Available online at http://www.ifgdg.org

Int. J. Biol. Chem. Sci. 18(5): 1713-1722, October 2024

ISSN 1997-342X (Online), ISSN 1991-8631 (Print)

International Journal of Biological and Chemical Sciences

Original Paper http://ajol.info/index.php/ijbcs http://indexmedicus.afro.who.int

Ethnobotanical survey of plants used in the treatment of *Candida albicans* vaginitis in traditional medicine in Togo

Ablam ALOGNON[1*], Sossawè POLI[1], Minyo Ega Sossa MONTANT[1], Yao HOINSOU[1], Luckman GBATI[1], Efui Holaly GBEKLEY[1,2], Bouraïma DJERI[1] and Damintoti Simplice KAROU[1]

[1]*Microbiology and Food Quality Control Laboratory (LAMICODA), Higher School of Biological and Food Techniques (ESTBA), University of Lomé, Lomé, Togo.*
[2]*Laboratory of Biomedical Sciences, Food and Environmental Health - Research Unit in Biomedical Sciences and Bioactive Substances (LaSBASE-UR-2SB), Higher School of Biological and Food Techniques (ESTBA), University of Lomé, Lomé, Togo.*
[*] *Corresponding author ; E-mail : gastonalognon92@gmail.com; Tel : +228 91081487*

Received: 27-06-2024 Accepted: 26-09-2024 Published: 31-10-2024

ABSTRACT

Plants are a great source of active ingredients and can be an alternative to solve problems related to conventional medicines. The aim of this study was to identify the plants used in traditional medicine to treat *Candida albicans* vaginitis in Togo. From August 10 to 20, 2020, a survey was carried out among 102 traditional medicine practitioners in the Maritime region of Togo. Data collection was then carried out through interviews using a specially designed semi-structured questionnaire. Traditional practitioners were asked about plants used to treat candidiasis and their uses. The survey data identified 35 plant species belonging to 23 families. The most cited family was the Lamiaceae, with 15 citations. The most frequently cited species were *Ocimum canum, Mangifera indica* and *Khaya senegalensis,* with frequencies of 9.90%, 8.91% and 6.93% respectively. A total of six (6) symptoms were cited. These included genital pruritus, creamy yellowish leucorrhoea, dyspareunia, pelvic pain, cycle disturbances and infertility. Genital pruritus, creamy yellow leucorrhoea and dyspareunia were the most recurrent symptoms, cited by 100%, 94.10% and 89.22% of respondents respectively. The main method of preparation was decoction. Togo has a high floristic biodiversity of plants to combat *Candida albicans* vaginitis. These results constitute a good database for biological screening in the search for plant-based molecules against *Candida albicans* vaginitis.

Keywords: Botanical study, Traditional practitioners, biological activities.

INTRODUCTION

Candidiasis is the most frequent fungal infection in human pathology. Among the different forms of candidiasis, vulvovaginal candidiasis is a frequent reason for consultation in gynecology (Bergogne-Bérézin,2007, Sobel, 2007). Vulvovaginal candidiasis is second only to bacterial vaginosis and is most often caused by *Candida albicans* (Mogtomo et al., 2016). It is estimated that 75% of women have at least one episode of *Candida* vaginitis in their lifetime, of which 40% to 50% have more than one episode (Bergogne-Bérézin, 2007; Sobel, 2007). Despite the development of modern medicine, traditional medicine still has an important place. This is due to the fact that herbal medicines are often considered less toxic than pharmaceutical ones (Dibong et al.,

DOI: https://dx.doi.org/10.4314/ijbcs.v18i5.8

2011). In addition, the development of multiple resistance of fungal to conventional antifungal is a phenomenon that is increasingly encountered (Whaley et al., 2017; Ekpo et al., 2017). It leads to therapeutic failure. To remedy this, new sources of drugs are needed. Plants represent an enormous source of chemotherapeutic agents that could be used against microorganisms. It is therefore necessary to study them in order to find the solution to this multi-resistance (Mbaveng, 2015). Apart from the problems posed at the therapeutic level, another aspect of the difficulties is related to the socio-economic conditions of the African populations. This situation of economic precariousness means that these populations do not all have access to the most effective antifungal drugs, which remain very expensive for their purchasing power (Ebrahim, 2003).

As a result, they are increasingly turning to medicinal plants for treatment. In West Africa, as in the rest of the continent, more than 80% of the population rely on traditional medicine for their primary health care (Sanogo, 2006). It was within this framework that this work was being carried out with the objective of conducting an ethnobotanical survey on plants that treat vulvovaginal candidiasis.

MATERIALS AND METHODS

Geographic setting of the study

Togo (Figure 1) is a country in West Africa, bordered to the north by the Republic of Burkina Faso, to the east by the Republic of Benin, to the west by the Republic of Ghana and to the south by the Atlantic Ocean. Togo is divided from north to south into five economic regions: the Savannah region, the Kara region, the Central region, the Plateaux region and the Maritime region. This study was conducted in the Maritime region. This region extends between 1° 20' West longitude and 1° 50' East longitude and between 6° 10' South latitude and 6° 60' North latitude, covering an area of 6,100 km^2, or about 10.78% of the total area of Togo. The Maritime Region is bordered to the north by the Plateaux Region, to the west by the Republic of Ghana, to the east by the Republic of Benin and to the south by the Atlantic Ocean. The climate is sub-equatorial with a long rainy season from March to July (maximum of 1200 mm in June) and a short rainy season from September to November (Togo Politique, 2022). This study was carried out in different markets of maritime region namely markets of Bè, agoe assiyéyé, Adawlato, hanoukope and Anfoin.

Data collection

The survey was conducted among the Traditional medicine practitioners (TMPs) in the maritime region using a survey form. An initial interview was conducted with the TMPs to give them a brief explanation of the objectives of the study and the importance of the information they would be providing, in order to obtain their consent to participate in the study. Data collection was then carried out through interviews using a specially designed semi-structured questionnaire. The questionnaire focused on the following main points: i) the identity of the respondent: surname, first names, age and sex; ii) the origin of the knowledge: initiation within the family or in another setting, iii) the status of the healer: full-time or part-time healer, iv) the disease: the symptoms that help to make the diagnosis, v) the plants used in the treatment of the disease, the organs of the plants used, the method of preparation of recipes and administration. After the interviews with the TMPs, the plant samples were collected and photographs were taken at the site to assist in the identification of the plants. The identification of the plants was carried out at the botany and plant ecology laboratory of the Faculty of Sciences of the University of Lome by comparison with the specimens available in the herbarium of the said faculty and or the national herbarium if necessary.

Data analysis

Plant samples and photos were identified at the Botany and Plant Ecology Laboratory of the Faculty of Science, University of Lome. The data collected were analyzed using Microsoft Excel, version 2016.

Citation frequencies (CF) were determined using the following formula

$$CF=CP/CT\times100$$

Where CP represents the number of times the species is cited and CT is the total number of citations.

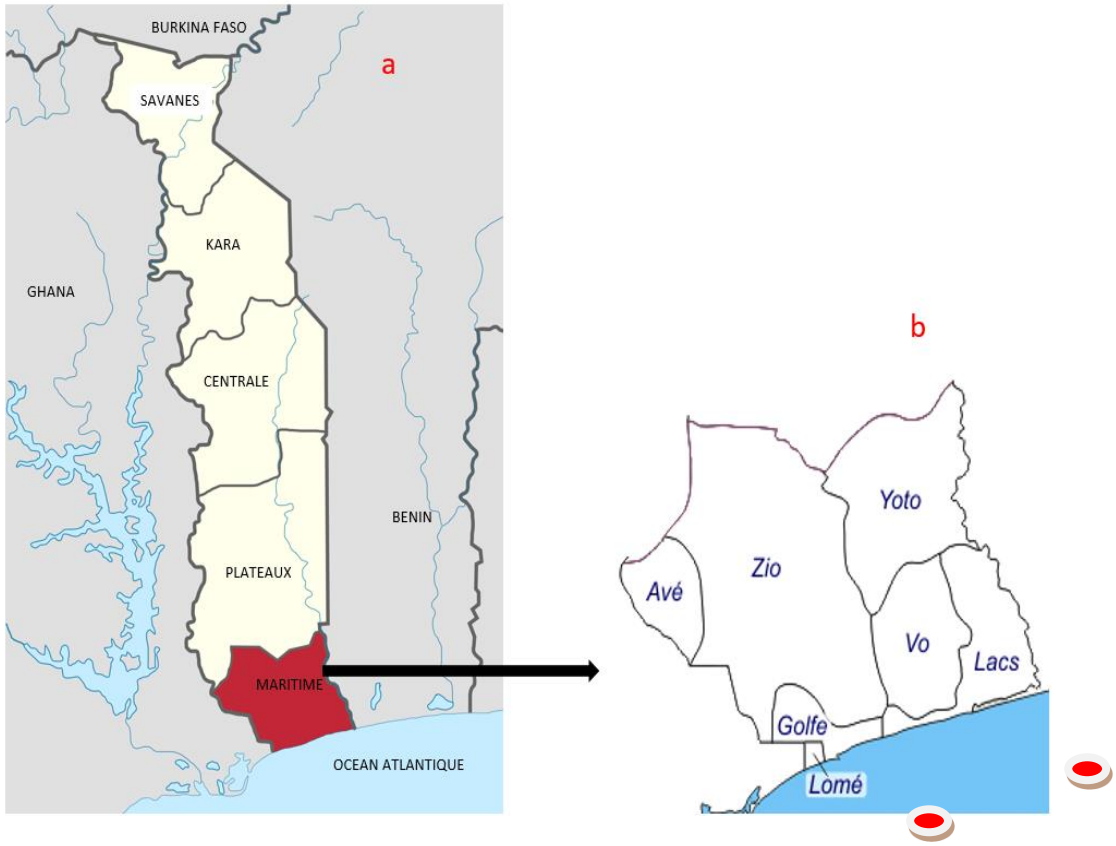

Figure 1: Target localities in Togo's maritime region.

RESULTS

Sociodemographic data

The present study enrolled 102 TMPs from the Maritime region of Togo, of which 14 were male and 88 were female. Their average age was 49.68 ± 7.82 years with a minimum of 26 years and a maximum of 53 years. Table 1 summarizes the socio-demographic data of these TMPs. The TMPs were divided into 3 age groups. The analysis of Table 1 shows that the majority of the TMPs are in the two age groups of 30 to 50 and 50 to 70 years. These two age groups alone account for over 90% of the respondents. About 95% of these TMPs had been to school, 57.84% have reached primary school and 34.31% secondary school. As for the origin of their knowledge, the majority, 81.37%, were initiated into the practice of traditional medicine within the family, while the others were initiated outside the family framework. The survey results also revealed that 100% of the TMPs practice traditional medicine full-time. In terms of the season and time of harvesting plant organs, the data also varied among TMPs. Some preferred to harvest plant material in the dry season and others in the rainy season, but the most important factor was the availability of plants for seasonal use.

Means of diagnosis of *Candida albicans* vaginitis by TMPs

The diagnosis of *Candida albicans* vaginitis by TMPs is based solely on symptoms. For this purpose, several symptoms have been cited. Among these symptoms, genital pruritus, creamy yellow leucorrhoea and dyspareunia are the most recurrent symptoms and are respectively cited by 100%, 94.10% and 89.22% of respondents. Other symptoms such as pelvic pain, cycle

disturbances and infertility were less cited (Figure 2). The survey showed that the TMPs in the maritime region have some knowledge of the symptoms that define the disease.

Botanical characteristics and diversity of plants with antifungal properties

The data collected identified 35 plant species belonging to 23 families. Figure 3 showed the most represented families which were Lamiaceae and Apocynaceae. The most cited species were *Ocimum canum, Mangifera indica* and *Khaya senegalensis* which had a citation frequency (CF) of 9.90%, 8.91% and 6.93% respectively (Table 2).

Plant parts used

Several plant organs are used in the preparation of these antifungal recipes, as shown in figure 4, which shows that leaves (59.80%), followed by bark (20.58%) and fruit (12.74%) are the most frequently used parts. Other parts are used in frequencies of less than 5%.

Dosage forms and method of administration

In terms of dosage forms, over 98% of recipes were in decoction form. Infusions amount of for just over 2% of cases. The main route of administration was mainly oral (Table 3).

Table 1: Socio-demographic data of plant professionals involved in the treatment of vaginitis in the Maritime region.

Parameters		**N (%)**
Gender	Male	14 (13,73)
	Female	88 (86,27)
Age range	<30	9 (8,82)
	[30-50[	68 (66,67)
	[50-70[	25(24,51)
Educational level	Illiterate	5 (4,90)
	Primary	59 (57,84)
	Secondary	35 (34,31)
	University	3 (2,94)
Origine of knowledge	Family heritage	83 (81,37)
	Initiation by a TMP	11 (10,78)
	Divine revelation	3 (2,94)
	Others	5 (4,90)
Status of healer	Full-time	102 (100)
Plant collection seasons	Rainy season	25 (24,51)
	Dry season	10(9,80)
	All seasons	67(65,69)
Time of day	Morning	92 (90,20)
	Evening	8 (7,84)
	Any time of day	2 (1,96)

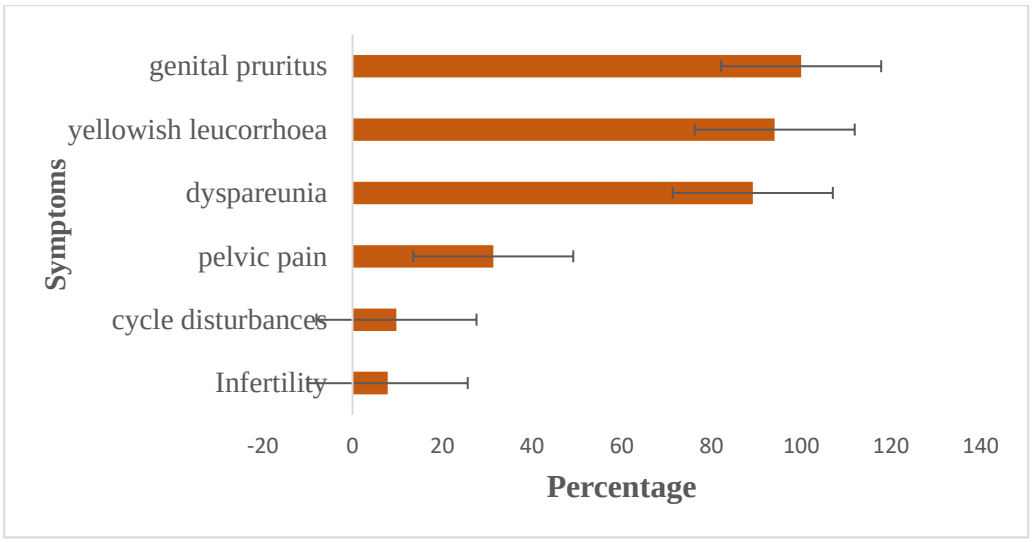

Figure 2: Symptoms cited by traditional practitioners.

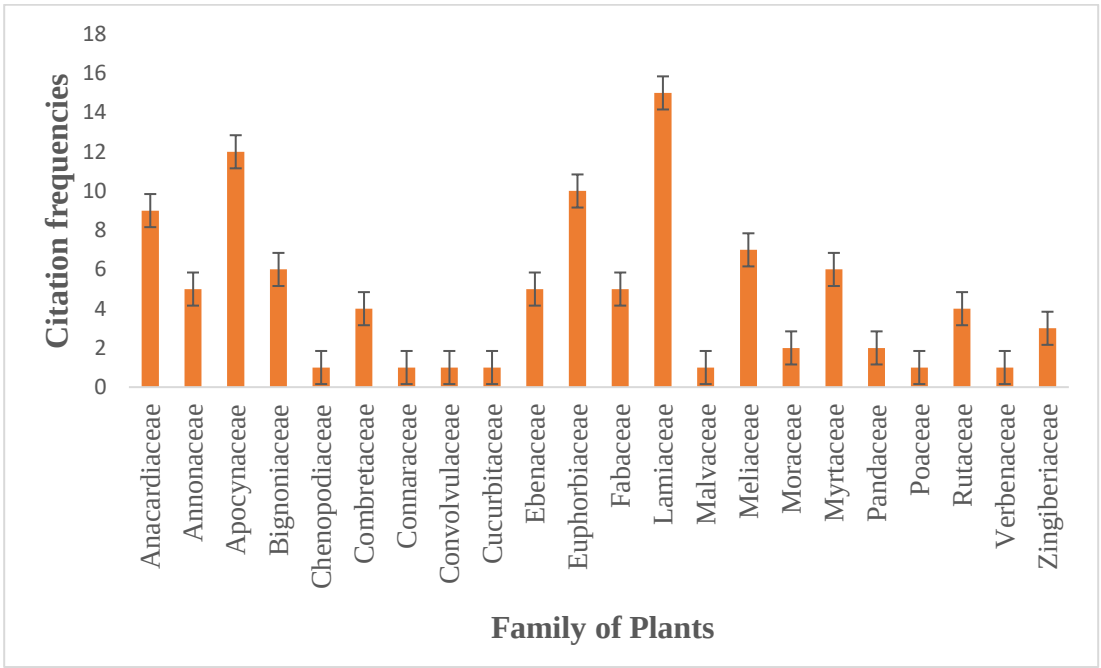

Figure 3: Distribution of plant species within families.

Table 2: Botanical characteristics and diversity of plants with antifungal properties.

Scientific names	Family	Vernacular names	CP	Citation frequency	Parts uses	Preparation method
Acacia nilotica	*Anacardiaceae*	Nep nep (french)	2	1,96	Pods	Decoction
Alstonia boonei the willd	*Apocynaceae*	Gnamibia	7	6,86	Leaves	Decoction
Andropogon pinguipes	*Poaceae*	Gongonni	1	0,98	Barks	Decoction

Bridelia ferruginea Benth	*Euphorbiaceae*	Akamati (ewe)	6	5,88	Barks	Decoction
Chenopodium ambrosioides	*Chenopodiacea e*	Magbézondé (ewe)	1	0,98	Leaves	Decoction
Clausena anisata(Willd)	*Rutaceae*	Eyra (ewe)	2	1,96	Leaves	Decoction
Cnestis ferruginea	*Connaraceae*	Tsoevisihlè (ewe)	1	0,98	Leaves	Decoction
Diospyros mespiliformis	*Ebenaceae*	Djéka (ewe)	5	4,90	Leaves	Decoction
Euphorbia hirta	*Euphorbiacée*	Nossika (ewe)	1	0,98	Leaves	Decoction
Ficus exasperate	*Moraceae*	Magnia kokbé (ewe)	2	1,96	Leaves	Decoction
Gossypium barbadense	*Malvaceae*	Detifouti(ewe)	1	0,98	Leaves	Decoction
Holarrhena floribunda	*Apocynaceae*	Séséwou (ewe)	3	2,94	Barks	Decoction
Jatropha curcas	*Euphorbiaceae*	Baanin	2	1,96	Fruits	Decoction
Khaya sénégalensis	*Meliaceae*	Mahogen (ewe)	7	6,86	Leaves	Decoction
Kigelia africana (Lam.)	*Bignoniaceae*	Nyakpékpé (ewe)	4	3,92	Leaves	Decoction
Lippia multiflora	*Verbenaceae*	Avoundati (ewe)	1	0,98	Leaves	Decoction
Mangifera indica L.	*Anacardiaceae*	Amangoti (ewe)	9	8,82	Barks	Decoction
Merremia tridentata	*Convolvulaceae*	Vouvoudragni (ewe)	1	0,98	Leaves	Decoction
Microdesmis keayana	*Pandaceae*	Déou	2	1,96	Leaves	Decoction
Momordica Charantia	*Cucurbitaceae*	Agnagnra (ewe)	1	0,98	Leaves	Decoction
Ocimum canum	*Lamiaceae*	Ahamé (ewe)	10	9,80	Leaves	Decoction
Ocimum gratissimum L.,	*Lamiaceae*	Esrou,Dzogbeti (ewe) azeou (kabye)	5	4,90	Leaves	Decoction
Pergularia daemia	*Apocynaceae*	Kpankèkè (ewe)	1	0,98	Leaves	Decoction
Phyllantus amarus Schumach& Thonn.	*Euphorbiaceae*	Hlinvi(ewe)	1	0,98	Leaves	Decoction
Pillostigma thonningii	*Fabaceae*	Eklo (ewe)	1	0,98	Leaves	Decoction
Psidium guajava L.,	*Myrtaceae*	Gbebe	2	1,96	Leaves	Decoction
Pteleopsis suberosa Engl.& Diels	*Combretaceae*	Kotokolika (ewe)	4	3,92	Leaves	Decoction
Secamone afzelii	*Apocynaceae*	Zoukon (ewe)	1	0,98	Seeds	Decoction
Spathodea campanulata P. Beauv.	*Bignoniaceae*	Adatsigolo (ewe)	2	1,96	Leaves	Decoction
Syzygium aromaticum	*Myrtaceae*	Plingota (ewe)	4	3,92	Fruits	Decoction
Tetrepleura tetraptera (Schumach.&Thonn.)	*Fabaceae*	4 côtés (french)	2	1,96	Fruits	Decoction
Uvaria chamae	*Annonaceae*	Agbana be kin(ewe)	1	0,98	Root	Decoction
Xanthoxylum xanthozyloides	*Rutaceae*	Ehé (ewe)	2	1,96	Barks	Decoction
Xylopia aethiopica	*Annonaceae*	Esso (ewe)	3	2,94	Fruits	Decoction
Zingiber officinalis	*Zingiberiaceae*	Dotè (ewe)	3	2,94	Stem	Decoction

CP: Number of citations for the plant

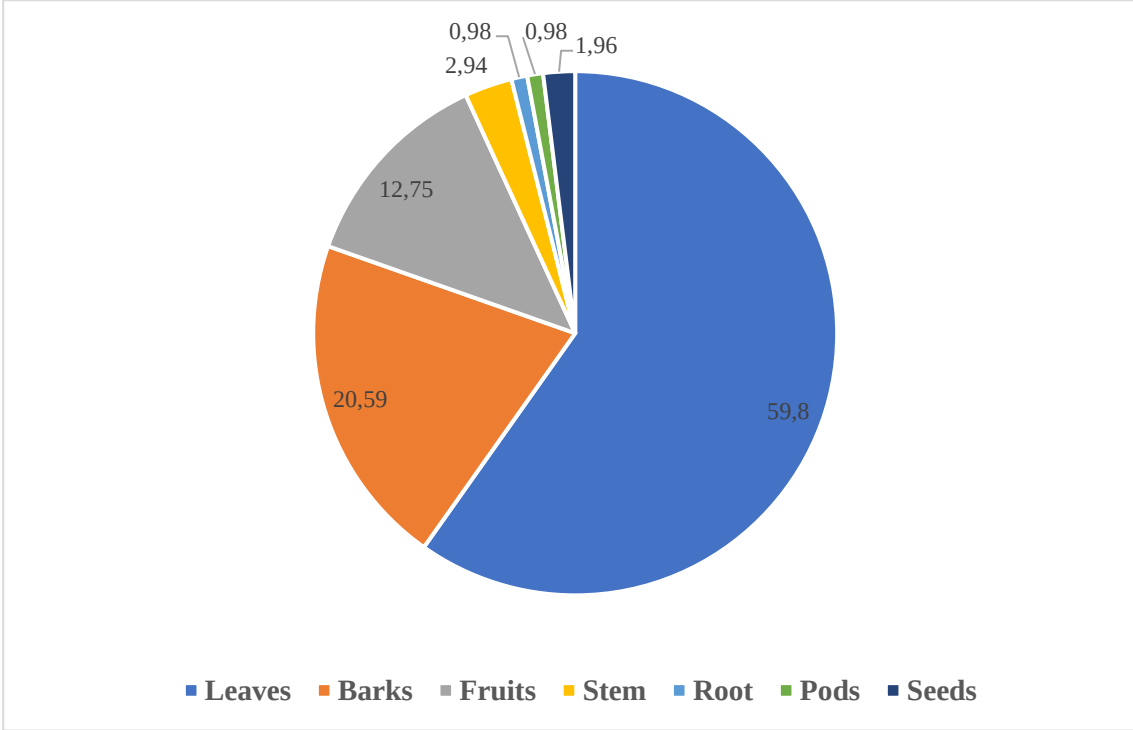

Figure 4: Plant parts used cited by traditional practitioners.

Table 3: Dosage forms and method of administration.

Method of administration	**Dosage forms**	
	Decoction	Infusion
Oral route	98%	2%

DISCUSSION

The aim of this study was to identify the plants used to treat vulvovaginal candidiasis in the Maritime region of Togo. Ethnobotanical studies have been carried out in the region, such those of Koudouvo et al. (2011) which focused on plants used to treat malaria, and that of Gbekley et al. (2015) which looked at plants used in the treatment of diabetes. With regard to vaginitis, this is the first study of its kind to be carried out in the region. The ethnobotanical survey was carried out among 102 traditional practitioners in the region, most of whom were men. It was found that knowledge of a traditional medicine recipe is above all a family secret, passed down from generation to generation through custom and oral tradition. (Gbekley et al., 2015). It is therefore necessary to be of a mature age and to have a certain confidence in order to access the knowledge of this medicine. This is the main reason why this profession is practiced by older people. This is confirmed by the fact that the majority of the TMPs in this study were initiated within the family. The present study showed a good diversity of plants used in the treatment of vaginitis in the Maritime region of Togo, with 35 plant species belonging to 23 families identified. Other ethnobotanical studies have revealed a similar diversity of antifungal plants; Ouattara et al. (2020) recorded 29 plants belonging to 19 families. The most represented

families were the Lamiaceae with 15 plants cited, followed by the Apocynaceae with 12 plants cited. Several studies have also revealed the predominance of Lamiaceae in the use of plants in traditional medicine (Daoudi et al., 2016; , Dougnon et al., 2017, Koukoura et al., 2022). The results of this study showed that the plant species most commonly used in the Maritime region were *Ocimum canum, Mangifera indica* and *Khaya senegalensis,* which had a citation frequency of 9.90%, 8.91% and 6.93% respectively.

The organs most frequently used to treat vaginal candidiasis were leaves, followed by bark and fruit. This result corroborates those found by Otang et al. (2012) and Fanou et al. (2020), who found that leaves were the most commonly used organs. In view of the results, the most widespread preparation method is decoction. This result corroborates the findings of other studies carried out in other African countries (Tsouh Fokou et al., 2016). In addition to the ailments targeted in this study, the most frequently cited plants are also used in the treatment of other pathologies. The bark, leaves, trunks, roots and large branches of *Khaya senegalensis* are much sought-after in traditional medicine for their use in the treatment of rheumatism, diabetes, headaches, stomach aches, diarrhea, anemia, syphilis, leprosy, chickenpox and angina (Fagbohoun, 2014). *Ocimum canum* leaves are used as a spice, condiment and flavoring in sweetened beverages, as a theiform drink for indigestion and coughs, and in the treatment of respiratory infections, gastroenteritis, hepatitis, malaria, syphilis and gonorrhea (Bassole et al., 2005; Aluko et al., 2016)

Mangifera indica root decoctions are traditionally used to treat malaria. Many research studies showed that mango leaves and fruit possess antioxidant, anti-inflammatory, gastroprotective, anti-diabetic, cardioprotective, hypolipidemic, antitumour, wound healing, anti-pyretic, antibacterial, anti-spasmodic, anti-carcinogenic, anti-viral, hepatoprotective, immunomodulatory, and anti-dysentery properties (Shah et al., 2010 ; Imran et al., 2017).

Conclusion

This study shows that Togo's maritime region has an interesting floristic biodiversity of antifungal plants. Moreover, the region's traditional practitioners share many similarities in the use of plant species. The plants thus inventoried constitute a panel that can serve as a starting point for biological screening in the laboratory, especially the species *Ocimum canum, Mangifera indica* and *Khaya senegalensis*, which have a good customary value but have not yet been cited in scientific works dealing with the treatment of vaginitis.

COMPETING INTERESTS

The authors declare that they have no competing interest.

AUTHORS' CONTRIBUTION

EHG and AA conceptualized the study, AA, EHG and SP, EMSM collected, analyzed and interpreted the data, AA and SP wrote the manuscript, SP, EMSM, YH, LG and BD critically revised the manuscript. All authors have read and agreed to the published version of the manuscript.

ACKNOWLEDGEMENTS

The authors would like to express their sincere thanks and deep gratitude to all those who contributed to the realization of the present work, in particular to the professional of the plants surveyed.

REFERENCES

Aluko BT, Oloyede OI, Afolayan AJ. 2012. Phytochemical and nutrient compositions of the leaves of *Ocimum canum* Sims. *Afr J Biotechnol*., **11**(63):12697-701. DOI: 10.5897/AJB11.3418.

Bassole IHN, Nebie R, Savadogo A, Ouattara CT, Barro N, Traore SA. 2005. Composition and antimicrobial activities of the leaf and flower essential oils of Lippia chevalieri and Ocimum canum from Burkina Faso. *Afr J Biotechnol*., **4**(10):1156-1160.

Bergogne-Bérézin E. 2007. Flores vaginales normales, vaginites et vaginoses bactériennes : diagnostic et thérapeutique.

Antibiotiques, **9**(2):139-44. DOI: https://doi.org/10.1016/S1294-5501(07)88779-6 .

Daoudi A, Bammou M, Zarkani S, Slimani I, Ibijbijen J, Nassiri L. 2016. Étude ethnobotanique de la flore médicinale dans la commune rurale d'Aguelmouss province de Khénifra (Maroc). *Phytothérapie*, **14**(4) :220-8. DOI:10.1007/s10298-015-0953-z.

Dibong DS, Emmanuel MM, Alfred N, France KM, Lagarde BJ. 2011. Ethnobotanique et phytomédecine des plantes médicinales de Douala, Cameroun. *Int. J. Biol. Chem. Sci*., **5**(3): 1105-1117.

Dougnon TV, Attakpa E, Bankolé H, Hounmanou YMG, Dèhou R, Agbankpè J, De souza M. Fabiyi K, Gbaguidi F, Baba-Moussa L. 2017. Etude ethnobotanique des plantes médicinales utilisées contre une maladie cutanée contagieuse : La gale humaine au Sud-Bénin. *Pharmacopée et Médecine Traditionnelle Africaine*, **18**(0) :16-22.

Ebrahim MS. 2003 Médecine traditionnelle. Observation de la santé en Afrique. *Revue de la Régulation*, **4**:7-11.

Ekpo IA, Kechia FA, Iwewe YS, Ngueguim AD, Nangwat C, Dzoyem JP. 2017. Species distribution nd antifungal susceptibility profile of Candida spp isolated from urine of hospitalized patients in Dschang District Hospital, Cameroon. *Int. J. Biol. Chem. Sci*., **11**(3): 1212-21. DOI:10.4314/ijbcs.v11i3.23

Fagbohoun L. 2014. Etude chimique de coloran ts naturels et matériaux résineux traditionnels au Bénin dans le domaine artisanal [Internet] [phdthesis]. Université d'Avignon; [cité 2 juin 2023]. Disponible sur: https://theses.hal.science/tel-0116846.

Fanou BA, Klotoe JR, Fah L, Dougnon V, Koudokpon CH, Toko G. 2020. Ethnobotanical survey on plants used in the treatment of candidiasis in traditional markets of southern Benin. *BMC Complement Med Ther*., **20**(1): 288. DOI: https://doi.org/10.1186/s12906-020-03080-6.

Gbekley EH, Karou DS, Gnoula C, Agbodeka K, Anani A, Tchacondo T, Agbonon A, Batawila K, Simpore J. 2015. Étude ethnobotanique des plantes utilisées dans le traitement du diabète dans la médecine traditionnelle de la région Maritime du Togo. *Pan Afr Med J*., **20**:437. DOI: 10.11604/pamj.2015.20.437.5660.

Imran M, Arshad MS, Butt MS, Kwon JH, Arshad MU, Sultan MT. 2017. Mangiferin: a natural miracle bioactive compound against lifestyle related disorders. *Lipids Health Dis*., **16**(1):84. DOI: 10.1186/s12944-017-0449-y.

Karou DS.2006. Evaluation de quelques propriétés pharmacologiques de quatre plantes de la pharmacologie traditionnelle du Burkina Faso.Thèse Unique de Doctorat, Université de Ouagadougou, Ouagadougou, p.83.

Koudouvo K, Karou DS, Kokou K, Essien K, Aklikokou K, Glitho IA, Simpore J, Sanogo R, De souza C, Gbeassor M. 2011. An ethnobotanical study of antimalarial plants in Togo Maritime Region. *Journal of Ethnopharmacology*, **134**(1):183-90. DOI: 10.1016/j.jep.2010.12.011

Koukoura KK, Salifou TS, Gbekley EH, Pissang P, Effoe S, Tchacondo T, Batawila S. 2022. Enquête ethnobotanique des plantes médicinales utilisées dans le traitement des infections vaginales et intestinales dans la région maritime au Togo. *International Journal of Biological and Chemical Sciences*, **16**(5):1906-18.

Mbaveng AT, Sandjo LP, Tankeo SB, Ndifor AR, Pantaleon A, Nagdjui BT, Kuete V. 2015. Antibacterial activity of nineteen selected natural products against multi-drug-resistant Gram-negative phenotypes. *SpringerPlus.,* **4**(1): 823. DOI: 10.1186/s40064-015-1645-8.

Mogtomo MLK, Njiki AN, Longang AM, Foko LPK, Embolo E, Kom B, Wandja PV, Tchamdjeu F, Ngono NAR. 2016. Prévalence des germes impliqués dans les infections vaginales chez les femmes camerounaises et facteurs de risque. *Int J Biol Chem Sci*., **10**(1):255-68.

Otang WM, Grierson DS, Ndip RN. 2012. Ethnobotanical survey of medicinal plants used in the management of opportunistic fungal infections in HIV/AIDS patients in the Amathole District of the Eastern Cape Province, South Africa. *J Med Plants Res.,* **6**(11): 2071-2080. DOI: 10.5897/JMPR11.069.

Ouattara EK, Coulibaly K, Etien TD, Zirihi NG. 2020. Etude ethnobotanique de plantes antifongiques utilisées traditionnellement en Côte d'Ivoire et du potentiel de *Piliostigma Thonningii* (schumach.) milneredh. (Fabaceae) dans le contrôle de souches telluriques. *International Journal of Biological and Chemical Sciences*, **14**(1) : 239-53. DOI : 10.4314/ijbcs.v14i1.20.

Sanogo R.2006. Le rôle des plantes en médecine traditionnelle. Développement, Environnement et Santé 10e école d'été de l'IEPF et du SIFEE ;6.

Shah KA, Patel MB, Patel RJ, Parmar PK. 2010. *Mangifera indica* (mango). *Pharmacogn Rev.*, **4**(7): 42-8. DOI : 10.4103/0973-7847.65325.

Sobel JD. 2007. Vulvovaginal candidosis. *The Lancet*, **369**(9577): 1961-71. DOI : 10.1016/S0140-6736(07)60917-9.

Togo Politique. 2022. Présentation de la région des Savanes. [Internet]. [cité 23 janv 2022]. Disponible sur : https://togopolitique.org/presentation-de-la-region-savanes.

Tsouh Fokou PV, Kissi-Twum AA, Yeboah-Manu D, Appiah-Opong R, Addo P, Tchokouaha Yamthe LR, Mpoma AN, Boyom FF, Nyarko AK. 2016. *In Vitro* Activity of Selected West African Medicinal Plants against *Mycobacterium ulcerans* Disease. *Molecule,* **21**(4):445. DOI: 10.3390/molecules21040445.

Whaley SG, Berkow EL, Rybak JM, Nishimoto AT, Barker KS, Rogers PD. 2017. Azole Antifungal Resistance in *Candida albicans* and Emerging Non-albicans Candida Species. *Front Microbiol*., **7**(2173): 1-12. DOI: 10.3389/fmicb.2016.02173.