Chemical characterization of Tectona grandis, Thalia geniculata, Lasiomorpha senegalensis and of Musa acuminata used as food packing’s in Benin

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Abstract
Several plant leaves are used like packing in agro alimentary in Benin and play a double role. While acting as packing, they offer an antibacterial protection and/or antifungal to the conditioned food. It is in the research of possible antibacterial potential and/or antifungal of the leaves of Tectona grandis, of Thalia geniculata, of Lasiomorpha senegalensis and of Musa acuminata in traditional use as packing for the conservation of food in Benin that the present survey has been led. It aims to make the phytochemical screening of the leaves concerned. From the gotten results, it notices that the non volatile extracts of the plant species tested contain antibacterial compounds (flavonoids, tannins) antifungal (quinonic derivative) and no cyanogenic derivatives is present in somes leaves.

Keywords: Phytochemical screening, Tectona grandis, Thalia geniculata, Lasiomorpha senegalensis, Musa acuminata

1. Introduction
In agro-food industry, the healthy conservation, of long during and the qualities organoleptiques of the products consumed is a permanent obsession (Holzapfel, 2002; Motarjemi, 2002) [11, 13]. The packing is part of these techniques of conservation of the agro-food products. It is indispensable for its protection, its transportation, its promotion and its use (Palling, 1980; Paine, 1987; Rock, 1997) [18, 17, 19]. Modern materials used as packing for food products include a number of articles (wood, paper, glass, plastic, metal). But before and during the modern area in Africa and in all tropical regions the plant leaves served in general and are used to pack the semi-solid or solid food to be preserved and/or marketed (Bureau and Tissot, 1987; Bureau and Muton, 1989; Adegunloye et al., 2006) [9, 8, 1]. Besides, it has been recognized that some leaves contain the aromatic active compounds, stains, enzymes (papaïne for example), antimicrobial agents that migrate from the plant leaf towards its food and improve its conservation and organoleptiques properties (Buquet and Muff, 1972; Bramsnaes, 1981). Works listed and characterized a big number of these plant species (Hounhouigans, 2000, Adegunloyes et al., 2006; Adejumo and Ola, 2008; Onzo et al., 2013) [12, 1, 2, 16]. There are even an economic and environmental benefit bound to the use of these plant leaves as food packing, especially due to their biodegradability (Onzo et al., 2013) [1]. The food craft in Benin has retained the use of a certain plant food packing numbers even in the big cities (Boko et al., 1997; Onzo et al., 2013) [3, 1]. It is the case of the plant leaves of Thalia geniculata, Tectona grandis, Lasiomorpha senegalensis and Musa acuminata in traditional use as packing for the conservation of food in Benin. So, did we ask to know if these four plant leaf species used like food packings in Benin don't contain chemical features having an effect antimicrobial and/or antifungal that can protect food for which they serve as packing?

2. Material and Methods
2.1 Criteria of choice of the plant species
The choice of our plant species is based on the works of Onzo et al., (2013) [1] in which several species of vegetable plant leaves used as packing for various food categories in Benin have been identified throughout the national territory. Among these species of plant leaves Thalia geniculata, Tectona grandis, Lasiomorpha senegalensis and Musa acuminata are the main species that are used traditionally in the South of Benin. These species of leaves were chosen for the study, because of the importance of their use by the producers for the packing of foodstuffs such as a stuff derived from starchy corn called akassa or Gui ou lio in local language fongbe (Nago, 1997; Onzo and et al., 2013) [15, 1]. In general, the consumers prefer the akassa wrapped in these leaves that would confer it a good presentation, good texture and good aroma (Onzo et al., 2013) [1].
2.2 Collection and drying of the plant material
Collection of the leaves of Tectona grandis, Thalia geniculata, Lasiorrhiza senegalesis and of Musa acuminata has been achieved during September 2014 in the township of Abomey-Calavi (latitude/longitude: 6°26′54″ north/2°21′20″ east), department of the Atlantic in the South Benin. These plant species were collected in their natural habitat to know the swampy zones edging the Nokoué lake for Thalia geniculata and Lasiorrhiza senegalesis whereas Tectona grandis and Musa acuminata have been collected on silty-clay farm land. Taxonomic identification of these leaves was conducted by taxonomists of the National herbarium of the university of Abomey-Calavi using the data available to this effect. They have been dried to the laboratory temperature (25 °C-30 °C) during about two (02) weeks in the shade and away from the sunlight and then powdered.

2.3 Identification of the secondary metabolites
The procedure used for the research of every compound enumerate as follows:
- The gallic tannins has been characterized by an aqueous solution of ferric chloride (FeCl3) to 2% driving to the development of a coloration bruise-black or green black characterizing the presence of tannoids;
- The catechic tannins has been put in evidence by the reagent of Stiasny (formalin 30% in HCl extract; 2/1 v/v) (Soro et al., 2009) [20];
- The flavonoids as for them are revealed by the reaction to the cyanidine (Bruneton, 1999) [9];
- The anthocyanes have been revealed by hydrochloric acid addition to 5% and some drops of ammonia water to infuse it. A red coloration that turns to the purplish or greenish bruise indicates the presence of anthocyanes;
- The leuco-anthocyanes is put in evidence by the obtaining a flaky precipitate of a décocion in ethylic ether indicating the presence of muclilages (Traore, 2010) [22];
- The anthracenosides have been put in evidence by testing in ethanol alkaline with ammoniacal solution. The development of a cherry red color indicates the presence of aglycones anthracenosic.

3. Results and Discussion
Table I present the results of the phytochemical analysis of species of plant leaves used. From the data analysis, it notices that in the non-volatile extracts the tannins have been identified in all species except in the species Musa acuminata where they are represented by trace. Nearly all species contain anthocyanes and leuco-anthocyanes except Musa acuminata. Muclilages are present in all plant species studied. The anthracenosides meanwhile are largely in T. grandis and in trace in the other species. In the same way, the flavonoids have been strongly identified in T. grandis species and weakly in other species. Quinonic derivatives and cyanogenic compounds are absent in all plants species studied except in T.grandis species in which we detected the quinonic derivatives in small quantities. Saponins are like quinonic derivatives and cyanogenic absent in all the extracts studied investigated except in the extract of L. senegalensis in which they are found in small quantities. Fagbohoun et al., (2013) [25] got similar results for T. grandis species for which they affirmed the presence of tannins, flavonoids, quinones, mucillages and saponins.

About T. geniculata species Williams and Harbornes, (1977) cited by Lagnica, (2005) [23] also found similar results; notably the presence of flavonoïdes in this species. In the same way, the works of Watson and Dallwitzes, (1992) [26] rapported in this species the presence of Proanthocyanidins.

Table 1: Result of phytochemical screening of plants

<table>
<thead>
<tr>
<th>Species Compounds</th>
<th>T. grandis</th>
<th>T. geniculata</th>
<th>L. senegalensis</th>
<th>Musa sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tannins galliques</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>±</td>
</tr>
<tr>
<td>Tannins catechic</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>+</td>
<td>-</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>Anthocyanes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>±</td>
</tr>
<tr>
<td>Leuco-anthocyanes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Derivative quinoniques</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Saponines</td>
<td>±</td>
<td>±</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Cyanogenic Derivatives</td>
<td>±</td>
<td>±</td>
<td>+</td>
<td>±</td>
</tr>
<tr>
<td>Mucilages</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>±</td>
</tr>
<tr>
<td>Anthracenosides</td>
<td>+</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
</tbody>
</table>

+: presence ; - absence ; ±: trace

The table II presents the biologic properties of the chemical compounds being in the plant species. To the look of the information of the table II, all species of plants whose extracts contain the tannins, the flavonoïdes, the derivatives quinoniques, the Saponosides, the Terpèneses and the steroids are antiseptics and therefore of the potential candidates capable to act as packing susceptible to play a role in the conservation of food. It is therefore by order about priority of T. grandis, T. geniculata, de L. senegalensis et de Musa acuminata. All these species contain at least an antibacterial, an antiviral and/or one fungicide. Except the effects biocides all our four studied plant species contain the food complements being able to play a role antioxidant, anti-inflammatory, antiallergique, antitumoral, vasculoprotecteur and/or vein trope also.
The present survey consisted in making the screening phytochimique of the excerpts non volatile of the leaves of Tectona grandis for its contribution in the realization of this research. The authors sincerely thank the Laboratory of Study and Research in Applied Chemistry, Polytechnic School of Abomey-Calavi, for its contribution in the realization of this research.

5. Acknowledgments

The authors sincerely thank the Laboratory of Study and Research in Applied Chemistry, Polytechnic School of Abomey-Calavi, for its contribution in the realization of this research.

6. References

16. Onzo FC, Azokpota P, Akissoé N, Agbani OP. Biodiversité des emballages-feuilles végétales utilisées...