Therapeutic Uses Of Loranthaceae Parasites In The Mandara Mountains, Far North Cameroon

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***Abstract*—Loranthaceae are very important parasitic plants in traditional medicine. In order to determine the therapeutic uses and organs used for woody parasites Loranthaceae, an ethnobotanical survey was conducted among 237 people belonging to 25 ethnic groups, including 195 men and 42 women in 9 districts of Mandara Mountains, Far North Cameroon. The results show that local healers have a good knowledge of local Loranthaceae and their uses. These species parasites of ligneous are especially used in the treatment of large groups of diseases such as sterility (98.73%), mental disorders (95.78%), digestive disorders (86.49%), poisoning (58.22%) and chronic diseases (46.35%). They are also used in magico-religious practices (92.4%) for good or bad. The main organs used are stems (73.83%), haustorium (47.5%), their mixture (24.75%) and leaves (16.28%). At the same time, the presence of Loranthaceae on the host plants leads to their death, hence the loss of plant biodiversity.**

Keywords—Loranthaceae; ethnobotany; Parasite; Host Plants; Mandara Mountains.

I. INTRODUCTION

Parasitic plants are plants that live and grow at the expense of other plants called host plants [1]; [2]. They are subdivided into two broad groups, holoparasites that are free of chlorophyll, pulling hosts all their feeds and hemiparasites that only take water and minerals from the host while retaining their chlorophyllic synthesis power. These parasitic plants are distributed in more than seven families, among which that of the Loranthaceae which groups together the epiphytoid hemiparasitic phanerogams forming more or less spherical tufts on the aerial parts of their hosts [3].

Loranthaceae, although parasitic plants, are used internationally by traditional healers in the treatment of various diseases such as cancer, hypertension, hypotension, diabetes, hepatitis, stroke, infertility, microbial diseases and delusions [4]; [5]; [6]; [7]. They are also used for mystical purposes [8].

Loranthaceae are widespread throughout the world. They include about 77 genera and more than 950 species [3]; [1]. Loranthaceae are very common and cause significant damage in natural formations and plantations in Africa, particularly in Burkina Faso, Ivory Coast, Cameroon, Gabon, Ghana, Mali [9]; [10].

In Cameroon, Loranthaceae are represented by nearly 26 species grouped into seven genera, *Agelanthus, Englerina, Globimetula, Helixanthera, Phragmanthera, Tapinanthus* and *Viscum* [11]; [3]. They have resulted in huge yield reductions for species such as *Dacryodes edulis* and *Cola nitida* in the Littoral, East, Southwest and West regions [12]; [13].

Of the various natural causes of loss of plant biodiversity and decreases in yields on plantations, Loranthaceae occupy a very important position in terms of damage [3]; [10]; [14]; [9]. The mistletoe trees are shrubs that are attached to the aerial parts of their hosts and are responsible for the economic, ecological, morphological and physiological damage that varies with the parasitised woody species [11]; [15]). Natural woody plant formations and fruit plantations are a target of parasitic plants [16]; [17]; [18], [19]; [9]. In Cameroon, woody parasites are now a real scourge, given the damage they cause both in natural plant formations [12] and in fruit plantations [13]; [7]. Woody species of environmental and socio-economic importance such as *Azadirachta indica* (Meliaceae), *Balanites aegyptiaca* (Balanitaceae), *Terminalia mantaly* (Combretaceae), *Dalbergia sissoo* (Fabaceae), *Acacia albida* (Mimosaeae), *Ficus* sp. (Moraceae), *Dacryodes edulis* (Burseraceae) and fruit species such as *Psidium guajava* (Myrtaceae), *Vitellaria paradoxa* (Sapotaceae), *Persea americana* (Lauraceae) are unfortunately attacked by Loranthaceae [20]; [12];[7]; [21].

In Cameroon, very few studies have been carried out on woody parasites Loranthaceae with the exception of the works of [20]; [8]; [12] in the littoral region of [7] in the eastern region, from [11] in the southern region and from [21] in the South-West region. The aim of this study is to determine the

traditional uses of woody parasites Loranthaceae, their main organs used and their main hosts in the area of Mandara Mountains, Far-North region, Cameroon.

II. MATERIALS AND METHODS

A. Study site

The study was conducted in the Sudano-Sahelian zone of Far North Cameroon, located between 10 ° 0 'and 12 ° 0' North latitude and between 14 ° 0 'and 15 ° 0' East longitude (Figure 1). Covering an area of 7660 km², they cover the departments of Mayo Sava, Mayo Tsanaga and the district of Méri in Diamaré, or 16.2% of the total area of the Region. It forms a vast plain to the East and North and a set of mountain ranges called Mandara Mountains in its Western part along the Nigerian border, highly rugged with peaks higher than 1200m above sea level. The climate is of the Sudano-Sahelian type, slightly milder and a monomodal rainfall of average duration and intensity varying between 800 and 1000 mm / year [22]. There are two (2) seasons, a short rainy season of three (3) to four (4) from June to October and a long dry season of seven (7) to nine (9) from October to November. The average annual temperature is 28ºC [23]. The soil is sandy-clayey and sandy. The vegetal formation is of the Sudano-Sahelian type, characterized by the spiny prairie dominated steppe and by its extreme fragmentation due to natural conditions and anthropic action. The population of the region is estimated in 2004 at about 1.165.700 inhabitants [24], dominated by ethnic groups such as Mafa, Moufou, Hide, Fulou (peuhl), Mabas and Woula. The main activities are agriculture, trade, livestock and handicrafts.

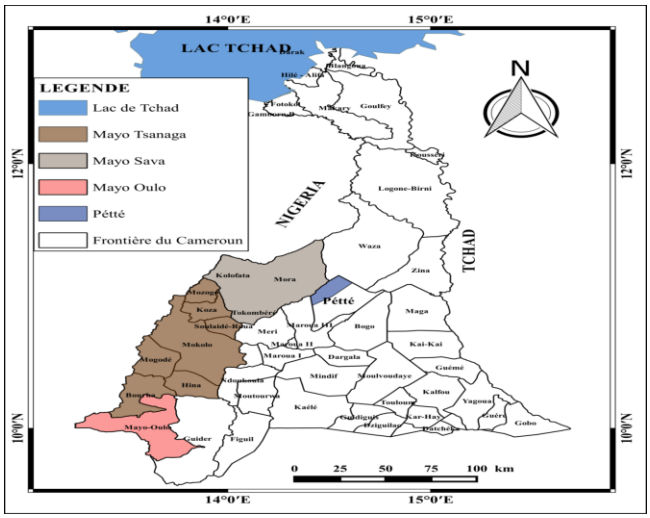

Figure 1 : Location of the study area

III. ETHNOBOTANICAL SURVEYS

The surveys were conducted in nine districts (Mokolo, Souledé-Roi, Mogodé, Hina, Bourha, Mora, Tokombéré, Petté, Mayo-Oulo) distributed in four (4) departments (Mayo-Tsanaga, Mayo-Sava, Diamare and Mayo-Louti) of the Far-North and North region, These surveys were conducted at the end of the rainy season, during the rest periods of the peasants, between September and October 2018. The choice of the Mandara Mountains as study area is guided by the abundance of vascular parasites, favored by the local climatic conditions (slightly milder climate and a much higher rainfall), by high altitude (600 to 1200m) and by the low agropastoral activities. The districts were sampled thanks to the help of departmental delegates and village chiefs who know a lot of areas where there are enough traditional therapists and peasants knowledgeable Loranthaceae. A sample of 237 people of both sexes (including 195 men and 42 women), of different ages, and 25 ethnic groups was formed and distributed on the whole population including traditional traders, breeders, shepherds, officials orchards and plantations and connoisseurs of the Loranthaceae.

With regard to the actual interview, people were interviewed either in their fields or in their homes, individually or in groups, using a questionnaire previously prepared and tested with a sample of 60 people, containing closed questions to which they should answer yes or no and open questions that require comment. The interviews were semi-structured, done in local language. The main focus has been on the knowledge of woody parasites Loranthaceae, organs used in traditional pharmacopoeia and host plants.

IV. Analysis and data processing

The data from the surveys were grouped by district, gender and ethnicity to determine the response rate of the respondents (F) according to the knowledge of the Loranthaceae in different domains. F = (S / N) x 100, with F = percentage response; S = number of people responding to a given area of use and N = Total number of people surveyed. We have established classes of areas of use of Loranthaceae species. These include the medicinal, veterinary and magico-religious fields. In the medicinal fields, the diseases have been divided according to the host plants on which the Loranthaceae are taken.

V. RESULTS

A. Local names of Loranthaceae

The Mandara Mountains ethnic groups know and use names for parasitic plants in the family Loranthaceae (Table 1). The local designation of Loranthaceae varies by ethnicity. However, most of them refer to the Loranthaceae by a single name, with the exception of Mafa, Mandara and Kanouri who designate Loranthaceae by two names indifferently. For the Mafa, the Loranthaceae are called Votok or Modovnoh, while the Bana refer to them as Mourkourderma or Tcham and the Kanouri as Yakoboude or Brougou.

Table 1 : Local names of Loranthaceae by ethnic groups in the study area

Departments	Subdivisions	Ethnics	Local names
Mayo-Tsanaga	Mokolo	Mabeng	Mogononob
	Souledé-Roi	Mafa	Votok et Modovnoh
	Mogodé	Kapsiki	Melba
	Hina	Daba	Kounounoup
		Hina	Damganna
	Bourha	Bana Kapsiki	Mourkourderma, Tcham
Mayo-Sava	Mora	Mandara, Mouyeng	Mehenek
	Tokombéré	Mofou	Mezeneuk
Diamaré	Petté	Peuls Kanouri	Yaotéré
		Kanouri	Yakoboudé, Brougou
Mayo-Louti	Mayo-Oulo	Guidar	Larad
		Fali	Koudji

B. Ethnobotanical knowledge of Loranthaceae

Overall, the populations of the Mandara Mountains know the ethnobotanical uses of Loranthaceae. But this knowledge varies by district (Table 2). It ranges from 25% in the district of Petté to 85% of the respondents' responses in that of Mokolo. In the majority of the boroughs the respondents' answers are higher than 50%. In only three districts, respondents' answers are less than 50%. These are Petté (25%), Mayo-Oulo (34%) and Hina (45%).

Table 2 : Therapeutic Uses of Loranthaceae by Borough

Departments	Boroughs	Answers (%)
Mayo-Tsanaga	Mokolo	85,00
	Souledé-Roi	55, 00
	Mogodé	67, 00
	Hina	45, 00
	Bourha	64, 00
Mayo-Sava	Mora	50, 00
	Tokombéré	83,50
Diamaré	Petté	25, 00
Mayo-Louti	Mayo-Oulo	34, 00

C. Loranthaceae sensitive host plants

In the study area, eight main host species of Loranthaceae were mentioned by the respondents (Figure 2). These are *Diospyros mespiliformis* (Ebenaceae), *Ziziphus mauritiana* (Rhamnaceae), *Acacia albida* (Mimosaceae), *Azadirachta indica* (Meliaceae), *Dalbergia sisso'o*, *Tamarindus indica* (Fabaceae), *Psidium guajava* (Myrtaceae) and *Citrus* sp. (Rutaceae). Respondents' answers vary from 76.5% for *D. mespiliformis* to 42% for *Citrus* sp. These last two species are respectively the most quoted and the least cited by the respondents. *D. mespiliformis* is followed by *Z. mauritiana* (70%), *A. albida* (64%) and *A. indica* (60.5%). Two groups of species differ significantly (P <0.05) according to farmers' responses. The first group consists of *D. mespiliformis*, *Z. mauritiana* and *A. albida*, and the second group of other species. In each group, the difference is not significant (P> 0.05) between species.

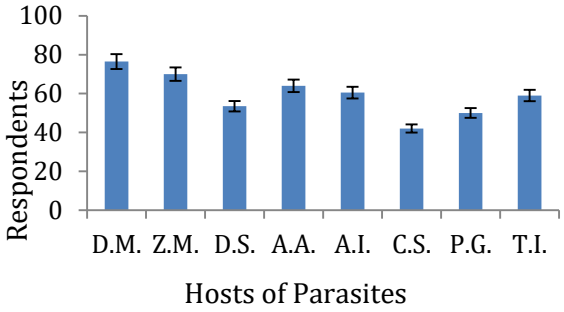

Figure 2 : Loranthaceae sensitive host plants

D.M : *Diospyros mespiliformis ;* Z.M : *Ziziphus mauritiana ;* D.S : *Dalbergia sisso'o ;* A.A : *Acacia albida ;* A.I : *Azadirachta indica ;* C.S : *Citrus sp. ;* P.G : *Psidium guajava et T.I :Tamarindus indica*

D. Host plants of Loranthaceae used in tradithérapy

The main host plants for Loranthaceae used by peasants in traditional borings therapy are presented in Table 3. In general, most of these host plants are used in traditional therapy in the study area. However the most used are Mangifera indica (66.11%) and Senna singueana (65.00%) and the least used is Sorghum bicolor (40.00%).

As for the districts, the farmers' responses ranged from 61.43% in Mokolo to 39.29% in Petté. The boroughs of Mokolo is followed by those of Mogodé (52.86%) and Bourha (52.50%). The difference in responses for host plants used in traditional therapy is significant between districts (P <0.005).

Table 3 : Host plants of Loranthaceae used in traditional therapy Answers (%)

	Petté	Mora	Tokombéré	Soulédé-Roi	Mokolo	Mogodé	Hina	Bourha	Mayo-Oulo	Average/Ecartyp
Mangifera indica	60	75	85	25	80	85	60	50	75	66.11±15.43
Senna singueana	50	65	70	50	80	60	65	80	65	65.00±7.78
Piliostigma sp.	25	40	50	60	50	65	70	75	55	54.44±11.73
Vitex sp.	45	50	65	45	65	40	50	50	60	52.22±7.41
Diospyros mespiliformis	35	60	30	30	55	30	55	45	80	46.67±14.07
Carica papaya	50	20	45	20	60	45	55	60	35	43.33±12.22
Citrus sp.	30	55	45	35	40	55	55	40	50	45.00±7.78
Calotropis procera	60	50	30	80	75	55	50	75	40	57.22±13.58
Corchorus trilocularis	30	30	55	45	45	65	30	50	55	45.00±10.00
Sorghum bicolor	20	45	30	50	65	55	25	50	20	40.00±14.44
Abelmoschus esculentus	20	35	60	50	60	50	55	30	25	42.78±13.58
Gossypium hirsutum	55	40	30	45	70	60	65	40	45	50.00±11.11
Sesamum indicum	30	45	55	20	50	30	70	60	65	47.22±14.20
Capsicum frutescens	40	20	75	35	65	45	20	30	55	42.78±15.31
Average (Ecartyp)	39.29 (12.14)	45.00 (12.14)	51.79 (14.64)	42.14 (12.55)	61.43 (10.00)	52.86 (11.02)	51.79 (11.99)	52.50 (12.50)	51.79 (13.67)	49.84 (5.13)

E. Organs of Loranthaceae used in traditional medicine

Depending on the populations of the study area, stems (73.83%) are the most used parts in traditional herbal medicine (Figure 3). The haustorium (sucker) comes in second place with 47.5%, followed by the mixture of several plant organs of the species of Loranthaceae with 24.75% of responses. Leaves and twigs are poorly used by local populations with respectively 16.28% and 9.28% of farmers' responses. The high frequency of use of the stem could be explained by the presence of the substances preserved in this part. Regarding the harvest of this organ, it is done in a traditional way by the local populations who are familiar with the phenological periods of the Loranthaceae (leafing, flowering, fruiting), so each part is sought during its determined phenological phase (April, May and June). Statistical analysis indicates that there is a highly significant difference between the plant organs of Loranthaceae species used by local populations (P <0.05).

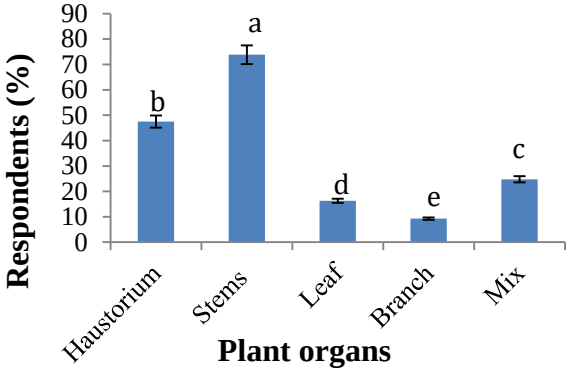

Figure 3 : Organs of Loranthaceae used in traditional medicine

F. Categories of use of Loranthaceae by local populations

According to the peasant women, each plant species can be parasitized by the Loranthaceae and each parasite is named after the host that hosts it. In the study area, Loranthaceae are used to cure almost all diseases and other ailments.

The use categories of Loranthaceae vary according to farmers' responses (Figure 4). Infertility (male and female) is largely treated by Loranthaceae according to the responses of 98.73% of respondents. It is followed by mental disorders (95.78%), magico-religious practices (92.4%) and digestive disorders

(86.49%). Poisonings and chronic diseases are poorly represented with respectively 58.22% and 46.35% of farmers' responses.

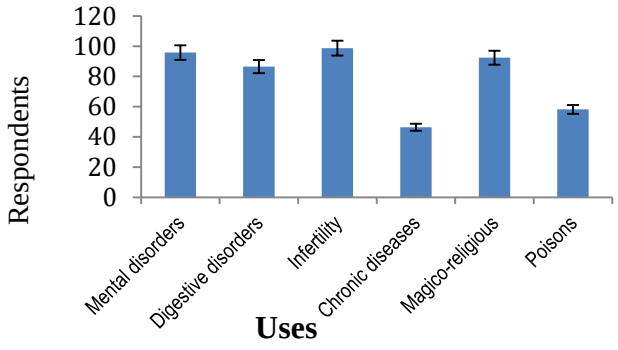

Figure 4: category of uses

VI. Discussion

The populations of the Mandara Mountains know the Loranthaceae well and then they designate them by different names from their local dialects. This knowledge of Loranthaceae by different ethnic groups was also confirmed by [25] and [7] studying the Parasitism and Ethnobotany of Loranthaceae in Lokomo, East Cameroon. Our study reveals the importance of Loranthaceae in the Boroughs according to their constitutive tribes and confirms the results of [26] who studied the distribution of Loranthaceae according to their host attacks in the main cocoa areas of Côte d'Ivoire. The susceptibility of host plants to parasitism of Loranthaceae varies with the species and corroborates the findings [25] who showed that *Psidium guajava*, a Myrtaceae and *Citrus* spp., A Rutaceae, are sensitive to 36% to 30% respectively.

Regarding the organs of Loranthaceae used by traditional healers, the stems are the most used. These results are different from those obtained by [27], who found that leaves (25%) are the most used organs. These differences would be due to the fact that these authors worked on all the medicinal plants whereas we worked only on the Loranthaceae. These same authors have reported that digestive disorders are the most commonly treated ailments of medicinal plants (20%) in Morocco whereas our study shows us that infertility (male and female) are the well-treated ailments of Loranthaceae in Mandara Mountains.

On the other hand, according to the ethnic groups questioned in the study area, Loranthaceae species have a double face. They can do well just as they can do magically. Unfortunately, we have not been able to collect detailed information on the harm that can cause the Loranthaceae; they are given only to the insiders.

The therapeutic properties of the species of Loranthaceae given by the peasants and traditional therapists of the Mandara Mountains are presented as solutions to large groups of ailments such as infertility, mental disorders, digestive disorders, chronic diseases and magico-religious practices. The same types of results have been reported by [7] who demonstrated that Loranthaceae species are used to treat nerve attacks, measles, epilepsy, chronic wounds and abscesses and perform mystical practices. As for [28], he found that in West Africa, epiphytic and parasitic plants such as Loranthaceae are traditionally recognized as parasitic plants with very important magico-religious powers and contain pharmacodynamic properties of the plant host. They are used in particular to cure mental illnesses. According to [20], Loranthaceae have a number of therapeutic uses to treat or control a wide range of diseases such as nerve attacks, ringing ears, convulsions, chronic cramps, diabetes, breathing difficulties, pain due to rheumatism, epilepsy, dizziness, gout, uterine hemorrhage, hypertension and hypotension, back pain, kidney pain, menopause, migraine, heart palpitations, purification general, disorders of the rules, the bleeding of the nose. For [29], Loranthaceae parasites of ligneous are used in the treatment of several evils among which sterility and miscarriages. On the other hand, in parallel with the vulnerability of host plants, certain host species are very resistant to parasitism of Loranthaceae. For this purpose, additional studies are needed to determine the chemical composition of the host plants in order to highlight the causes of the susceptibility of certain host plants to parasitism of Loranthaceae and those that are resistant, such as *Mangifera indica*.

IV. CONCLUSION

Loranthaceae are very important to the populations of the study area despite the damage caused by them. They are of multiple uses in the life of the local peasants. Medicinally, they are used to treat many diseases and symptoms. To this end, medicinal knowledge about Loranthaceae may be a source of medicine and income for local populations in the study area. This medicine puts Loranthaceae users in symbiosis with their natural environment. This then requires further conservation and protection of Loranthaceae species. The valorization of traditional medicine based on Loranthaceae will contribute to the reduction of diseases and mortality in rural areas. These initial results will contribute to the understanding of the ethnobotanical and socio-economic and environmental importance of the Loranthaceae in order to put in place a sustainable management plan for this family so dear to the populations of the Mandara Mountains.

VII. Acknowledgment

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