat during cooking	Malaria, cough and bad cold (add lemon), healing and anti-infectious properties (tummy sore after childbirth (add pepper), diarrhea, digest, muscle relaxant, diuretic, headaches, stomach aches, hypertension and stimulates the appetite.	
Strangers of surveyed cities	Dioula Gouro Sénoufo	Kinkeliba or Sougbanbrou or Sougouligban Fonhon ponzô	Hot drink (tea)	Cough and bad cold (add lemon), digest, muscle relaxant, diuretic, headaches, stomach aches, hypertension, facilitates digestion.	Drive out mosquitoes Gouros

Preparation method, frequency and period of consumption of savannah tea

Figure 5, shows the percentage of responses collected according to the preparation method, the frequency and the period of consumption of the savannah tea in the city of Abidjan (Center of non-settlement of the plant) and the leaves harvest Center.

The decoction is the most common method of preparation with percentages of 92.52 % and 86.19 % in Abidjan and in cities where the savannah tea tree grows.

55.06 and 80.88 % of the surveyed people respectively consume the herbal tea once a day respectively in the cities where the plant grows and in Abidjan. 37.98 % of questioned people in the cities where savannah tea grows have a frequency of two (2) times consumption a day compared with 16.04 % in Abidjan.

Evening is the most frequent period of consumption, with rates of 71.35 and 80.04 % respectively in the cities where the savannah tea plant grows and in Abidjan. This is followed by consumption in the morning, practiced by 19.17 % of the people surveyed in Abidjan and 25.44 % in the cities where savannah tea plant grows.

It should be noted that the consumption is mainly based on dry leaves (99 % in Abidjan and 92.25 % in cities where savannah tea plant grows). The consumption of fresh leaves is only 7.75 % in the cities where savannah tea plant grows and 1 % in Abidjan.

Acquisition of savannah herbal tea

The Acquisition of savannah herbal tea recorded in Figure 6 shows that 88.83 % (cities where

savannah tea grows) and 99.02 % (in Abidjan) get herbal tea by purchasing it. In cities where the plant grows, 12.17 % of questioned consumers acquire herbal tea through harvesting.

The rate of people carrying out this method of acquisition is very low in Abidjan (0,98 %). Concerning the purchasing place we have respectively, 98.92 and 100 % in the cities where it grows and in Abidjan. All the interviewees purchase herbal tea in the market and only 2.08 % are in supermarket in Abidjan. In all study areas, the price ranging from 25-50 F CFA (~ 20 g tea bag) is the most used with percentages of 94.91 and 83.14 %, then comes the 100 F CFA (~ 20-50g tea bag), with frequencies of 5.18 % in Abidjan and 15.9 % in urban areas where and it grows and finally the price of 410 CFA (20 g tea bag) with a percentage of 1.54 % only in Abidjan supermarket.

According to surveyed people on the processing of savannah tea leaves in tea. It should be noted that 90.14 % and 95.24 % respectively in cities where savannah tea grow and Abidjan, some among the surveyed people would like it to be the transformed in herbal tea. However, 8.86 and 3.86 % respectively in the cities where it grows and in Abidjan did not want its transformation. 67.65 % of surveyed consumers in cities where savannah tea grows and 57.16 % in Abidjan would like to buy it at the amount of 20 F CFA (2 g). Then, 25.15 % (Abidjan) and 20 % (cities where savannah tea grows) would like it at the amount of 25 F CFA (2 g), then 16 % and 10.02 % respectively would like to buy it at the amount of 50 FCFA (2 g).

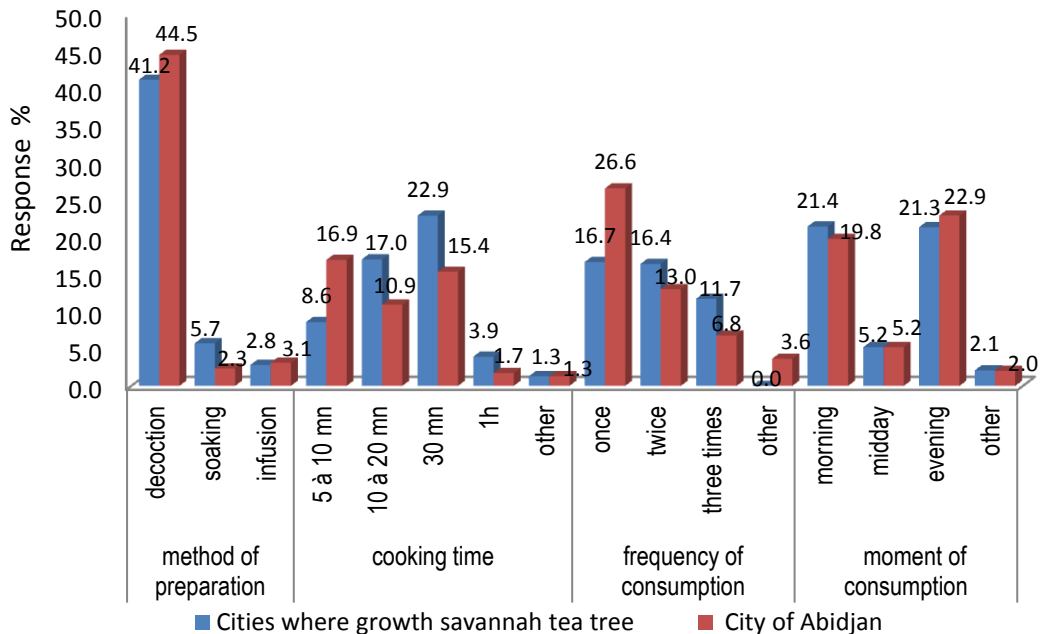


Figure 5: Percentage of responses according to the method of preparation, the frequency and the period of consumption of savannah tea

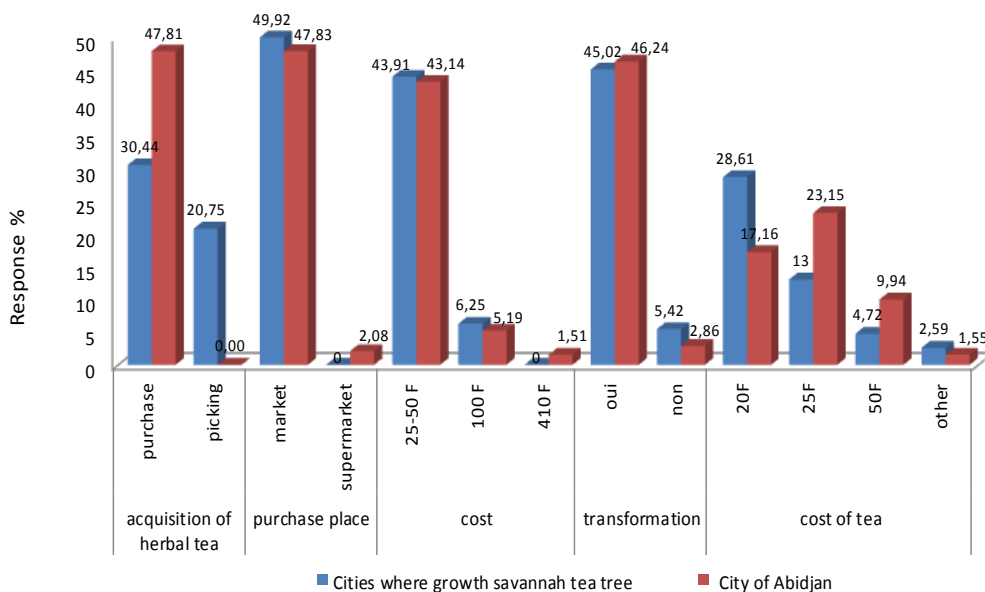


Figure 6: Percentage of survey according to the acquisition, purchase place, transformation, cost of herbal tea and tea

Discussion

Collection and transformation of savannah tea leaves in herbal tea and harvest period. The most harvesting method used, is to cut the fresh leafy stems at the shrub base. This practice can be explained by a desire to gain time for the actors of this field. However, the sustainability of such practice could entail in the short run, a threat to the survival of the savannah tea tree which is a wild plant. Moreover, the abuse of this method of harvesting has led to the disappearance of large harvesting sites at Toumodi and Katiola.

The transportation of harvests as bundles carried on head, the drying and outdoor storage conditions, practiced by the majority of women, showed that the transformation of savannah tea tree as a herbal tea remains a traditional activity. Drying conditions on the ground and in the air, exposed leaves to contamination by microorganisms and other forms of food contaminants. This analysis is confirmed by the study of (Hanson *et al.*, 2011), who observed the presence of the genus *Bacillus* in *Lippia multiflora* herbal tea. The drying time is variable, as this step depends on sunlight, temperature and ambient humidity, the quantity of leaves to be dried and the drying surface. Among the different parts of the plant, the leaves are most commonly used. This result is in agreement with those of (N'guessan *et al.*, 2009). These authors have shown that the leaves are the main sought parts in plants. The peak harvest of leaves observed in the period from April to August could be explained by the fact that at that time the plant is growing, it has healthy leaves, less perforated by insects. This result also shows that this is the most conducive period for leaves collection. The period from September to January, represents a small harvesting activity, which could be justified by the flowering of plants, perforating leaves by insects, dried leaves by drought, as well as bushfires. The period from February to March, is the lowest harvesting period due to plant regrowth.

Different uses of savannah tea tree

In the nutritional level, the information from the survey show that the savannah herbal tea is a hot drink consumed as tea, this result agrees with those of (N'guessan and Yao-Kouamé, 2010;

Kanko *et al.*, 2004a) who reported that the infusion of *Lippia multiflora* is used as tea. In Bondoukou (North-Eastern), in addition of being consumed like a hot drink, the leaves are used to flavor dishes namely sauces and fresh meat. This result demonstrates the flavoring properties of Savannah tea leaves (Kanko *et al.*, 2004b), the author describes the leaves of *Lippia multiflora*, as leaves with characteristic and pleasant flavoring, it could open the way for their use in food industry as additive. In the city of Abidjan, this plant is used for its nutritional and medicinal properties. This is because the consumers of Abidjan are more attracted by its pleasant flavoring they assimilate to citronella. However, in the harvesting cities of savannah tea, the use is as nutritional as medicinal, certainly due to the fact that, that plants are still a source of traditional medical care in these areas. This suggestion is in accordance with that of (Bissangou and Ouamba, 1997). According to these authors, in Africa *Lippia multiflora* Moldenke plays a key role in traditional healing. People use this plant to treat malaria, diarrhea, as indicated by the results of (Benoît-vical *et al.*, 1996; Oussou *et al.*, 2008). Moreover, apart from its ability to treat hypertension, indicated by (Ameyaw, 2009; Etou-Ossibi *et al.*, 2005), to fight against coughs, to allow muscle relaxation and its laxative nature (Mwangui *et al.*, 1993; Abena *et al.*, 1997).

Information from the survey also indicates that the savannah tea tree is used to treat other diseases, including urinary tract infections. This information also shows that the Savannah herbal tea is also used for its anti-infective, healing and diuretic properties. Besides the food and medicinal properties, the leaves of savannah tea are used to repel mosquitoes and perfume houses in Gourous and baoule (gôdè) ethnic groups. This statement is in accordance with that of (Kanko, 1995; Koumaglo *et al.*, 1996; Tia *et al.* 2011). These authors, indeed, highlighted the pesticide properties of the essential oil of *Lippia multiflora*. Similarly (Bissangou and Ouamba, 1997) have emphasized that the extract of *Lippia multiflora* was the object of a test of formulation like insecticide. Which use, remains however limited or minor.

Preparation and consumption of savannah herbal tea

Savannah tea leaves are mostly prepared as decoction and are orally administered. This result is in accordance with those of (Abena *et al.*, 1997; Kunle and *al.*, 2003; Ameyaw, 2009) indicating that savannah tea is often used in form of decoction and as a conventional tea in Congo. The cooking time is 30 min, in places where savannah tea grows, while in Abidjan, the highest time is 10-20 min. This difference could be explained by the fact that the majority of the population of the cities where savannah tea grows, cook food on charcoal. Whereas, in Abidjan, the cooking is done on gas fire or coal.

The consumption frequency in Abidjan is once a day, and the preferred time is evening, as it is usually used to fight against tiredness and to relax. In other cities, those morning and evening, have different functions. The two consumptions that of the morning and the evening have different functions. In fact, herbal tea is preferably consumed in the morning, in the form of tea for breakfast (Georges, 1989; N'guessan and Yao-Kouamé 2010.). It is taken in the evening to remove tiredness (Kunle *et al.*, 2012) the stress of the day, and is also constitutes a means of gathering, sharing and exchange after evening meal (Mamadou, 2008).

The several use of savannah tea within the country (areas of regrowth) shows that this plant is widely used by local people than those of Abidjan. This result is in accordance with those of Valentin *et al.* (1995); Pascual *et al.* (2001). For these authors, the gender *Lippia* is widely used by local people. In all areas of the survey, the most commonly used forms are dry leaves. In Abidjan, the purchase prices of these leaves are 25-50 and 100 CFA (~ 20g bag of herbal tea) with the sellers of the market. These results are in accordance with those of N'guessan and Yao-Kouamé (2010). However, some inhabitants of the city of Cocody (Abidjan) buy them in supermarket. This form of acquisition of herbal tea is explained by the fact that these people of higher standard of living rather attend these modern markets.

Purchasing intentions of tea from savannah tea leaves

The large majority of the surveyed people would like savannah tea leaves to be processed in form of tea, which shows the people great interest to this plant, the concern of upgrading it and prevent its extinction. The prices intended to the finished products (tea) are 20 F or 25 F (2g). These prices are the same charged for tea on markets.

Conclusion

The investigations carried out in the five cities of the Côte d'Ivoire on savannah tea (*Lippia multiflora*) have described the traditional process of manufacturing herbal tea. The vernacular name of savannah tea varies from one ethnic group to another. The period from April to August is the leaves large harvests, which are the most used parts by surveyed people. These leaves are sold in dried form and largely used for food. The savannah tea tree is used as medicine in areas where it wildly grows. It would be better to afford the opportunity to transform the leaves of *Lippia multiflora* in tea in order to have a crop with a high added value, which could help the population to appeal to their needs.

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