

Ethnobotanical Study of Latex Plants in the Maritime Region of Togo

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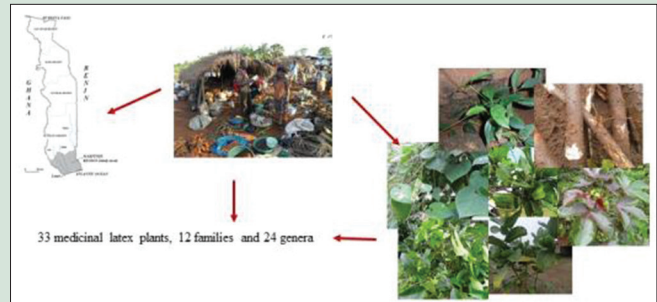
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ABSTRACT

Background: In Togo, a little is known about latex plants of the flora used for medicinal purposes. **Objective:** The aim of this study was to identify the latex plant species and their medicinal uses in the Maritime Region of Togo. **Materials and Methods:** The methodology was based on ethnobotanical semi-structural individual interviews of 220 informants. Quantitative ethnobotanical index was used to analyze the data. **Results:** A total of 33 latex plants species were recorded, from 12 botanical families and 24 genera. The most represented families were *Euphorbiaceae* and *Moraceae* with eight species each. The relative importance (RI) value of each species and the informant consensus factor (ICF) of the ailments categories showed that *Pergularia daemia* (Forssk.) Chiov. (RI = 2.00) and *Euphorbia hirta* L. (RI = 1.91) were the most versatile in relation to their uses, and infectious diseases (ICF = 0.922) were the category with the greatest consensus among 17 categories. **Conclusion:** These latex plants of Togolese flora are variously used in traditional medicine and it would be important to undertake further investigations in phytochemistry, pharmacology, and toxicology to validate their uses.

Key words: Ethnobotany, folk medicine, latex plants, survey, togo

Abbreviation Used: UV: use value, ICF: informant consensus factor, RI: relative importance, PP: pharmacological properties attributed to a species for a specific ailments, AC: ailment categories treated by a given species



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INTRODUCTION

In developing countries, up to 80% of the population still relies on the traditional medicine for their primarily health care.^[1] Medicinal plants constitute the basis of health care systems in many societies. The recovery of the knowledge and the practices associated with these plant resources are a part of an important strategy linked to the conservation of the biodiversity, discovery of new medicines, and bettering the quality of life of poor rural communities. Ethnobotanical studies of medicinal plants have taken many paths, sometimes testing hypotheses of the use and the knowledge,^[2] or sometimes describing the use of plants in given cultural contexts.^[3] However, indigenous knowledge of using medicinal plants for healing human ailments is, in danger of gradually becoming extinct, because this knowledge is passed on orally from generation to generation without the aid of a writing system and many traditional healers do not keep written records.^[4] Consequently, little is known about the medicinal practices of the indigenous people.

In Togo, a country located in Western Africa with a border on the Atlantic Ocean in the South, in recent years, the plants used traditionally for therapeutic purposes have attracted the attention of researchers.^[5-10] In spite of these studies, little is known about latex plants of Togolese flora used for medicinal purposes.

Plant latex is a good source of various secondary metabolites, which shows growth inhibitory effects in bacteria, fungi, viruses, tumors, and cancer cell lines. It shows toxicity to insects, act as growth and

reproductive cycle inhibitor. It also shows cytotoxic and anticancer activity and is widely used as laxative, anti-arthritic and as conditioning agents for cosmetic purposes.^[11]

This paper seeks to contribute to the knowledge of the latex plants used medicinally by the inhabitants of the Maritime Region of Togo, by presenting the results of a descriptive study of the medicinal latex plants, in order to identify the latex plants species used therapeutically and provide baseline information for future pharmacological, phytochemical, and toxicological studies.

MATERIALS AND METHODS

Study area

Togo is a Western African country lying between Burkina Faso in the North, Benin in the East, and Ghana in the West. Togo's coastline in the

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South stretches for a distance of 54 km. The country is divided into five economic regions from the North to the South: The Savannah Region, Kara Region, Central Region, Plateaux Region, and Maritime Region. The Maritime Region, the study area extends between 1°20' and 1°50' East and 6°10' and 6°60' North of the equator. It is constituted of seven prefectures: Ave, Bas-Mono, Golfe, Lacs, Vo, Yoto, and Zio. It borders the Plateaux Region, the Republic of Ghana, the Republic of Benin, and the Atlantic Ocean [Figure 1]. The region covers an area of 6100 km² which is approximately 10.78% of the total of 56,600 km² land area of Togo mainland. The climate is sub-equatorial with a long rainy season from March to July (maximum in June: 1200 mm), and short rainy season from September to November (maximum in October: 1000 mm). The minimal precipitations for these two seasons are 184.4 mm and 6.9 mm, respectively. The average annual temperature is around 27.5°C with a maximum around 35.1°C in warm season.^[6] The region contains disparate forests, relics of gallery forests, savannahs, coastal thickets, meadows, or halophilic marshy.^[12] The soil begins after the Atlantic Ocean by series of detrital postocene age. After this, there are a valley and the flood plains of rivers Haho, Mono, and Zio.^[12] The region is inhabited by 2,599,955 people, the main ethnic groups being Ewe, Ouatchi, Mina, Fon, and Adja.^[13] Globally, the region benefits from an excellent biodiversity of medicinal plants.^[14]

Data collection

Information was obtained from the traditional healers using a semi-structured questionnaire.^[15] The survey was realized from June to December 2013, after their informed consent. Questions asked were about (i) the traditional healer or herbalist identity (name and surname, sex, age, and level of education), (ii) the origin of their knowledge, (iii) the uses of latex plants, and (iv) the professional experience. Information was also gathered on access to the plants and restrictions on their use. Every informant was asked to sign a consent form certifying

his agreement with the form which was edited to explain the importance of the information they would provide.

Plant identification

After interviews, preliminary identification of the plants was done in the field by a botanist. Afterward, herbarium specimens were prepared, and photographs were taken to aid in the confirmation of the identity of the plants. Plant identities were confirmed by giving a voucher specimens number at the Herbarium of the Botany Department, University of Lomé.

Data analysis

Initially, the information about the uses of the species collected, along with botanical information, was compiled into a database. The species were listed in alphabetical order by family, local name in the region, medicinal uses, used parts, and herbarium number. Ethnobotanical data were analyzed and summarized by using Microsoft excel. Excel spreadsheet was used to make simple calculations and determine the quantitative ethnobotanical index.

Use value

The use value (UV), a quantitative method that demonstrates the relative importance (RI) of species known locally, was calculated according to the following formula:^[16]

$$UV = \frac{\sum U}{n}$$

Where: “UV” is the UV of species, “U” is the total number of use reports per species and “n” represents the total number of informants interviewed for a given plant. Values will be high (near 1) if there are many use reports for a plant, implying that the plant is important, and near 0 if there are few reports related to its use.

Relative importance

The RI value was calculated according to the following formula:^[15,17]

$$RI = PP + AC$$

Where: “PP” is obtained by dividing the number of pharmacological properties attributed to a species for a specific ailments divided by the maximum number of properties attributed to the most resourceful species, species with the highest number of properties; “AC” is the number of ailment categories treated by a given species divided by the maximum number of ailment categories treated by the most resourceful species. The highest possible value of RI is 2.0, which indicates the highest diversity of medicinal uses of a plant.

Informants consensus factor

Different specific uses were reported by the informants for the latex plants and that were broken down into a certain number of use categories according to previous studies.^[15,17,18] The specific use category, concerns various diseases. The informant consensus factor (ICF) was calculated according to Heinrich *et al.*^[19] as following:

$$ICF = \frac{Nar - Na}{Nar - 1}$$

Where “Nar” is the sum of the uses registered by each informant in a given category, Na is the number of species indicated in that category. The ICF was used to identify which category was most important in the interviews. The maximum ICF value possible is 1, when there is a total consensus among the informants about the medicinal plants for a given category.

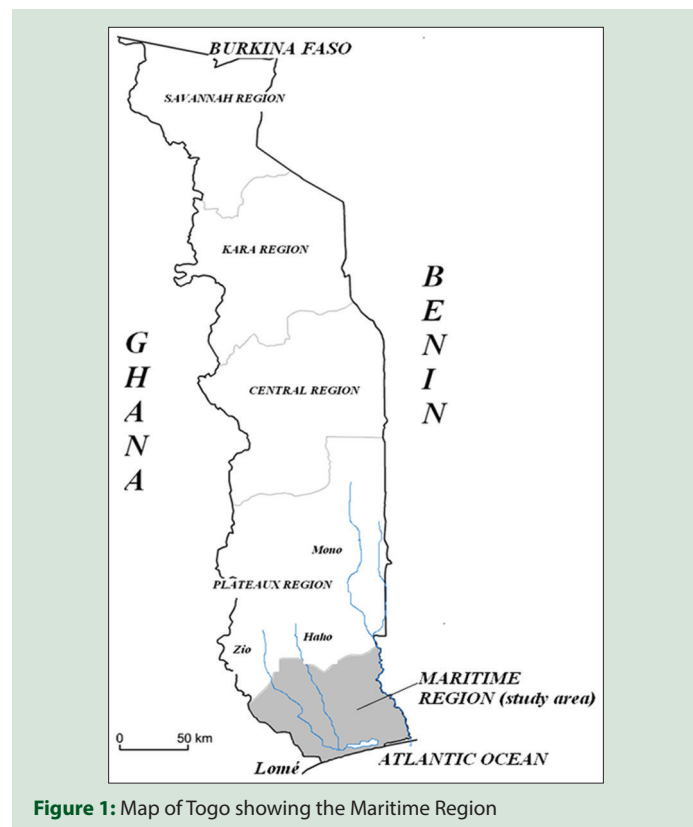


Figure 1: Map of Togo showing the Maritime Region

RESULTS

Informants' profile

A total of 220 informants (120 men and 100 women) were interviewed. They aged from 25 to 87 years, and the average age is 51.6 ± 11.1 years. The informants in the range of 46–60 years were in the majority and accounted for 53.6%. According to the results, 34.1% were illiterates, 30.0% attended primary school, 30.9% the secondary school, and only 5.0% of the informants attended the university. The ethnic groups of the informants were Ewe (39.5%), Ouatchi (33.6%), Mina (17.3%), and others such as Adja (4.5%), Kotokoli (2.3%), Kabyè (0.9%), Pédah (0.9%), and Akposso (0.5%). For the origin of their knowledge, the majority of the traditional healers (84.5%) inherited the knowledge from their families, while 0.9% received their knowledge through divine revelation. The traditional healers who inherited both from their families and from training represented 7.7% and 6.4% only from training. The traditional healers were experienced from 1 to 60 years but the majority (85.9%) was experienced from 1 to 30 years [Table 1].

Taxonomic diversity and use values

In this study, 33 medicinal latex plant species belonging to 24 genera and 12 families were recorded. The most represented families were *Euphorbiaceae* and *Moraceae* with eight species each, followed by *Asclepiadaceae* with five species and *Apocynaceae* with four species. The others families were represented by one species each [Table 2]. The life forms indicated that 43% of the reported species were shrub following by tree and liana (21% each), and herb (15%).

The latex plants most used by the traditional healers of the Maritime Region of Togo were *Euphorbia hirta* L. (UV = 0.700), *Pergularia daemia* (Forssk.) Chiov. (UV = 0.481), *Jatropha gossypifolia* L. (UV = 0.283), and *Alstonia boonei* De Wild. (UV = 0.235), followed by *Carica papaya* L. (UV = 0.176), *Jatropha curcas* L. (UV = 0.155), *Calotropis procera* (Ait.) Ait. F. (UV = 0.149), and *Secamone afzelii* (Schultes) K. Schum.

Table 1: Profile of the traditional healers interviewed

	Respondents (%)
Sex	
Males	54.5
Females	45.5
Age groups (years)	
≤30	2.7
31-45	25.9
46-60	53.6
61-75	15.9
≥76	1.8
Ethnic groups	
Ewe	39.5
Ouatchi	33.6
Mina	17.3
Others	9.6
Educational level	
Illiterates	34.1
Primary	30
Secondary	30.9
University	5
Origin of the knowledge	
Familial heritage	84.5
Familial heritage plus training	7.7
Training	6.4
Divine revelation	0.9
Others	0.5
Experience	
≤30	85.9
>30	14.1

(UV = 0.149). The lowest UV calculated was 0.005 for *Ficus thonningii* Blume, and *Milicia excelsa* (Welw.) C.C. indicating that these plants were rarely used by the informants [Table 2].

Relative importance

This study showed that the highest diversity use species were *P. daemia* (Forssk.) Chiov. (RI = 2.00), and *E. hirta* L. (RI = 1.91). *P. daemia* (Forssk.) Chiov was used for 26 pharmacological properties in 12 ailments categories and *E. hirta*, 26 pharmacological properties in 11 ailments categories. These two species were followed by *J. curcas* L. (RI = 1.35), *Manihot esculenta* Crantz (RI = 1.29), *C. papaya* L. (RI = 1.27), *A. boonei* De Wild. (RI = 1.16), *J. gossypifolia* L. (RI = 1.05), *Lactuca taraxacifolia* (Willd.) Schum. (RI = 1.05), and *C. procera* (Ait.) Ait. F. (RI = 1.00). The RI values of the others species were <1.00 (RI <1.00) and three species were mentioned for only one specific use [Table 2].

Informants consensus factor

Traditional healers use 33 medicinal latex plants for 82 diseases or specific uses in Maritime Region of Togo. These diseases were grouped into 17 use categories: Infectious diseases, gastrointestinal diseases, problems of the nervous system, gynecological problems, problems of the respiratory system, dermatological problems, diseases of the endocrine glands, diseases of the blood and hematopoietic organs, problems of the visual system, cardiovascular diseases, problems of the otorhinolaryngology and stomatology system, pediatrics, urologic problems, rheumatology-orthopedics, psychiatric diseases, magico-spiritual problems, and poisoning problems. The informants agree in the treatment of all the ailments categories except urologic problems [Table 3]. The categories with the greatest consensus among the informants were: Infectious diseases (ICF = 0.922), followed by problems of the respiratory system (ICF = 0.844), gynecological problems (ICF = 0.793), and gastrointestinal diseases (ICF = 0.735) meaningful that the traditional healers surveyed agree more in the treatment of these diseases. The informants use 24 latex plants species for infectious diseases, followed by 20 for gynecological problems and 19 for gastrointestinal diseases.

Plant parts used, preparation methods, and route of administration

The latex plant parts used in the study area were: Leaves, stem, stem bark, leafy stems, roots, root bark, seeds, fruits, latex, tuber, and whole plant [Figure 2]. The most frequently used part is the leaves (35.07%), followed by leafy stems (20.35%), stem bark (15.68%), roots (14.03%), latex (6.18%), whole plant (5.38%), and others (3.33%) including root bark, seeds, fruits, stem, and tuber. Latex plants are prepared and administrated in different ways. The decoction (67.9%) is the main form of preparation [Figure 3]. Others forms of preparations are maceration (10.4%), crude latex (5.8%), sauce (4.7%), juice (4.0%), poultice (2.8%), and infusion and powder (1.5% each). The concoctions are mainly administered by oral route (90.7%) linked to the form of preparation.

DISCUSSION

This study aimed to identify the latex plants and their medicinal uses. The species recorded are mostly belonging to *Euphorbiaceae*, *Moraceae*, *Asclepiadaceae*, and *Apocynaceae* families. According to literature, these families recorded the greatest number of latex plants.^[14] The main life form of the reported species was a shrub. This is in contradiction with others studies in the same area and elsewhere, where herbaceous plants are the most reported species.^[6,17] This may be due to the fact that this study is focused in the “group of plants” which has commonly a latex, and not in disease or medicinal plants in general.

Table 2: List of medicinal latex plants investigated with their related information

Species/families	Local name	Voucher number	Life form	Up ^a	Ailments treated/others uses	Mode prep ^b	Rt of Ad ^c	RI ^d	UV ^e
<i>Mangifera indica</i> L./ Anacardiaceae	Mangoti	TG12740	Tree	Lv St bk	Malaria, microbial infection, fever, intestinal worms, icterus	Dec Mac	Or	0.44	0.074
<i>Alstonia boonei</i> De Wild./ Apocynaceae	Nyamidua	TG02007	Tree	St bk Rt Lv	Anemia, asthenia, abdominal pain, hemorrhoid, malaria, stomachache, wounds, stomach ulcer, scurf, chickenpox, intestinal worms, microbial infection, vaginitis, dermatosis, venom	Dec Mac Jui	Or Tp Pu	1.16	0.235
<i>Holarrhena floribunda</i> (G. Don) Dur. and Schinz/ Apocynaceae	Sesewu	TG12749	Tree	St bk Rt Rt-bk Lv	Intestinal worms, microbial infection, candidiasis, malaria, dystocia, pelvic pain, diarrheas, hemorrhoid, infertility, lumbago, cardiomegaly, hematuria	Dec Mac Inf	Or	0.91	0.106
<i>Rauvolfia vomitoria</i> Afzel./ Apocynaceae	Dodema- kpowoè	TG12750	Tree	St bk Rt Rt-bk Lv	Abscess, amenorrhea, anemia, headache, convulsive attacks, microbial infection, infertility, stomach ache, mental diseases, stomach ulcer	Dec Mac	Or	0.92	0.117
<i>Thevetia nerifolia</i> Juss./ Apocynaceae	Sibisaba	TG12745	Shrub	Rt Lv	Headache, mental diseases, madness	Dec Mac	Or	0.28	0.016
<i>Calotropis procera</i> (Ait.) Ait. E./Asclepiadaceae	Wanga- chigbe	TG02213	Shrub	Lx, Rt Lv St	Abscess, whitlow, cough, hemorrhoid, sinusitis, epilepsy, microbial infection, stomach ache, tinea, snake bite	Dec Mac Cat Jui Sol	Or, Tp	1.00	0.149
<i>Cryptolepis sanguinolenta</i> (Lindl.) Schltr./Asclepiadaceae	Kanabo- djin, kadjin	TG02216	Liana	St bk Rt Lv	Amoebic dysentery, microbial infection, stomach ache, intestinal functional troubles, malaria	Dec Mac Inf	Or	0.32	0.074
<i>Leptadenia hastata</i> (Pers.) Decne./Asclepiadaceae	Alevoin, Garba	TG12741	Liana	Lx, Rt Lv	Asthenia, microbial infection, cough	Dec Sol	Or	0.36	0.016
<i>Pergularia daemia</i> (Forssk.) Chiov./Asclepiadaceae	Kponkeke, kpankeke	TG12743	Liana	Lx Rt Lv St St-lv	Agalactia, abscess, anemia, asthenia, vaginal candidiasis, dermatosis, microbial infection, tuberculosis, malaria, cough, stomach ache, abdominal pain, chronic hiccup, pelvic pain, female infertility, abortion risk, diarrheas, fever, impotence, dysmenorrhea, ocular pains, diabetes, chronic alcoholism	Dec Mac Cat Pow Jui Sau Oth	Or, Tp, Ins	2.00	0.481
<i>Secamone afzelii</i> (Schultes) K. Schum./Asclepiadaceae	Anosika- ekato	TG12744	Liana	Lv St-lv	Agalactia, dystocia, cough, malaria, microbial infection, amebiasis, intestinal worms	Dec Oth	Or, Che	0.48	0.149
<i>Lactuca taraxacifolia</i> (Willd.) Schum./Asteraceae	Anonto	TG12752	Herb	Rt Lv St-lv	Anemia, asthenia, diabetes, hypertension, dystocia, abdominal bloating, urinary retention, witchery, against bad spirit	Dec Pow Jui Sau Oth	Or, Sca	1.01	0.122
<i>Carica papaya</i> L./Caricaceae	Adibati, Adubati	TG00342	Shrub	Rt Lv Fr Sd Lx	Intestinal functional troubles, dystocia, impotence, male infertility, diarrheas, headache, inguinal scrotal hernia, icterus, microbial infection, amebiasis, intestinal worms, stomach ache, malaria, candidiasis, tinea, against witchery, against sorcery	Dec Mac Pow Inf Oth	Or, Tp, Pu	1.27	0.176
<i>Ipomoea batatas</i> (L.) Poir./ Convolvulaceae	Dzete	TG12746	Liana	Lv	Abortion risk, bleeding	Dec Jui	Or, Tp	0.24	0.010
<i>Elaeophorbia grandifolia</i> / Euphorbiaceae	Dzoku, Zoku	-	Tree	Lx Lv St-lv	Cough, microbial infection, whitlow, dermatosis, stomach ache, hemorrhoid, intestinal functional troubles, infertility, early menopause, epilepsy	Dec Pow Mac Sol Oth	Or, Tp	0.88	0.096
<i>Euphorbia heterophylla</i> (Haw.) Croizat/Euphorbiaceae	Anosika- asu	TG03183	Herb	Wp	Microbial infection, early menopause	Dec	Or	0.24	0.010

Contd...

Table 2: Contd...

Species/families	Local name	Voucher number	Life form	Up ^a	Ailments treated/others uses	Mode prep ^b	Rt of Ad ^c	RI ^d	UV ^e
<i>Euphorbia hirta</i> L./ <i>Euphorbiaceae</i>	Notsigbe, Anosigbe	TG12747	Herb	Wp	Agalactia, amebiasis, anemia, asthenia, asthma, tooth decay against bad spirit, diabetes, cough, diarrheas, abdominal pain, paralysis, dysentery, hemiplegia, impotence, dysmenorrhea, gonorrhoea, hemorrhoid, hypertension, microbial infection, ovarian cyst, stomach-ache, oligospermia, stomach ulcer, intestinal worms	Dec	Or, Che, Mw	1.91	0.700
				Lx		Mac			
				Lv		Inf			
				St-lv		Jui			
				Fr		Sau			
<i>Euphorbia onocladata</i> Drake/ <i>Euphorbiaceae</i>	Somawi	TG12748	Tree	St	Bronchitis, against the thunder	Dec	Or	0.24	0.010
				St-lv		Oth			
<i>Euphorbia poissonii</i> Pax/ <i>Euphorbiaceae</i>	Adikpui, Adikpè	TG03242	Tree	Lv	Against the bad spirit	Oth	Oth	0.12	0.010
<i>Jatropha curcas</i> L./ <i>Euphorbiaceae</i>	Babati Babatihe	-	Shrub	Lx	Abscess, amebiasis, abortion, tooth decay, wounds healing, dystocia, lumbago, abdominal pain, broken limbs, icterus, impotence, buccal mycosis, whitlow, hypertension, urinary infection, malaria, wounds, buccal wounds, rheumatism, deafness	Dec	Or, Tp, Fu, Bru, Mw	1.35	0.155
				Sd		Mac			
				Lv		Cat			
				St-lv		Jui			
				Rt		Sol			
<i>Jatropha gossypifolia</i> L./ <i>Euphorbiaceae</i>	Babatidjin	TG12753	Shrub	Lx	Anemia, anorexia, asthenia, hepatitis, icterus, wounds, microbial infection, malaria, prostate, against sorcery	Dec	Or, Tp, Oth	1.05	0.283
				Lv		Oth			
<i>Manihot esculenta</i> Crantz/ <i>Euphorbiaceae</i>	Agbeli, Akuteti	TG12742	Shrub	Lx	Anemia, asthenia, headache, dysentery, wounds healing, ocular pains, fever, microbial infection, stomach ache, snake bite, incurable wounds, intestinal worms	Dec	Or, Tp	1.29	0.112
				Lv		Inf			
				Tb		Cat			
						Jui			
						Sau			
<i>Aloevera</i> L./ <i>Liliaceae</i>	Adi-adi	-	Herb	Lx	Aide-mémoire, dermatosis, abdominal pain, icterus, microbial infection	Dec	Or, Tp	0.52	0.037
				Lv		Sol			
						Oth			
						Mac			
<i>Antiaris africana</i> Engl./ <i>Moraceae</i>	Logoti	TG12754	Tree	Lx	Sickle cell disease	Mac	Or	0.12	0.010
<i>Ficus capensis</i> Thunb./ <i>Moraceae</i>	Gbovitsi	-	Tree	Lv	Infertility, malaria	Dec	Or	0.24	0.021
				Fr		Mac			
				Rt					
<i>Ficus exasperata</i> Vahl./ <i>Moraceae</i>	Tataplala, Sasaplala	TG05098	Tree	Lv	Malaria, icterus, intestinal functional troubles	Dec	Or	0.28	0.010
				Rt		Mac			
<i>Ficus platyphylla</i> Del./ <i>Moraceae</i>	Vodjin	TG12738	Tree	St	Anemia, microbial infection, malaria, ovarian cyst	Dec	Or, Pu	0.36	0.032
<i>Ficus polita</i> Vahl./ <i>Moraceae</i>	Gbovigan	TG12739	Tree	Lv	Microbial infection, malaria	Dec	Or	0.16	0.010
						Mac			
<i>Ficus thonningii</i> Blume/ <i>Moraceae</i>	Asiti	TG05191	Tree	Lx	Abortion risk	Sol	Or	0.12	0.005
<i>Ficus umbellata</i> Vahl./ <i>Moraceae</i>	Gbafo	TG05204	Tree	St bk	Abscess, anemia, malaria, diarrhea, amoebic dysentery, hemorrhoid, oligospermia, cough, polymenorrhea	Dec	Or, Tp, Fu	0.76	0.074
				Lv		Mac			
						Cat			
<i>Milicia excelsa</i> (Welw.) C.C. Berg/ <i>Moraceae</i>	Logo- zangou	TG12751	Tree	Lx	Chronic headache	Dec	Or	0.12	0.005
<i>Parquetina nigrescens</i> (Afzel.) Bullock/ <i>Periplocaceae</i>	Bovoin, Atobo, Tobo	TG02305	Shrub	Lv	Epilepsy, sexual impotence, hemorrhoid, microbial infection, insomnia, abortion risk, heart pains	Dec	Or	0.72	0.064
				St		Mac			
				Rt					
<i>Vitellaria paradoxa</i> C.F. Gaertn/ <i>Sapotaceae</i>	Yokuti	TG08239	Tree	St bk	Broken limbs, microbial infection, female infertility	Dec	Or, Tp	0.36	0.053
<i>Cissus populnea</i> Guill. and Per/ <i>Vitaceae</i>	Bokofetri, Esan, Adeka	TG09406	Liana	Rt	Impotence, male infertility, Oligospermia	Inf	Or	0.23	0.032
				Lv		Mac			

^aUp: Used part; Lv: Leaves; St-lv: Leafy stems; Rt: Root; Rt-bk: Root bark; Sd: Seed; Fr: Fruit; Lx: Latex; St Bk: Stem bark; WP: Whole plant; Tb: Tuber; ^bMode prep: Mode of preparation: Dec: Decoction; Mac: Maceration; Cat: Cataplasm; Pow: Powder; Jui: Juice; Inf: Infusion; Sol: Solution; Oth: Others; ^cRt of Ad: Route of administration; Or: Oral; Tp: Topical; Che: Chewing; Ins: Instillation; Mw: Mouthwash; Sca: Scarification; Pu: Purge; Bru: Brushing; Fu: Fumigation; ^dRI: Relative importance; ^eUV: Use value

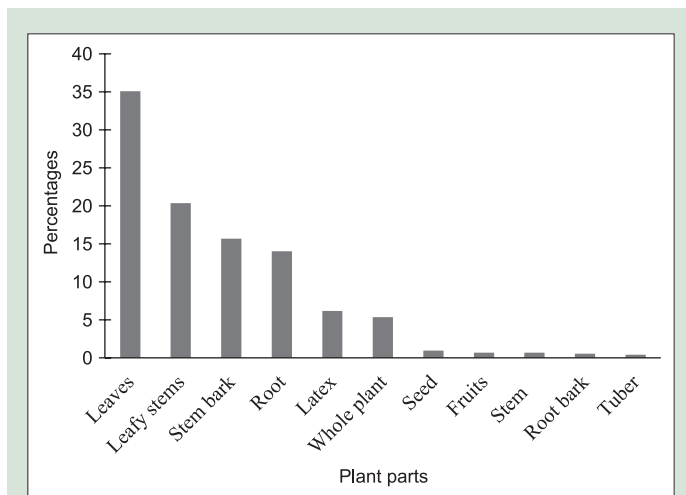


Figure 2: Frequency of latex plant used parts by the traditional healers of the study area

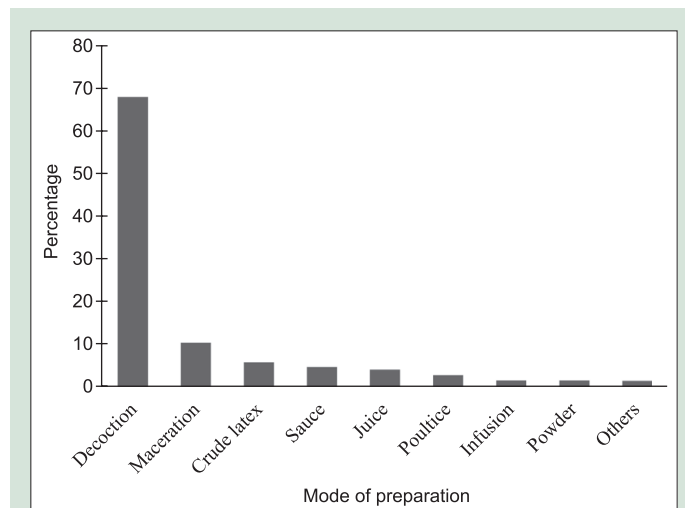


Figure 3: Mode of preparation of phytomedicine

Table 3: Informant consensus for diseases treated with medicinal latex plants used by the inhabitants in Maritime Region of Togo

Categories	Number of uses mentioned	Number of plant species	ICF*
Infectious diseases	296	24	0.922
Problems of the respiratory system	46	8	0.844
Gynecological problems	93	20	0.793
Gastrointestinal diseases	69	19	0.735
Cardiovascular diseases	14	5	0.692
Diseases of the blood and hematopoietic organs	30	11	0.655
Dermatological problems	25	10	0.625
Diseases of the endocrine glands	6	3	0.600
Pediatrics	6	3	0.600
Problems of the otorhinolaryngology and stomatology system	8	4	0.571
Poisoning problems	5	3	0.500
Psychiatric diseases	7	4	0.500
Problems of the visual system	3	2	0.500
Rheumatology-orthopedics	18	10	0.470
Magico-spiritual problems	12	7	0.454
Problems of the nervous system	16	10	0.400
Urologic problems	3	3	0.000

*ICF: Informant consensus factor

The RI of the species showed two species: *P. daemia* (Forssk.) Chiov, and *E. hirta* L. with the highest diversity of uses. The high versatility of medicinal plants could indicate the higher diversity of active compounds contained by the species but there are few ethnobotanical and pharmacological studies in our study area to prove it.^[6,8,20,21] Eight species of Togolese flora cited in this study were reported by Koudouvo *et al.*,^[6] in an ethnobotanical study of antimalarial plants in the same area. Likewise, 9–13 species reported in this study were also documented by several authors in different countries.^[22,23] The species demonstrating the highest RI values in this study had scientifically proven for some pharmacological properties. Thus, *P. daemia* (Forssk.) Chiov., *E. hirta* L., *J. curcas* L., *J. gossypifolia* L., *A. boonei* De Wild., *Rauwolfia vomitoria* Afzel., *C. papaya* L., *C. procera* (Ait.) Ait. F., *Cryptolepis sanguinolenta* (Lindl) Schltr had been shown to possess activities against microbes, parasites, or to possess anti-inflammatory, antioxidant, and anticancer

activities.^[24–26] Some of the species cited in our survey had not yet been studied for their pharmacological activities, indicating the need of more studies.

According to the ICF, the informants agree more in the treatment of all the ailments categories except urologic problems category, and the infectious diseases category had the greatest consensus among the informants. These results are in accordance with those previous studies in which these use categories were found among those with the greatest consensus.^[15,27] The use of a large number of medicinal latex plants for the treatment of infectious diseases in the region could be due to the high occurrence of these problems in the study area, due to poor hygiene, and other factors like water and air pollution.

Concerning the plant parts used, preparation methods, and route of administration, many ethnobotanical surveys had shown that the leaves are most frequently used as decoction and administrated orally.^[6,28,29] The leaves and leafy stems are predominantly used because they are collected very easily than underground parts, fruits, and others,^[30] and in scientific point of view leaves are active in photosynthesis and production of metabolites.^[31] Beside this, another important reason of using leaves could be concerning conservation of the plants as digging out roots might be the cause of death of the plant and putting the species in a vulnerable condition.^[28]

CONCLUSION

This study revealed that the latex plants are variously used in the Maritime Region of Togo by the traditional healers to treat many ailments but there is a little scientific information available concerning many of them. Thus, the results of this survey represent a baseline for selection of species for further phytochemical, pharmacological, and toxicological investigations. Additional studies are also necessary to identify possible difference uses between ethnic groups of the studied area in order to know how the traditional healers select these plants.

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Conflicts of interest

There are no conflicts of interest.

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