OPEN ACCESS
Haya: The Saudi Journal of Life Sciences
Abbreviated Key Title: Haya Saudi J Life Sci
ISSN 2415-623X (Print) |ISSN 2415-6221 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: http://scholarsmepub.com/haya/

Original Research Article

Medicinal Potentials of *Phragmanthera capitata* (Sprengel) *S. balle* (Loranthaceae) Used in the City of Douala (Cameroon)

Ladoh-Yemeda Christelle Flora[1*], Ndongo Din[1], Tomedi Eyango Minette[2]
[1] Department of Plant Biology, Faculty of sciences, University of Douala, Cameroon
[2]Department of Aquaculture, Institute of Fisheries Science, Yabassi, Cameroon

***Corresponding author:** Ladoh-Yemeda Christelle Flora. Email: christieflora@yahoo.fr
Received: 15.12.2018 | Accepted: 25.12.2018 | Published: 10.01.2019
DOI:10.21276/haya.2019.4.1.1

Abstract

Loranthaceae are epiphytic hemiparasitic plants that cause considerable damage to cultivated and spontaneous woody plants around the world. These plants are also used locally to treat many health problems. The aim of this work is to identify the various potentials of *Phragmanthera capitata* exploited by tradi-practitioners of traditional medicine. An ethnobotanical survey based on direct and semi-structured interviews was conducted among 121 tradi-practitioners in the city of Douala. About 52.9% of the surveyed tradi-practitioners knew only *P. capitata* as a hemiparasitic plant while 47.1% knew about other Loranthaceae species. In the latter group, 56.2% differentiated them only through flowers. 26 plant species have been recognized as host plants to *P. capitata*, 73.1% of which are woody species. The most cited species were *Persea americana*, *Dacryodes edulis* and *Psidium guajava*. 64.5% of the tradi-practitioners surveyed used *P. capitata* only for medicinal purposes (UV = 0.64) and the rest added ritual practices (UV = 0.71). The inventory identified 38 health problems treated by this species among which, hypertension, diabetes, nerve pain, cancer, heart disorders and mystical diseases are the most concerned. The leaves (93.3%) and stems (56.7%) are mostly used. This study showed the importance of *P. capitata* in the traditional pharmacopoeia of Cameroon despite its pernicious nature. Phytochemical and pharmacological investigations are envisaged to highlight certain medicinal properties of *P. capitata*.
Keywords: Ethnobotany, *Phragmanthera capitata*, host plants, traditional medicine.

INTRODUCTION

The Loranthaceae, also commonly known as "African mistletoe", are chlorophyllous parasitic plants that attach to the branches of their hosts via a sucker called the haustorium, providing a real physiological and structural bridge between the parasite and its host [1]. The parasites inflict on their hosts a diversion of water and nutritional substances essential to their life, their activity results in a hypotrophy and a dieback of the distal part of the host branch [2]. The damage they cause is economically and morphogenically variable depending on the parasitised woody species [1, 3]. Loranthaceae parasitism is a widespread ecological problem worldwide [4]. These parasites have long been considered unimportant [5], while they affect the growth and economic value of host trees that eventually die [6].

Loranthaceae are the most diverse group of parasitic plants with about 850 species in 65 genera [7]. In Cameroon, this family is represented by 26 species in 7 genera: *Agelanthus*, *Englerina*, *Glometula*, *Helixanthera*, *Phragmanthera*, *Tapinanthus* and *Viscum* [4]. *Phragmanthera capitata* is a ubiquitous and very devastating species. Its remarkable ubiquity is suitable for all ecological variations in Cameroon [8-11]. Very invasive on parasitized host trees, this species has a very wide host range compared to other Loranthaceae [8]. Although it significantly reduces the yield of woody species, Loranthaceae play an important and complex role in the biological system where they interact with ants, birds, mammals and endophytic microorganisms [11-14].

Programs and strategies for mechanical, chemical, biological and even integrated control have been developed to eradicate or at least reduce the invasion of Loranthaceae in natural formations and plantations. However, these different attempts have shown their limits [13, 15-19]. Despite their strong pernicious character, Loranthaceae have been and are widely used throughout the world in traditional medicine in the treatment of a broad spectrum of diseases such as cancer, rheumatism, disorders of the female reproductive system, hypertension, hypotension, asthma, epilepsy and

infectious diseases [20-25]. The objective of this work was to identify the various potentialities of *P. capitata* exploited by tradi-practitioners of traditional medicine in the city of Douala (Cameroon).

MATERIALS AND METHODS

Study Site

This study was carried out in the city of Douala (Figure 1). Douala (latitude, 3 ° 40 '-1 "-04 ° 11' N, longitude, 9 ° 16 '-1" -09 ° 52' E, altitude, 13 m) has a climate which belongs to the equatorial domain of a particular type called "Cameroonian" which is characterized by two seasons with a long rainy season (at least 9 months), abundant rainfall (about 4000 mm per year), high temperatures (26.7 ° C) and stable. The minimum average temperature in Douala for 30 years (1961-1990) is 22.6 ° C in July and the maximum average temperature of 32.3 ° C in February. The relative humidity of the air remains high all the year and close to 100% [26]. Douala has about 2.5 million inhabitants and the population growth is not always followed by an increase in economic resources [27]. The choice of this study area was justified by the fact that the city of Douala being the economic capital of Cameroon, is a cosmopolitan city where we find almost all the tribes of Cameroon [28].

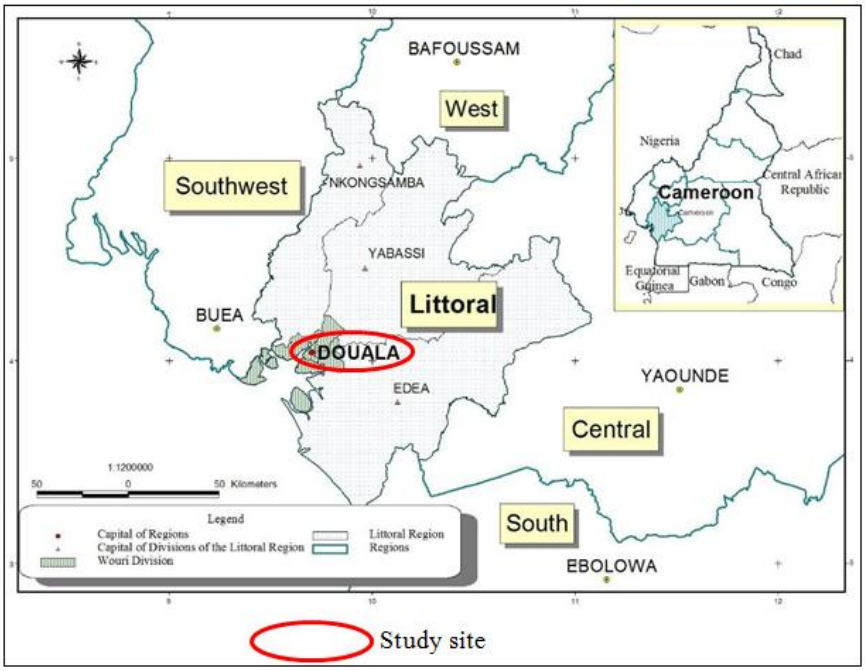

Fig-1: Location map of the study site

Ethnobotanical survey

An ethnobotanical survey was conducted in the city of Douala with 121 practitioners of traditional medicine (tradi-practitioners) (naturopaths / traditional healers). The survey was mainly interested in their knowledge and uses of *Phragmanthera capitata*. Direct interviews were conducted using semi-structured "snowball" questionnaires, a sampling technique in which the contacted tradi-practitioners were asked to identify other reliable therapists [29]. The condition for validating the responses of this survey was to recognize *P. capitata* and to have used it for some sort of treatment. A photograph and a description of the plant were presented to each identified person. The questionnaire items covered the socio-demographic characteristics of informants (gender, age, region of origin, year of experience, nature of knowledge acquisition and education), knowledge of parasitic plants, and traditional uses of *P. capitata*.

Determination of quantitative ethnobotanical parameters

Citation frequency (CF)

Citation frequency was determined as indicated by Schrauf and Sanchez [30]:

$$CF\ (\%) = \frac{Number\ of\ citations}{Number\ of\ practioners} \times 100$$

The use value (Vu)

The use value (Vu) was determined to evaluate the importance of *Phragmanthera capitata* in this study. The data were classified in categories of use and the value of use determined in each category. This index was calculated according to Phillips and Gentry [31], and modified by Rossato *et al.*, [32]:

$$Vu = \sum_{I=1}^{In} \frac{\mathbf{Ui}}{\mathbf{n}}$$

Where Ui is the number of uses mentioned by a practitioner i and n is the total number of tradi-practitioners interviewed.

The fidelity level

The fidelity level (FL) was used to determine the frequency of use of *Phragmanthera capitata* for the different categories of medicinal use. This index was calculated according to Friedman *et al.*, [33]:

$$\mathbf{FL} = \frac{\mathbf{Np}}{\mathbf{N}}$$

Where Np is the number of tradi-practitioners who mention a species for a use category p and N is the total number of interviewer tradi-practitioners.

RESULTS

Socio-demographic profile of tradi-practitioners of traditional medicine

For this study, 121 tradi-practitioners of traditional medicine in the city of Douala were interviewed about their knowledge of *Phragmanthera capitata*, 60.3% are naturopaths and 39.7% of traditional healers (Figure-2). To avoid any ambiguity, tradi-practitioners had to first recognize *P. capitata* through the photos presented to them during the survey to collect data on their knowledge and medicinal uses.

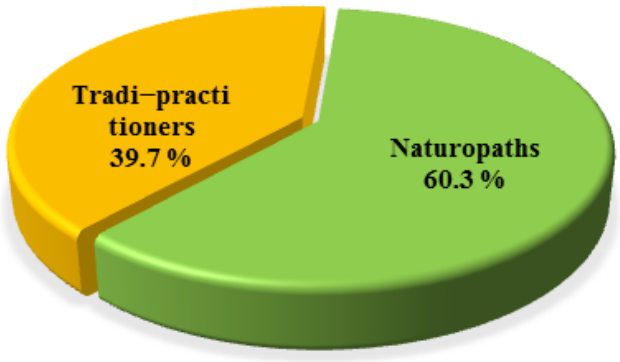

Fig-2: Tradi-practitioners surveyed

The majority 70.2% were men, and 29.8% were women. Their average age was 54 ± 10 years with a minimum of 32 years and a maximum of 74 years. Respondents were divided into 05 age groups, of which the most represented class was 51 to 60 (44%), followed by 41 to 50 (27%) (Table-1).

Most tradi-practitioners came from the Western Region (32.2%) and the Littoral Region (19.8%). Tradi-practitioners who have learned about medicinal plants from their families such as parents and grandparents were represented (52.1%). A proportion (30.6%) acquired this knowledge through learning from a herbalist or studying books on traditional medicine and 17.4% gained their knowledge from both modes. No practitioner had acquired knowledge through formal training. About 70.2% of the tradi-practitioners surveyed attended school, 52.9% had primary education and 17.3% were drop outs.

Knowledge and use of *Phragmanthera capitata* by tradi-practitioners of traditional medicine

All the tradi-practitioners selected for this study knew and used *Phragmanthera capitata*. About 52.9% of tradi-practitioners knew only *P. capitata* as a parasitic plant in trees and 47.1% knew more about other species of the same family (Figure-3). Of these, 56.2% differentiated *P. capitata* from other species only through flowers, 36.8% by leaves and flowers and 7% by leaves, flowers and fruits (Figure-4). The species is known under several names according to the localities of origin of the tradi-practitioners: Tsahlô (Mbouda), Tsapla (Dschang), Kuitchou (Baham), Kwichu (Bandjoun), Nketchou (Bangou), Pouom (Bamoun), Torikoué (Bakoko), Lihok (Bassa), Samacopé (Douala) Chulen (Nguemba), Garigou (Tikane), Kolo'o me tobo (Ewondo) and Etontcha (Maka) (Figure-5).

Table-1: Socio-demographic characteristics of the tradi-practitioners interviewed

Socio-demographic characteristics		Percentage (%)
Gender	Female	29.8
	Male	70.2
Age	[31-40]	14.9
	[41-50]	22.3
	[51-60]	36.4
	[61-70]	12.4
	> 70	14
Region of origin	West	32.2
	Littoral	19.8
	North West	10
	South West	6.6
	Center	14
	East	8.3
	North	9.1
Years of experience	[1-10]	14
	[11-20]	44.6
	[21-30]	14
	[31-40]	17.4
	> 50	10
Nature of knowledge acquisition	Hereditary	52
	Empirical	30.6
	Hereditary and empirical	17.4
Education	School drop outs	36
	Primary	46,7
	Secondary	17,3

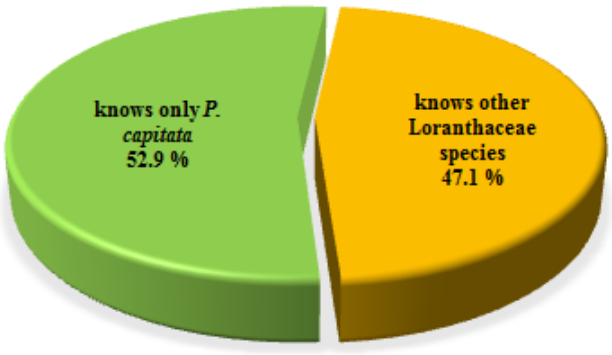

Fig-3: Knowledge of *Phragmanthera capitata* by tradi-practitioners

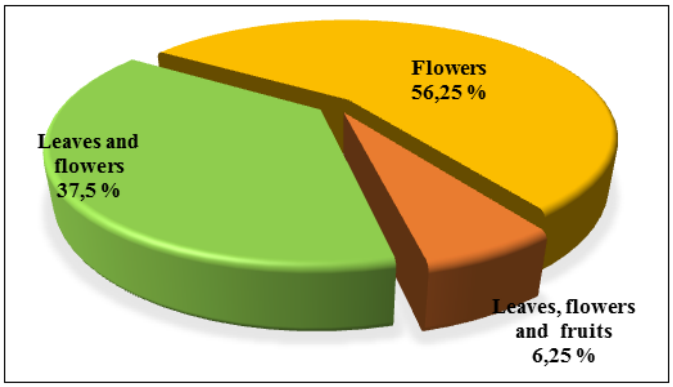

Fig-4: Differentiation of Loranthaceae species by Tradi-practitioners

Fig-5: *Phragmanthera capitata* extract marketed

Tradi-practitioners acknowledge having already encountered *P. capitata* on 26 plant species including 73.1% of woody species and 26.9% of non-woody species. The most cited woody species were *Persea americana*, *Dacryodes edulis* and *Psidium guajava*. Of the non-woody species, the most cited are *Bambusa arundinaceae* and *Manihot esculenta* (Figure-6). These species belong to 19 families, the most represented being Rutaceae (4 species) (Table-2).

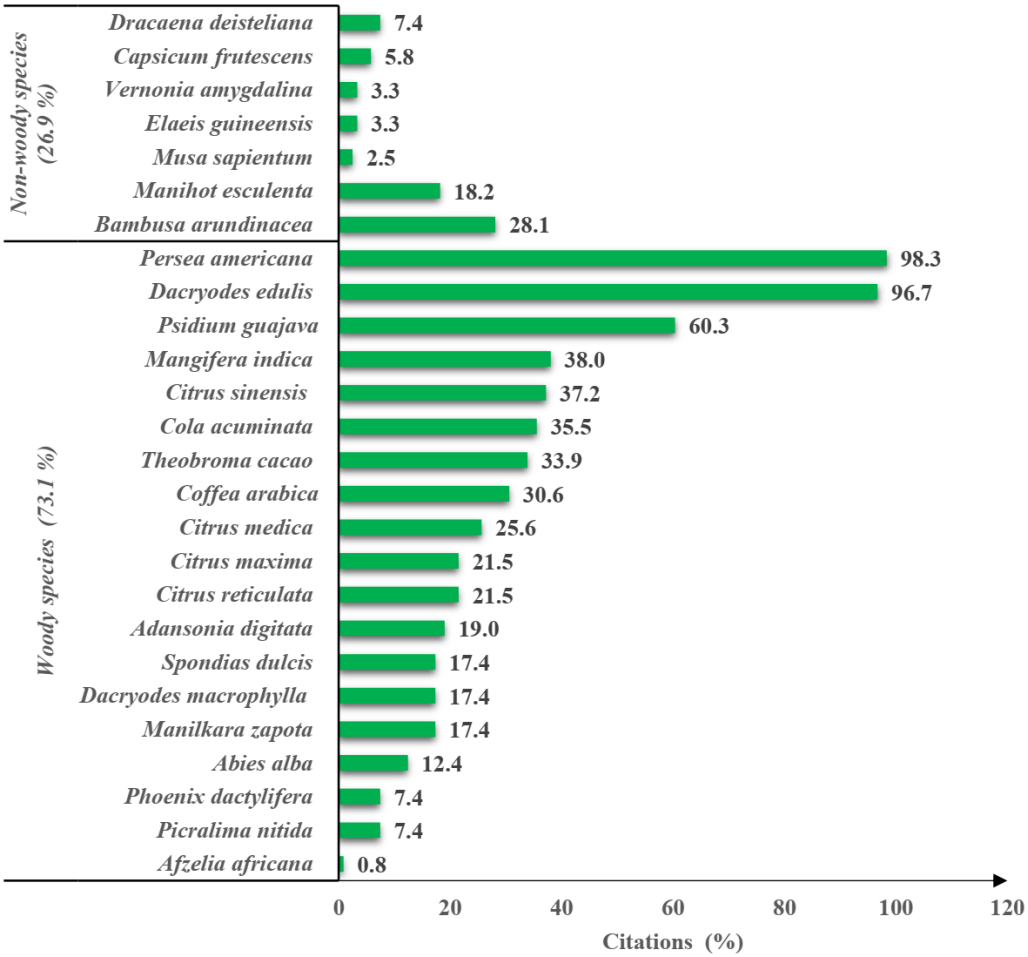

Fig-6: Host species identified by the surveyed tradi-practitioners

Table-2: List of families of parasitized host species identified

Families	Scientific names
Anacardiaceae	*Mangifera indica* L.
	Spondias dulcis Sol. ex Parkinson
Apocynaceae	*Picralima nitida* (Stapf) T. Durand & H. Durand
Arecaceae	*Phoenix dactylifera* L.
	Elaeis guineensis Jacq.
Asteraceae	*Vernonia amygdalina* Delile
Bombacaceae	*Adansonia digitata* L.
Burseraceae	*Dacryodes edulis* (G. Don) H.J. Lam)
	Dacryodes macrophylla (Oliv.) Lam.
Dracaenaceae	*Dracaena deisteliana* Engl.
Euphorbiaceae	*Manihot esculenta* Crantz
Fabaceae	*Afzelia africana* Sm. & Pers.
Lauraceae	*Persea americana* Mill.
Musaceae	*Musa sapientum* L.
Myrtaceae	*Psidium guajava* L.
Pinaceae	*Abies alba* Mill.
Poaceae	*Bambusa arundinacea* Smith ex Pers.
Rubiaceae	*Coffea arabica* L.
Rutaceae	*Citrus medica* L.
	Citrus sinensis (L.) Osbeck
	Citrus reticulata Blanco
	Citrus maxima (Burm.) Merr.
Sapotaceae	*Manilkara zapota* (L.) Van Royen
Solanaceae	*Capsicum frutescens* L.
Sterculiaceae	*Cola acuminata* (P. Beauv.) Schott & Endl.
	Theobroma cacao L.

Tradi-practitioners surveyed used *P. capitata* for medicinal purposes and rituals. About 64.5% use it only for medicinal purposes with UV = 0.64 and 35.5% for both medicine and rituals (purification, disemboweling, bad spells, seduction, protection against curses ... etc.) with UV = 0.71 (Table-3).

Table-4: Uses of *Phragmanthera capitata*

Uses of *P. capitata*	FR (%)	V_u
Medicinal	64.5	0.64
Medicinal / Rite	35.5	0.71
Total	100	1.35

FR: Frequency of quotes, V_u: Use value

About 86.7% of the respondents preferred to harvest the plant themselves on the host trees against 13.3% who bought very often from herbalists or villagers. 63.3% indicated that the host tree influences the properties of all species of mistletoe including *P. capitata*. According to them, the tree that houses the mistletoe is more important than the mistletoe species to use for treatment. The choice is dependent on the host tree and it does not matter the species of mistletoe, which parasitizes it. They are thus oriented by the host plant. On the other hand, 36.7% use *P. capitata* or any other species of the same family depending on their availability in the immediate environment. Therefore, all Loranthaceae species have the same properties as the species and even the host tree (Table-5).

Table-5: Mode of supply and choice of use of *Phragmanthera capitata*

Phragmanthera capitata	Mode/choice	Quotes (%)
Mode of supply	Harvest	86.7
	Purchase	13.3
Choice of parasitic plant	Properties of host trees	63.3
	Availability of trees	36.7

Therapeutic importance of *Phragmanthera capitata*

The survey identified 38 health problems treated by *Phragmanthera capitata*. A high degree of consensus of *P. capitata* was observed for the treatment of hypertension (0.87), diabetes (0.77), nerve pain (0.64), cancers (0.47), cardiac disorders (0.4) and mystical diseases (0.4) (Figure-7). The identified pathologies (mystical diseases excluded) were

grouped into 02 categories namely: non-transmissible diseases which accounted for 75.7% against 24.3% for infectious diseases (Table-6).

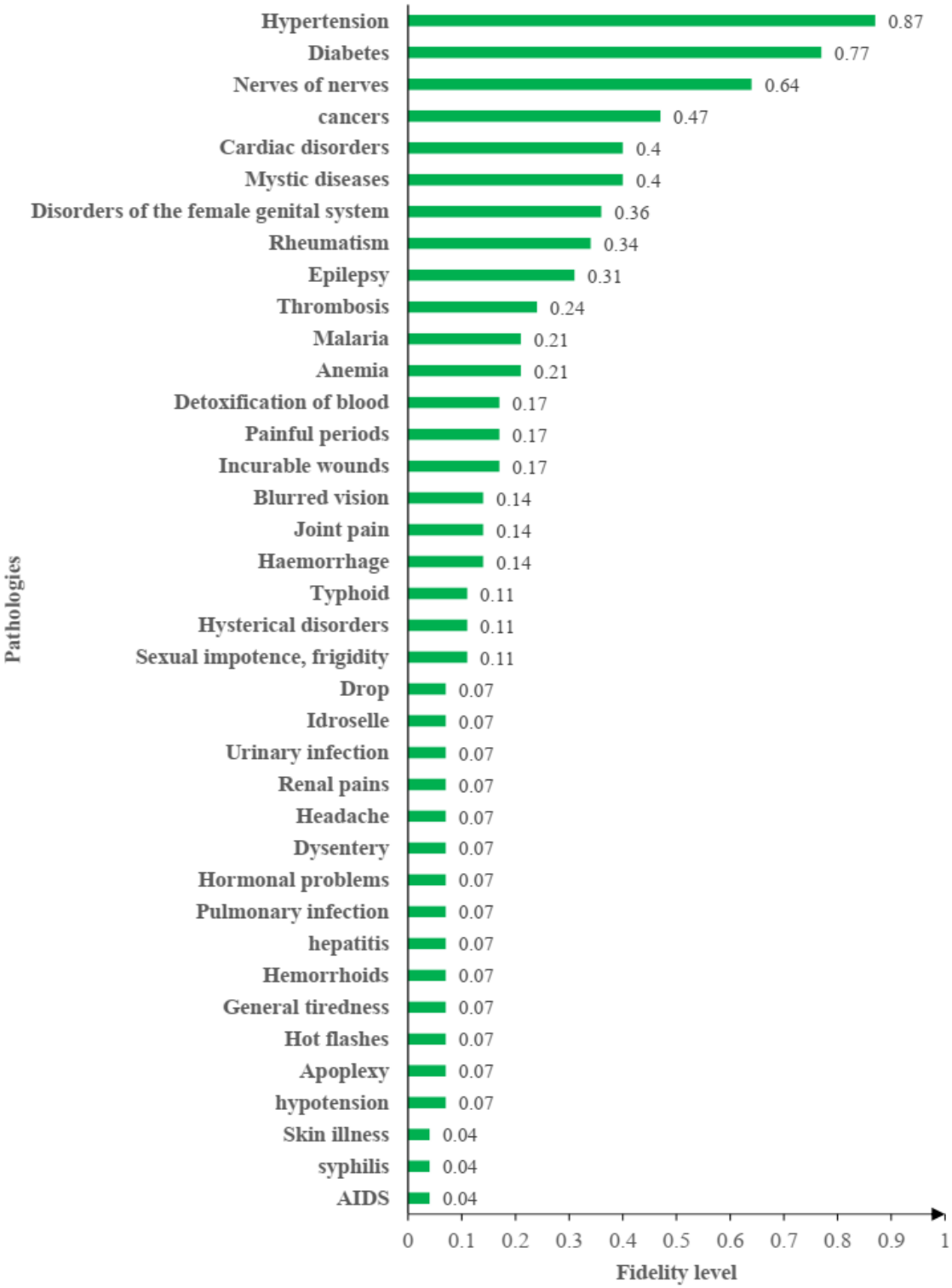

Fig-7: Health problems identified during the survey

Table-6: Classification of health problems according to their transmissibility

Categories	Inventory of health problems	FL	%
Non-transmissible	Anemia, apoplexy, incurable wounds, hot flushes, cancers, blood detoxification, diabetes, joint pain, kidney pain, epilepsy, general fatigue, gout, haemorrhage, hemorrhoids, hypertension, hypotension, idrosella, sexual impotence (frigidity), sore throat nerves, headaches, hormonal problems, painful menstruation, rheumatism, thrombosis, cardiac disorders, disorders of the female genitals, hysterical disorders, blurred vision	**6.5**	**75.7**
Infectious	Dysentery, hepatitis, lung infection, urinary tract infection, skin disease, malaria, AIDS, syphilis, typhoid	**0.7**	**24.3**

FL: Fidelity level

All organs of *P. capitata* were used by tradi-practitioners mostly the leaves (93.3%) and stems (56.7%) (Figure-8). Regarding the time of harvest, 46.2% of tradi-practitioners preferred to harvest *P. capitata* before flowering and fruiting, 30.8% preferred to harvest in the dry season, 19.2% preferred harvesting in the morning against 3.8% in at night (Figure-9).

Several methods of preparation methods were used, infusion (90%), decoction (66.7%) and maceration (36.7%) were mostly mentioned (Figure 10). Water is the most used extraction liquid in the preparation methods (60%), followed by palm wine and / or raffia (17.1%) and brandy (vegetable alcohol) (14.3%) (Figure-11). 73% of tradi-practitioners use *P. capitata* while dry and fresh, 20% while dry and 7% while fresh (Figure-12). Organ drying is done in shade (56.7%) or in a room (43.3%) (Figure-13).

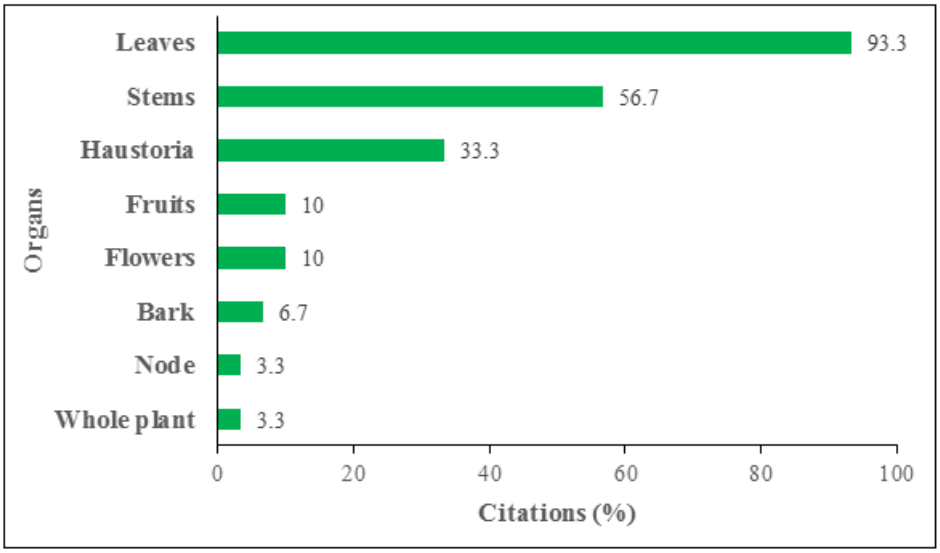

Fig-8: Organs of *Phragmanthera capitata* used for the treatment of health problems

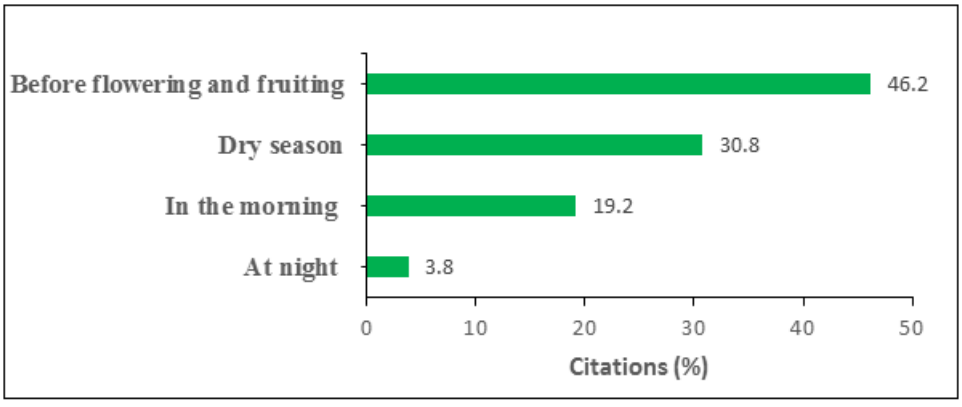

Fig-9: Harvest time of *Phragmanthera capitata*

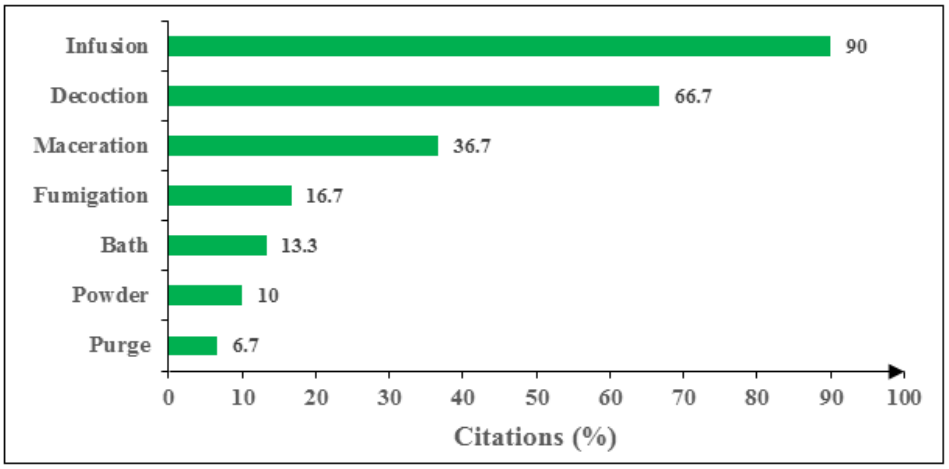

Fig-10: Preparation method based on *Phragmanthera capitata*

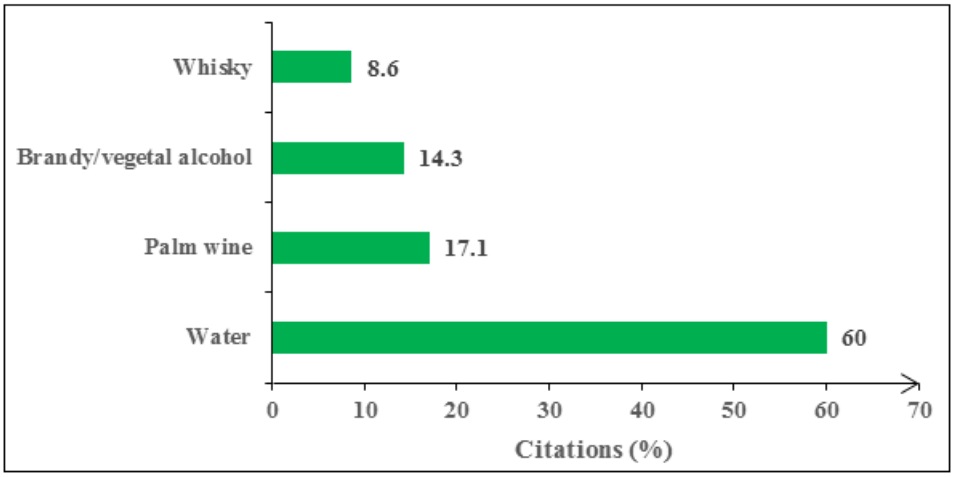

Fig-11: Extraction fluids of the active ingredients of *Phragmanthera capitata*

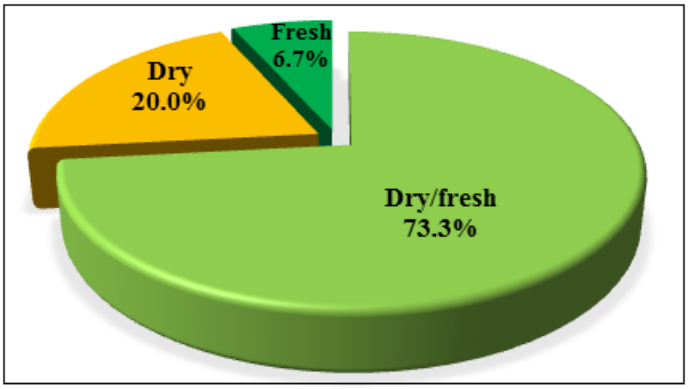

Fig-12: State of use of *Phragmanthera capitata*

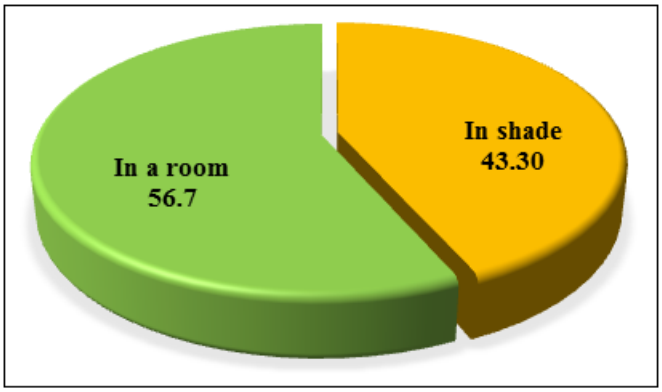

Fig-13: Method of drying the organs of *Phragmanthera capitata*

DISCUSSION

The ethnobotanical survey showed the contribution of *Phragmanthera capitata* in the Cameroonian pharmacopoeia. The majority of the interviewed tradi-practitioners were between the ages of 51 and 60 and the males were largely dominant. Traditional medicine is usually practiced by the elderly and it is usually through this means that the transmission of knowledge about the plants to younger generations is carried out. In recent times, there has been a lack of interest among young people in traditional medicine, fostered by the rejection of their abilities by local populations. In this profession, young people are not easily accepted by the community as tradi-practitioners because they are considered as having very little experience [34, 35]. Oral and face-to-face learning is the most common way for tradi-practitioners to have knowledge of traditional practices [34]. In recent years, global demand and the acceptability of traditional medicine have become increasingly important [36, 37]. There is an increase in the marketing of medicinal plants and a growth in the number of people who value and use these products, or even a job. This explains why, of the total number of tradi-practitioners surveyed, 30% practice naturopathy even if they have not acquired their knowledge in a hereditary way. The practice of traditional medicine has long been limited to the less educated, since the most educated perceive it as an ancient form of medicine that is primitive and inappropriate [38].

Phragmanthera capitata is a well-known species in Cameroon, however its identification is rather delicate in that the species of this family are easily affected by meteorological and ecological factors [24]. The species of the family Loranthaceae are easily identifiable by the flowers which have colors rather specific to the genera and often even to the species. The flowers of *P. capitata* have the shape of a light yellow rod with red corolla tips [24, 39, 40]. The basis of the identification of *P. capitata* in this study was mostly at the level of the flower, as admitted by almost all tradi-practitioners. In addition, *P. capitata* is a highly invasive plant as a parasite of woody species in Africa and its remarkable ubiquity is suitable for all ecological variations in Cameroon [3, 11, 22, 40-42]. In Cameroon, numerous studies have shown a very high parasitism rate of *P. capitata* in orchards and plantations [3, 43].

It appears from this work that species of the family Loranthaceae are commonly called "tree cancer", given the damage they cause to the host trees (defoliation and drying of the host tree) [22]. They are also called "bird poo", certainly because of the way of spread of Loranthaceae, which is done through the birds which after consuming the berries, deposit their droppings containing the seeds surrounded by viscine which adhere on the trunk trees and germinate [44]. The diversity of local names of this plant observed in this study indicates knowledge and secular uses [45].

Many other studies have reported the presence of *P. capitata* on identified woody species, with the exception of *Mangifera indica*, which has been reported as a parasitism-resistant plant to Loranthaceae [3, 25]. Tradi-practitioners surveyed indicated that it is rare to encounter Loranthaceae species on *M. indica*, and when this is the case, it is very popular for the treatment of very specific pathologies such as mystical diseases. Results from Ladoh *et al.*, [46] are consistent with that obtained from this study.

Loranthaceae generally parasitize economically important trees in Africa and all of the woody species identified in this study have already been cited by several authors [39, 47-49]. Non-woody species are rarely parasitized by Loranthaceae. With the exception of *Bambusa arundinaceae* (bamboo from China) reported by Ladoh *et al.*, [46], *Capsicum frutescens* (chilli), *Dracaena deisteliana* (Tree of peace), *Elaeis guineensis* (oil palm), *Manihot esculenta* (manioc), *Musa sapientum* (banana) and *Vernonia amygdalina* were for the first time mentioned. Tradi-practitioners have indicated that species such as *M. esculenta* and *V. amygdalina* are very often parasitized when they have reached a certain level of maturity, usually plants that have been abandoned in fallows. Previous studies have shown that Loranthaceae species would have a preference for high, abundant, nutrient-rich, water-rich host plants or plants with low defense capacity [50-52].

The total use value (Vu = 1.35) of *P. capitata* indicates its wide use in ethnobotanical practices by surveyed tradi-practitioners [66]. Ladoh *et al.*, [46], however, obtained a lower index (Vu = 0.82) for *P. capitata* in their study with herbalists in the city of Douala. Many studies have shown that Loranthaceae have pharmaco-magical virtues widely used in various cultures [24, 35, 53, 54].

Research on Loranthaceae species has shown that secondary metabolites play an important role in determining host-parasite interactions [55]. Previous works have revealed variations in secondary metabolites present in the same Loranthaceae species collected from different hosts [56-59]. The correlation between the host and the chemical profile of Loranthaceae species has not yet been clearly defined, however some researchers believe that the host plays a role in the chemical profile of the species or plant [60]. The influence of host plant chemistry on the chemical constituents of the parasite harvested from different hosts could justify the fact that the host is just as important as the parasite in traditional medicine, and why the treatment of a disease very often depends of a particular or specific host [61-63].

Similar results have been obtained by some authors who reported the popularity of Loranthaceae species in the treatment of various diseases including hypertension, diabetes and cancers in many cultures around the world [21, 23-25, 64, 65].

CONCLUSION

This work made it possible to identify the uses of *Phragmanthera capitata* used by tradi-practitioners of traditional medicine in the city of Douala. This plant parasitizes both woody and non-woody plants. It is used in several galenic forms to treat 38 health problems of which the most cited were hypertension, diabetes, nerve pain, cancers, heart troubles and mystical diseases, the host plant would be decisive in the choice of *P. capitata* for the different treatments of the identified health problems. Further investigations should be carried out to confirm the therapeutic properties of *P. capitata* harvested from various host plants highlighted, for scientific validation to lead to improved traditional medicines.

REFERENCES

1. Sallé, G. (1994). Mission Loranthacées, Rapport de la mission réalisée au Cameroun du 10-19 mars 1994.
2. Sallé, G., Tuquet, C., & Raynal-Roques, A. (1998). Biologie des Phanérogames parasites: Les phanérogames parasites. *Comptes Rendus des Seances de la Societe de Biologie et de ses Filiales*, *192*(1), 9-36.
3. Dibong, S. D., Mony, R., Ladoh, C. F., Boussim, I. J., & Amougou, A. (2011). Parasitism evolution of Loranthaceae in the Ndogbong chiefdom's orchard (Douala, Cameroon). *International Journal of Plant, Animal and Environmental Sciences*, 3: 261-269.
4. Polhill, R. M., & Wiens, W. (1998). Mistletoes of Africa. Royal Bot. Gardens, Kew, 370.
5. Houénon, G. J. (1997). Rapport d'une mission de recherche sur les parasites vasculaires de la famille des *Loranthaceae*, dans la Sous-préfecture de Bassila. CPU/UNB –BENIN, 5.
6. Vanderveken, J. (1993). Les Phanérogames phytopathogènes. Traité de pathologie végétale: 234-248.
7. Thorne, R. F. (1992). Classification and geography of flowering plants. *Botanical Review*, 58.
8. Dibong, S. D., Din, N., Priso, R. J., Taffouo, V. D., Fankem, H., & Amougou, A. (2008). Parasitism of host trees by the Loranthaceae in the region of Douala (Cameroon). *African Journal of Environmental Science and Technology*, 2(11): 371-378.
9. Amon, A. D. E., Soro, D., N'Guessan K., & Traoré. (2010). Les Loranthaceae : Plantes vasculaires parasites des arbres et arbustes, au Sud-Est de la Côte d'ivoire. *Journal of Applied Biosciences*, 25, 1565-1572.
10. Sonké, B., Kenfack, D., & Tindo, M. (2000). Parasitisme de l'avocatier (*Persea americana*, *Lauraceae*) par les Loranthacées dans la région de Yaoundé (Cameroun). *Fruits*, 55: 325-331.
11. Soro, K., Soro, D., N'guessan, K., Gnahoua, G. M., & Traoré, D. (2010). Parasitisme des Loranthaceae sur les hévéas en zone forestière des sous-préfectures de Gagnoa et d'Ouragahio, en Côte d'Ivoire. *J. Anim. Plant Sci*, *6*(1), 597-604.
12. Watson, D. M. (2001). Mistletoe—a keystone resource in forests and woodlands worldwide. *Annual Review of Ecology and Systematics*, *32*(1), 219-249.
13. Yemeda, C. L., Mony, R., Tchatat, M., & Dibong, S. (2013). Contribution des fourmis à la lutte biologique contre les Loranthaceae. *International Journal of Biological and Chemical Sciences*, *7*(3), 924-937.
14. Ladoh-Yemeda, C. F., Nyegue, M. A., Ngene, J. P., Benelesse, G. E., Lenta, B., Wansi, J. D., ... & Dibong, S. D. (2015). Identification and phytochemical screening of endophytic fungi from stems of Phragmanthera capitata (Sprengel) S. Balle (Loranthaceae). *Journal of Applied Biosciences*, *90*(1), 8355-8360.
15. Dembele, B., Raynal-Roques, A., Sallé, G., & Tuquet, C. (1994). Plantes parasites des cultures et des semences forestières au Sahel, Institut du Sahel/CTA, 43.

16. Boussim, I. J., Raynal, A., Sallé, G., & Guinko, S. (1995). Impact de 4 Loranthacées parasites sur leurs espèces ligneuses hôtes du Burkina Faso: *Tapinanthus dodoneifolius* (DC) Danser, *T. globiferus* (Rich) Danser, *T. ophioides* (Sprague) Danser et *T. pentagonia* (DC) Van Tiegh. Annales de l'université de Ouagadougou, série B, (3), 203-216.
17. Mic, J., & Graham, W. (1997). Biological control of weeds: Theory and pratical application, ACIAR Monograph N°49. 192.
18. Ulla, N. (1999). Etude ontogénique, structurale et immunocytochimique des suçoirs de 3 Scrophulariacées parasites africaines, Thèse de doctorat / UPMC, Paris VI.491.
19. Boussim, J. I., & Médah, N. (2009). Méthodes de lutte contre les Loranthaceae. *Flora Vegetatio Sudano-Sambesica*, 12: 27-35.
20. Evans, J. 2005. Mistletoe: Good for more than free kisses. American Botanical Council. 68: 50-59.
21. Ouattara, D. (2006). Contribution to the inventory of significant medicinal plants used in the region of Divo (Southern Forest of the Ivory Coast) and to the diagnosis of the Guinea pepper tree: *Xylopia aethiopica* (Dunal) A. Rich. (*Annonaceae*). Doctoral thesis of the University of Cocody-Abidjan, Côte d'Ivoire, UFR Biosciences, 184.
22. Dibong, S. D., Din, N., Priso, R. J., Taffouo, V. D., Sallé, G., & Amougou, A. (2009). Germination et régénération naturelle de *Phragmantera capitata* (Loranthaceae) sur les arbres fruitiers à Douala, Cameroun. In : Systématique et Conservation des Plantes Africaines, X. van der Burgt, J. van der Maesen & Onana JM (eds), Royal Botanic Gardens, Kew, 839-846.
23. Jadhav, N., Patil, C. R., Chaudhari, K. B., Wagh, J. P., Surana, S. J., & Jadhav, R. B. (2010). Diuretic and natriuretic activity of two mistletoes species in rats. *Pharmacognosy Research*, 2(1): 50-57.
24. Adesina, S. K., Illoh, H. C., Imoh, I. J., & Imo E. (2013). African mistletoes (*Loranthaceae*); ethnopharmacology, chemistry and medicinal values: an update. *African Journal of Traditional, Complementary and Alternative Medicines*, 10(3): 161-170.
25. Ogunmefun, O. T., Olatunji, B. P., & Adarabioyo, M. I. (2015). Ethnomedicinal Survey on the Uses of Mistletoe in South-Western Nigeria. *European Journal of Medicinal Plants*, 8(4): 224-230.
26. Din, N., Saenger, P., Priso, J. R., Dibong, S. D., & Amougou, A. (2008). Logging activities in mangrove forests: A case study of Douala Cameroon. *African Journal of Environmental Science and Technology*, 2(2): 22-30.
27. Priso, R. J., Nnanga, J. F., Etame, J., Din, N., & Amougou, A. (2011). Les produits forestiers non ligneux d'origine végétale : valeur importance dans quelques marchés de la région du littoral-Cameroun. *Journal of Applied Biosciences*, 40: 2715-2726.
28. Mpondo Mpondo, E., Dibong, S. D., Priso, R. J., Ngoye, A., & Ladoh Yemeda, C. F. (2012). État actuel de la médecine traditionnelle dans le système de santé des populations rurales et urbaines de Douala (Cameroun). *Journal of Applied Biosciences*, 55: 4036-4045.
29. Martin, G. J. (1995). Ethnobotany. A methods manual. Londres, Royaume-Uni, Chapman & Hall, 93.
30. Schrauf, R. W., & Sanchez, J. (2008). Using freelisting to identify, assess, and characterize age differences in shared cultural domains. *Journal of Gerontology Series B: Psychological Sciences and Social Sciences*, 63: 385-393.
31. Phillips, O., & Gentry A. H. (1993). The useful plants of Tambopata, Peru: II. Additional hypothesis testing in quantitative ethnobotany. *Economic Bot*, 47: 33-43.
32. Rossato, S. C., Leitão-Filho, H. F., & Begossi, A. (1999). Ethnobotany of Caiçaras of the Atlantic Forest Coast (Brazil). Economic Botany, 53: 387-395.
33. Friedman, J., Yaniv, Z., Dafni, A., & Palewitch, D. (1986). A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. *Journal of Ethnopharmacology*, 16: 275-287.
34. Lambert, J., Leonard, K., Mungai, G., Omindi-Ogaja, E., Gatheru, G., Mirangi, T., Owara, J., Herbst, C. H., Ramana, G., & Lemiere, C. (2011). The contribution of traditional herbal medicine practitioners to Kenyan health care delivery: results from community health-seeking behavior vignettes and a traditional herbal medicine practitioner survey. Health, Nutrition and Population (HNP) discussion paper. World Bank, Washington, DC.
35. O'Neill, A. R., & Rana, S. K. (2016). An ethnobotanical analysis of parasitic plants (Parijibi) in the Nepal Himalaya. *Journal of ethnobiology and ethnomedicine*, *12*(1), 14.
36. Hamilton, A. C. (2004). Medicinal plants, conservation and livelihoods. *Biodiversity & Conservation*, *13*(8), 1477-1517.
37. Abdullahi, A. A. (2011). Trends and challenges of traditional medicine in Africa. *African Journal of Traditional, Complementary and Alternative Medicines*, *8*(5S), 115-123.
38. Mukungu, N., Abuga, K., Okalebo, F., Ingwela, R., & Mwangi, J. (2016). Medicinal plants used for management of malaria among the Luhya community of Kakamega East sub-County, Kenya. *Journal of ethnopharmacology*, *194*, 98-107.
39. Begho, E. R., Omokhafe, K. O., Omo-Ikerodah, E. E., & Akpaja, E. O. (2007). Some observations on the fruit set and incidence of mistletoes on rubber trees in Nigeria. *American-Eurasian Journal of Sustainable Agriculture*, *1*(1), 13-18.

40. Houenon, J. G., Yedomonhan, H., Adomou, A. C., Tossou, M. G., Madjidou, M., & Akoegninou, A. (2012). Les Loranthaceae des zones guinéenne et soudano-guinéenne au Bénin et leurs hôtes. *International Journal of Biological and Chemical Sciences*, *6*(4), 1669-1686.
41. Engone Obiang, N. L., Sallé, G. 2006. Faut-il éradiquer *Phragmanthera capitata*, parasite des hévéas en Afrique ? Comptes Rendus Biologies. 329: 185-195.
42. Engone Obiang, N. L., Sallé, G., Eschbach, J. M., & Salomon, M. (2009). Susceptibility of rubber trees to Loranthaceae in Gabon. *Journal of Plant Interactions*, *4*(3), 233-240.
43. Biyon, J. B. N., Dibong, S. D., Taffouo, V. D., Ondoua, J. M., & Bilong, P. (2015). Niveau de parasitisme des hévéas par les Loranthaceae dans la région du Sud-ouest Cameroun. *Journal of Applied Biosciences*, *96*, 9055-9062.
44. Frochot, H., Sallé, G. (1980). Modalités de dissémination et d'implantation du gui (*Viscum album* L.). *Rev Forestière*, 32: 505-519.
45. Ekué, M. R., Sinsin, B., Eyog-Matig, O., & Finkeldey, R. (2010). Uses, traditional management, perception of variation and preferences in ackee (Blighia sapida KD Koenig) fruit traits in Benin: implications for domestication and conservation. *Journal of Ethnobiology and Ethnomedicine*, *6*(1), 12.
46. Ladoh-Yemeda, C. F., Vandi, T., Dibong, S. D., Mpondo, E. M., Wansi, J. D., Betti, J. L., ... & Eyango, M. T. (2016). Étude ethnobotanique des plantes médicinales commercialisées dans les marchés de la ville de Douala, Cameroun. *Journal of Applied Biosciences*, *99*(1), 9450-9466.
47. Gill, L. S., & Onyibe, H. I. (1990). Mistletoes on rubber trees in Nigeria. *Haustorium*, *23*, 1-2.
48. Bright, E. O., & Okusanya, B. A. (1998). Infestation of economic plants in Badeggi by Tapinanthus dodoneifolius (DC) Danser and T. globiferus (A. Rich) Van Tiegh. *Nigerian Journal of Weed Science*, *11*, 51-56.
49. Overfield, D., Riches, C., Asamoah, M., Sarkodie, O., & Baah, F. (1998). A farming systems analysis of the mistletoe problem in Ghanaian cocoa. *Cocoa Growers' Bulletin (United Kingdom)*.
50. Ehleringer, J. R., Schulze, E. D., Ziegler, H., Lange, O. L., Farquhar, G. D., & Cowar, I. R. (1985). Xylem-tapping mistletoes: water or nutrient parasites?. *Science*, *227*(4693), 1479-1481.
51. Ehleringer, J. R., Ullmann, J., Lange, O. L., Farquhar, G. D., Cowan, I. R., Schulze, E. D., & Ziegler, H. (1986). Mistletoes - a hypothesis concerning morphological and chemical avoidance of herbivory. Oecologia, 70: 234-237.
52. Okubamichael, D. Y., Griffiths, M. E., & Ward, D. (2011). Host specificity, nutrient and water dynamics of the mistletoe *Viscum rotundifolium* and its potential host species in the Kalahari of South Africa. *Journal of Arid Environments*, 75: 898-902.
53. Traoré, D., Da, K. P., & Soro, D. (2003). Control of parasitic vascular plants in Shea, in northern Côte d'Ivoire. Cases of the Tengrela natural park. University of Cocody. U.F.R. Biosciences. Laboratory of Botany. Report by P.E.P. A.I.S.A.-CI, 116.
54. Amon-Anoh, D. E., Seguena, F., Soro, K., Soro, D., & N'guessan, K. (2017). Ethnobotany study of Loranthaceae, hemiparasitic plants used in traditional medicine by population, in the Sud-Comoé region (Côte d'Ivoire). *Journal of Medicinal Plants Studies*, 5(5): 217-224.
55. Snyder, M., Fineschi, B., Linhart, Y. B., & Smith, R. H. (1996). Multivariate discrimination of host use by dwarf mistletoe *Arceuthobium vaginatum* Subsp. *Cryptopodum*: inter- and intraspecific comparisons. *Journal of Chemical Ecology*, 22: 295-305.
56. Ogunmefun, O. T., Fasola, T. R., Saba, A. B., & Oridupa, O. A. (2013). The Ethnobotanical, phytochemical and mineral Analyses of *Phragmanthera Incana* (Klotzsch), a species of mistletoe growing on three plant hosts in South-western Nigeria. *International Journal of Biomedical Science*, 9(1): 33-40.
57. Taiga, A. (2013). Quantitative phytochemical properties of mistletoe (*Viscum album*) from five different plants. *Research Journal of Agricultural and Environmental Management*, 2(6): 150-153.
58. Ladokun, O. A., Oni, S. O., & Ojezele, O. M. (2015). Biochemical Composition Of Mistletoe As Affected By Hosts (Cocoa, Kola And Coffee Tree). *Report and Opinion*, 7(6): 4.
59. Idu, M. D., Ovuakporie-Uvo, O., & Nwaokolo, M. J. (2016). Phytochemistry and microscopy of *Tapinanthus dodoneifolius* (DC) (Danser) (Santalales: Loranthaceae) (African mistletoes) from guava, rubber and orange host trees. *Brazilian Journal of Biological Sciences*, 3(5): 27-35.
60. Ibrahim, J. A., Omorelge, E., Iliya, H., Tarfa, I., Ayodele, F., & Abiodun, E. (2014). Chemical profiles as chemotaonomic tools or Loranthaceae in Nigeria. *African Journal of Plant Science*, 8(7) 343-352.
61. Traoré, D. (1983). Medicine and African magic. Presence Africaine Edition, Dakar, 569.
62. Arbonnier, M. (2000). Trees, shrubs and lianes of the dry zones of West Africa. *Trees, shrubs and lianes of the dry zones of West Africa.*
63. Ogunmefun, O. T., Olatunji, B. P., & Adarabioyo, M. I. (2015). Ethnomedicinal Survey on the Uses of Mistletoe in South-Western Nigeria. *European Journal of Medicinal Plants*, 8(4): 224-230.
64. Burkill, H. M. (1985). The useful plants of west tropical Africa. Royal Botanical Gardens, Kew. 3: 548-560.
65. Adodo, A. (1994). Nature power, a Christian approach to herbal medicine. Benedictine publication Nigeria. 3rd Edition, Edo State, 103-111. 7th Printing by Generation Press Ltd, Surulere, Lagos.
66. Romero-Franco, N., Jiménez-Reyes, P., Castaño-Zambudio, A., Capelo-Ramírez, F., Rodríguez-Juan, J. J., González-Hernández, J., ... & Balsalobre-Fernández, C. (2017). Sprint performance and mechanical outputs

computed with an iPhone app: Comparison with existing reference methods. *European journal of sport science*, *17*(4), 386-392.