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Research Article

Altitudinal Distribution Of Loranthaceae Parasites Of Woody Plants On The Mandara Mountains In The Far North Region, Cameroon

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Abstract: Despite the importance of Loranthaceae parasites of woody plants in traditional African medicine, very few studies have been carried out on their diversity in the Sudano-Sahelian zone of Cameroon. The study aims to examine the diversity of Loranthaceae parasites of woody plants and determine their altitudinal distribution over the Mandara Mountains in the Far North region, Cameroon. It took place in nine (09) borough spread over four Departments of the Mandara Mountains. The experimental setup is made up of 15 Hills (altitude ≥ 1000m) representing the main treatment. The 15 Hills are chosen at the rate of one Mount every 10 km in the whole of the Mandara Mountains. The Mounts were grouped by three according to the level of Altitude of the plain of each Mount to find five Mounts (Mont 1 (<500m = Mont1 + Mont2 + Mont15); Mont 2 ([500m-600m [= Mont4 + Mont5 + Mont3); Mont 3 ([600m-700m [= Mont6 + Mont7 + Mont13); Mont 4 ([700m-800m [= Mont8 + Mont9 + Mont14); Mont 5 (> 800m = Mont10 + Mont11 + Mont12)). On each Hill, two Flanks (East and West) were chosen and constituting the secondary treatment, and on each Flank, 50mx20m transects (repetitions) were installed by Altitude level (tertiary treatment) starting with the plain, to the top of the Hill with a space of 50m between two transects. On each transect of each difference in level, all the parasitized trees or not, as well as the parasitic plants were inventoried. A total of 120 host species distributed in 34 families and 75 genera are inventoried. Combretaceae and Mimosaceae are the most represented with 13 species each, ie 38.24% for each family. *Acacia* is the most diverse with 10 species, ie 8.33% of the host species. 18 genera, i.e. 24% of the flora, are reported to be monospecific in this zone. In all of the 120 listed host species, 68 species or 56.66% of the host species are parasitized by 1 or 2 parasitic species and represent the first class (I) which is the class of not very sensitive host species parasitism of Loranthaceae. The second class (II) of susceptible host species is made up of 8 species, ie 6.66% of the host species which represent species susceptible to parasitism. The third class (III) of host plants consists of species highly susceptible to parasitism. It is represented by 4 species, ie 3.33% of the host species. Seven (7) species of Loranthaceae have been identified (*Tapinanthus globiferus* (A. Rich.) Dancing, *Tapinanthus ophiodes* (Sprague) Dancing, *Tapinanthus belvisii* (DC) Dancing), *Agelanthus dodoneifolius* (DC) Polh. & Wiens, *Tapinanthus bangwensis* (Engl. And Kr.) Dancing, *Phragmanthera capitata* (Spreng) Ballé and *Globimetula braunii* (Engl.) Tiegh.) And divided into four genera which are *Tapinanthus*; *Phragmanthera*; *Agelanthus* and *Globimetula*. *Tapinanthus* is the most diverse with four species (*T. bangwensis, T. globiferus, T. ophiodes and T. dodoneifolius*). *Phragmanthera, Globimetula* and *Agelanthus* each have one species (*Phragmanthera capitata* (Spreng) Ballé, *Agelanthus dodoneifolius* (DC) Polh. & Wiens and *Globimetula braunii* (Engl.) Tiegh). *T. globiferus* is the most represented (125.66 ± 71.86 tufts / ha) and covers the plain and the hills, while *G. braunii* is the least widespread (45.57 ± 19.01 tufts / ha) and is more dense on the side West and at the top of the hills of the Mandara Mountains. Slopes and altitude influence the distribution of Loranthaceae over the Mandara Mountains in Far North Cameroon.

Keywords: Loranthaceae, Parasite; Hemiparasite, Mandara Mountains, Far North, Cameroon.

INTRODUCTION

Loranthaceae constitute a family of phanerogamous plants, chlorophyllian hemiparasites and epiphytes which, implanted on the aerial parts of their host plants (Jiofack *et al*., 2007), are responsible for economic, ecological and morphogenetic damage which varies according to the crops or woody species. parasitized (Sallé *et al*., 1998; Dibong, 2009; Boussim, 2002). These parasitic plants are subdivided into two large groups, holoparasites which are devoid of chlorophyll, deriving from their hosts all their food and hemiparasites which take only water and mineral elements from the host while retaining their power of synthesis chlorophyllian. Loranthaceae are widely distributed around the world. They include around 77 genera and more than 950 species (Boudet and Lebrun, 1986; Polhill, 1998; Soro, 2010; Houénon, 2012). In Africa, Loranthaceae are very common and have caused extensive damage to natural formations and plantations in countries such as Burkina Faso, Cote d'Ivoire, Cameroon, Gabon, Ghana, Mali and many more. Other African countries (Boussim, 2002; Boussim and Nayéré, 2009; Koffi, 2014). In Cameroon, the

Loranthaceae are represented by nearly 26 species grouped into seven (07) genera. They lead to a huge drop in the yield of fruit species such as *Dacryodes edulis* and *Cola nitida* in the Littoral, East, South-West and West Regions (Dibong *et al*., 2010; Massako, 2013). These woody parasitic plants are today a real scourge, given the damage they cause both in natural plant formations (Dibong *et al*., 2010; Amon, 2015) and in fruit plantations (Massako, 2013; Azo 'o *et al*., 2013). Woody species of environmental and economic importance such as *Azadirachta indica* (Meliaceae), *Balanites aegyptiaca* (Balanitaceae), *Terminalia mantaly* (Combretaceae), *Dalbergia sissoo* (Fabaceae), *Acacia albida* (Mimosaceae), *Ficus* sp. (Moraceae), *Dacryodes edulis* (Burseraceae) and fruit species of socio-economic importance such as *Psidium guajava* (Myrtaceae), *Vitellaria paradoxa* (Saposaceae), *Persea americana* (Lauraceae), are unfortunately attacked by Loranthaceae (Ngotta *et al*., 2015; Dibong *et al*., 2008, Dibong *et al*., 2010; Azo'o et al., 2013). Loranthaceae, although parasitic plants, are used internationally by traditional therapists and traditional healers in the treatment of various diseases such as cancer, hypertension, hypotension, diabetes, hepatitis, cerebral vascular accidents , infertility, microbial diseases and mental disturbances (Ohashi *et al*., 2003; Ekhaise *et al*., 2010; Wahab *et al*., 2010; Ogunmefun *et al*., 2013). They are also used for mystical purposes. In Cameroon, very few studies have been carried out on Loranthaceae parasites of woody plants except for the work of Dibong *et al*. (2008, 2009 and 2010) in the Littoral Region, de Azo'o *et al*. (2013) in the Eastern Region, de Balle (1982) in the Southern Region, and Ngotta et al. (2015) in the South West Region, from Mapongmetsem *et al*. (1998) and Ibrahima *et al*. (2006) in the Adamawa Region. The purpose of this study is to identify the species of Loranthaceae parasitic in woody plants and to highlight their distribution according to altitude on the Mandara Mountains in the Far North, Cameroon.

MATERIAL AND METHODS

Study site

The study was carried out in the Sudano-Sahelian zone of the 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 7660km², this area covers the Departments of Mayo Sava, Mayo Tsanaga, the Arrondissement of Méri and Petté in Diamaré and the Arrondissement of Mayo-Oulo in Mayo-Louti in the North, i.e. 16.2 % of the total area of the Far North Region. It forms a vast plain to the east and north and a set of mountain ranges called the Mandara Mountains in its western part along the Nigerian border, highly rugged with peaks reaching over 1200m altitude. The climate is of the Sudano-Sahelian type, slightly milder and a single-mode rainfall, with two (2) seasons, a short rainy season, ranging from June to October and a long dry season, from November to May (Gerhard, 2003). The annual average temperature is 28ºC (Maïnam, 1999). The soil is sandy-clayey and sandy. The plant formation is of the Sudano-Sahelian type characterized by the predominantly thorny shrub steppe and its extreme fragmentation due to natural conditions and human action. The main dominant species are *Acacia albida, Ziziphus mauritiana, Tamarindus indica, Azadirachta indica, Acacia seyal, Diospyros mespiliformis, Dalbergia sisso'o*. Some of these plants are used in traditional pharmacopoeia. The population of this Region was estimated at approximately 1,165,700 inhabitants in 2005 (BUCREP, 2005). It is dominated by ethnic groups such as Mafa, Moufou, Hide, Foulbé (peuhl), Mabas and Woula. The main activities carried out are agriculture, commerce, animal husbandry and crafts.

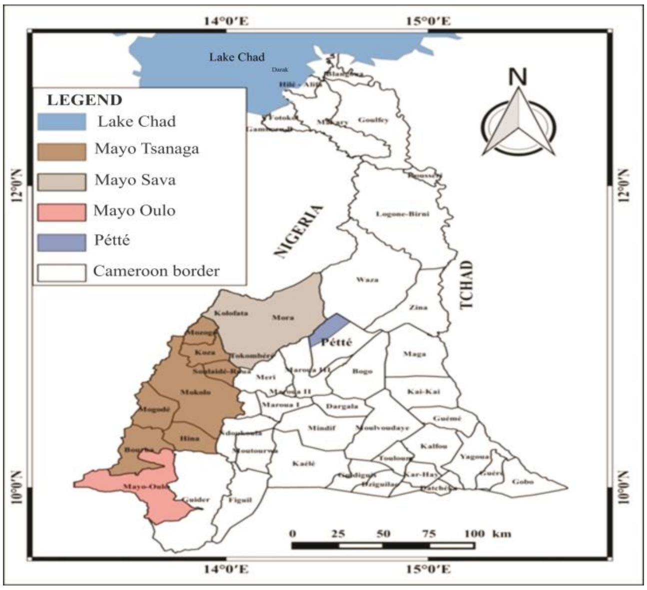

Figure 1: Location of the study area (Source: Bello Bienvenu, 2019)

METHODS

Collection of data

The botanical inventory of woody plants as potential hosts of Loranthaceae was carried out to highlight the susceptibility of each woody species to the parasitism of Loranthaceae. Surveys were carried out to identify the feet of parasitized and non-parasitized host plants and to inventory the parasitic species per infested plant in the Mandara Mountains. We used the Trees, Shrubs and Lianas of the Drylands of West Africa and Arbonnier (2000) guide book to identify species in the field.

The pest inventory was also carried out in the Mandara Mountains area. It consisted in listing all the parasitic plants (Loranthaceae) encountered. All parasitic species were systematically harvested with their hosts, and species located at the crowns of large trees were observed using binoculars. The transect survey method was used for the floristic survey. The study took place in nine (09) Arrondissements in four Departments of the Mandara Mountains. The inventory is carried out on 15 mountains chosen at the rate of one mountain every 10 km in all the massif of the Mandara Mountains; on each mountain, we have chosen two sides (east and west) and each side is subdivided into 16 altitudinal gradients. The experimental plan installed is therefore a split-plot (15x2) x16 made up of 15 Mountains (Altitude ≥ 1000m) representing the main treatment already developed by Thirakul, 1990. The two Flanks (East and West) of each mountain constitute the secondary treatment and on each side, 50mx20m transects (repetitions) were installed by altitude level (tertiary treatment) starting with the plain, up to the top of the Mont with a space of 50m between two transects. After data collection, the Mounts were grouped by three according to the Altitude level of the plain of each mountain to find five Mountains (Mont 1 (<500m = Mont1 + Mont2 + Mont15); Mont 2 ([500m- 600m [= Mont4 + Mont5 + Mont3); Mont 3 ([600m-700m [= Mont6 + Mont7 + Mont13); Mont 4 ([700m-800m [= Mont8 + Mont9 + Mont14); Mont 5 (> 800m = Mont10 + Mont11 + Mont12)). On each mountain, three 50m x 20m transects are installed on sixteen (16) altitudinal gradients. The latter were also grouped by four to find four gradients (plain (<500m); Altitude 1 ([500m-700m [); Altitude 2 ([700m-900m [); Altitude 3 (> 900m)). In each transect of each altitude level, all the woody species parasitized or not, the parasites and the tufts of Loranthaceae were counted. For each tree encountered, several parameters are noted; including the presence or absence of parasites and the name of the species or species of Loranthaceae present on the host plant. A sample (leaves, flowers, seeds) of each plant-parasite and its host is taken for identification purposes or for confirmation of identification made in the field.

Data analysis and processing

The collection of inventory data in the field made it possible to determine the species richness of Loranthaceae species. It is the number of Loranthaceae species found in the study area (Houénon *et al*., 2012). The data were classified by Mountain, by Flank and by Altitude. The Excel 2016 spreadsheet was used to calculate the means and plot the histograms; the density was calculated according to the formula: D = N / S with N = number of individuals of the species of the study environment and S = area occupied by the species, the Shannon index is calculated according to the formula H '= −∑ Pi ln Pi with H'= Shannon biodiversity index; i = a middle species; p (i) = Proportion of a species i compared to the total number of species (S) in the study environment (or specific diversity of the environment) which is calculated as follows: p (i) = ni / N where ni is the number of individuals of the species and N is the total number of individuals of all species (Shannon and Weaver, 1949). From this index, we can derive the equitability of Pielou (E) which is given by the formula ISH / log2N. Statgraphic 5.0 software is used to do analysis of variance (ANOVA) and Xlstat 2007 software is used to do principal component variable analysis and Duncan's test is used to compare the different Means. The Loranthaceae species determination keys used by Boussim (2002) and by Houénon (2012) are used to identify Loranthaceae.

RESULTS

Floristic composition and sensitivity of host plants

In total, 120 host species distributed in 34 families and 75 genera are recorded on the Mondara Mountains (Table 1). Combretaceae and Mimosaceae are the most represented with 13 species each, ie 38.24% for each family. They are followed by Caesalpiniaceae with 10 species or 29.41% and Moraceae with 9 species or 26.47%. Acacia is the most diverse genus with 10 species, or 8.33% of the host species. It is followed by *Combretum* and *Ficus* with 9 species each, ie 7.5% of the host plants for each genus. 18 genera or 24% are reported monospecific.

Three classes of host species are defined depending on the level of susceptibility to parasitism. In all of the 120 host species listed 68 species or 56.66% of the host species are parasitized by 1 or 2 parasitic species and represent the first class (I) which is the class of host species not very sensitive to the parasitism of Loranthaceae. Among these species, mention may be made of: *Haematostaphis barteri, Lannea acida, Lannea fructicosa, Sclerocarya birrea, Anona senegalesis, Hexalobus monopetalus, Vernonia thomsoniana, Stereospermum kunthianum, Adansonia digitata, Boswellia dalzielii, Commiphoriumidiculia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufiginia olufa ufia Piliostigma thonningii, Piliostigma reticulatum, Capparis fascicularis, Boscia angustifolia*. The second class (II) of susceptible host species is made up of 8 species, ie 6.66% of the host species which represent species susceptible to the parasitism of Loranthaceae. Among these species are:

Balanites aegyptiaca, Tamarindus indica, Boscia senegalensis, Anogeissus leiocarpus, Dalbergia sisso'o, Acacia seyal, Ziziphus abyssinica, Citrus limon. The third class (III) of host plants consists of species highly susceptible to parasitism by Loranthaceae. It is represented by 4 species, ie 3.33% of the host species. These include *Ziziphus mauritiana, Khaya senegalensis, Azadirachta indica* and *Diospyros mespiliformis*, among others.

Regarding the Loranthaceae species, *T. globiferus* is much more represented with 41.67%. It is followed by *A. dodoneifolius* with 41.67% and *T. ophiodes* with 12.50%. The least parasitic parasite is *G. braunii* with 7.50%.

Table 1: List of host species and their susceptibility to Loranthaceae parasitism

HOST PLANTS	LORANTHACEAE								
	A.d.	T.g.	T.o.	T.be.	T.ba.	P.c.	G.b.	Nep	SPS
Anacardiaceae									
Haematostaphis barteri Hook f.	+	+						2	vshp
Lannea acida A. Rich.s.l.		+						1	vshp
Lannea fructicosa (Hochst. ex A. Rich.) Engl.		+						1	vshp
Lannea schimperi (Hochst. ex A. Rich.) Engl.									
Lannea velunita A. Rich.									
Mangifera indica L.									
Sclerocarya birrea (A. Rich.) Hochst.		+						1	vshp
Annonaceae									
Anona senegalenis Pers.			+			+		2	vshp
Anona squamosa L.									
Hexalobus monopetalus (A. Rich.) Engl. & Diels	+	+						2	vshp
Apiaceae									
Steganotaenia araliacea Hochst.									
Apocynaceae									
Holarrhena floribunda (G. Don) Dur. & Schinz									
Asclepiadaceae									
Calotropis procera (Ait.) Ait. f.									
Asteraceae									
Vernonia thomsoniana Oliv. & Hiern		+						1	vshp
Balanitaceae									
Balanites aegyptiaca (L.) Del.	+	+			+			3	shp
Bignoniaceae									
Stereospermum kunthianum Cham.		+						1	vshp
Bombacaceae									
Adansonia digitata L.		+						1	vshp
Ceiba pentandra (L.) Gaertn.									
Burseraceae									
Boswellia dalzielii Hutch.		+		+				2	vshp
Boswellia papyrifera (Del.) A. Rich.									
Commiphora africana (A. Rich.) Engl.							+	1	vshp
Commiphora kerstingii Engl.									
Ceasalpiniaceae									
Bauhinia rufencens Lam.	+	+						2	vshp

Afzelia africana Smith ex Pers.									
Daniellia oliveri (Rolfe) Hutch. & Dalz.				+				1	vshp
Isoberlinia doka Craib & Stapf									
Piliostigma reticulatum (DC.) Hochst.	+	+						2	vshp
Piliostigma thonningii (Schum.) Milne-Redh.		+						1	vshp
Pterocarpus erinaceus Poir.									
Senna siamea Lam.									
Senna singueana (Del.) Lock									
Tamarindus indica L.	+	+	+	+				4	shp
Capparaceae									
Capparis fascicularis DC.		+			+			2	vshp
Boscia angustifolia A. Rich.		+						1	vshp
Boscia senegalensis (Pers.) Lam. ex Poir.	+	+	+					3	shp
Cadaba farinosa Forssk.						+		1	vshp
Capparis sepiaria L.						+		1	vshp
Maerua angolensis DC.									
Celastraceae									
Maytenus senegalensis (Lam.) Exell.		+						1	vshp
Combretaceae									
Anogeissus leiocarpus (DC.) Guill. & Perr.	+	+					+	3	shp
Combretum aculeatum Vent.									
Combretum adenogonium Steud. ex. A. Rich.							+	1	vshp
Combretum collinum Fresen.									
Combretum glutinosum Perr. ex DC.	+						+	2	vshp
Combretum lecardii Engl. & Diels					+	+		2	vshp
Combretum micranthum G. Don			+					1	vshp
Combretum molle R. Br. ex G. Don									
Combretum nigricans Lepr. ex Guill. et Perr.			+		+			2	vshp
Combretum nioroense Aubrév. ex Keay									
Guiera senegalensis J.F. Gmel.	+	+						2	vshp
Terminalia glauscesens Hochst.		+	+					2	vshp
Terminalia macroptera Guill. & Perr.		+						1	vshp
Terminalia mantaly H. Perr.									
Ebenaceae									
Diospyros mespiliformis Hochst. ex A. Rich.	+	+	+	+	+			5	hshp
Euphorbiaceae									
Croton macrostachyus Hochst. ex Del.		+						1	vshp
Croton psedopulchellus Pax		+						1	vshp
Euphorbia kamerunica Pax	+	+						2	vshp
Flueggea virosa (Roxb. ex Willd.) Voigt									
Jatropha gossypiifolia L.		+	+					2	vshp
Phyllanthus muellerianus (O. Ktze) Exell	+							1	vshp
Uapaca togoensis Pax							+	1	vshp
Fabaceae									

Andira inermis (Wright) DC.									
Dalbergia boehmii Taub.	+	+						2	vshp
Dalbergia melanoxylon Guill. & Perr.	+							1	vshp
Dalbergia sissoo Roxb.	+	+			+			3	shp
Dicrostachys cinera (L.) Wight & Arn.						+	+	2	vshp
Entada africana Guill. & Perr.							+	1	vshp
Pterocarpus erinaseus Poir.	+							1	vshp
Pterocarpus lucens Guill. & Perr.	+							1	vshp
Flacourtiaceae									
Flacourtia indica Willd.		+						1	vshp
Loganiaceae									
Strychnos spinosa Lam.		+						1	vshp
Meliaceae									
Azadirachta indica A. Juss.	+	+	+		+	+		5	hshp
Khaya senegalensis (Desr.) A. Juss.	+	+	+	+		+		5	hshp
Mimosaceae									
Acacia albida Del.	+	+						2	vshp
Acacia amythethophylla Steud. ex A. Rich.		+						1	vshp
Acacia ataxacantha DC.					+		+	2	vshp
Acacia ehrenbergiana Hayne	+							1	vshp
Acacia erythrocalyx Brenan									
Acacia gerardii Benth.									
Acacia hocki De Wild.	+				+			2	vshp
Acacia nilotica (L.) Willd. ex Del	+							1	vshp
Acacia seyal Del.	+		+	+				3	shp
Acacia tortilis sub sp. raddiana (Savi) Brenan	+	+						2	vshp
Albizia chevalieri Harms									
Albizia zygia (DC.) J.F. Macbr.		+		+				2	vshp
Prosopis juliflora (Sw.) DC.									
Moraceae									
Ficus sycomorus (Miq.) C.C. Berg		+	+					2	vshp
Ficus abutilifolia (Miq.) Miq.									
Ficus asperifolia Miq.	+							1	vshp
Ficus cordata ssp. lecardii (Warb.) C.C. Berg	+	+						2	vshp
Ficus dicranostyla Mildbr.									
Ficus glumosa Del.					+	+		2	vshp
Ficus platyphylla Del.	+							1	vshp
Ficus thonningii Blume									
Ficus umbellata Vahl		+						1	vshp
Myrtaceae									
Psidium guajava L.	+	+						2	vshp
Ochnaceae									
Ochna schweinfurthiana F. Hoffm.									
Olacaceae									

Jasminum obtusifolium Bak.									
Ximenia americana L.	+	+						2	vshp
Polygalaceae									
Securidaca longipedunculata Fres.									
Rhamnaceae									
Ziziphus abyssinica Hochst. ex A. Rich.	+	+	+	+				4	shp
Ziziphus mauritiana Lam.	+	+	+	+	+	+		6	hshp
Rubiaceae									
Crossopteryx febrifuga (Afzel. ex G. Don) Benth.									
Feretia apodanthera Del.	+	+						2	vshp
Gardenia aqualla Stapf. & Hutch.	+							1	vshp
Pavetta corymbosa (DC.) F. N. Williams									
Sarcocephalus latifolius (Smith) Bruce		+						1	vshp
Tricalysia okelensis Hiern									
Rutaceae									
Citrus limon (L.) Burm. F.		+	+	+				3	shp
Citrus sinensis (L.) Osbeck	+	+						2	vshp
Sapotaceae									
Malacantha alnifolia (Bak.) Pierre									
Vitellaria paradoxa Gaertn. f.		+						1	vshp
Sterculiaceae									
Sterculia setigera Del.					+		+	2	vshp
Tiliaceae									
Grewia barteri Burret						+		1	vshp
Grewia bicolor Juss.									
Grewia flavescens Juss.	+							1	vshp
Guibourtia copallifera Benn.									
Ulmaceae									
Celtis integrifolia Lam.									
Verbenaceae									
Lippia chevalieri Moldenke									
Vitex doniana Sweet.	+	+						2	vshp
Vitex madiensis Oliv.		+			+			2	vshp
SeP (%)	31.67	41.67	12.5	8.33	10.83	8.33	7.5		

***A.d.* :** *Agelanthus dodoneifolius*, ***T.g.* :** *Tapinanthus globiferus*, ***T.o.* :** *Tapinanthus ophiodes*, ***T.ba.* :** *Tapinanthus bangwensis*, ***T.be.* :** *Tapinanthus belvisii*, ***P.c.* :** *Phragmanthera capitata*, ***G.b.* :** *Globimetula braunii ;* SPS: Specificity of parasitic species; Npshp: number of parasitic species per host plant; pshp: parasitic sensitivity of the host plant (1 to 2 parasites = not very sensitive host plant (vshp), 3 to 4 parasites = sensitive host plant (shp), 5 to 6 parasites = highly sensitive host plant (hshp); +: presence.

Taxonomic composition of Loranthaceae

In total, seven (7) species of Loranthaceae have been recorded on the Mandara Mountains (Table 2). *Tapinanthus globiferus* (A. Rich.) Dancing is the most represented with an average density of 125.66 ± 71.86 tufts / ha. It is followed by *Agelanthus dodoneifolius* (DC) Polh. & Wiens with an average density of 116.39 ± 53.74 tufts / ha. Then it is *Tapinanthus ophiodes* (Sprague) Dancing which comes with an average density of 92.65 ± 51.06 tufts / ha; *Tapinanthus belvisii* (DC) Danser has an average density of 70.24 ± 53.63 tufts / ha; *Phragmanthera capitata* (Spreng) Ballé has an average density of 57.74 ± 27.2 tufts / ha. *Tapinanthus bangwensis* (Engl. And Kr.) Danser has an average density of 51.4 ± 33.24 tufts

/ ha. *Globimetula braunii* (Engl.) Tiegh. is the least represented parasitic species on the Hills with an average density of 45.57 ± 19.01 tufts / ha. The specific richness of Loranthaceae species varies between 1 and 3 parasitic species per host plant. Variance analysis shows that there is a highly significant difference between Loranthaceae species (P = 0.000 <0.001).

Table 2: Taxonomic diversity of Loranthaceae

KIND	SPECIES	DENSITY
Agelanthus	*Agelanthus dodoneifolius*	59.69±34.91[e]
	Tapinanthus globiferus	73.38±37.48[f]
	Tapinanthus ophiodes	44.35±42.8[d]
Tapinanthus	*Tapinanthus bangwensis*	25.22±36.87[b]
	Tapinanthus belvisii	35.01±17.77[c]
Phragmanthera	*Phragmanthera capitata*	26.96±21.89[b]
Globimetula	*Globimetula braunii*	17.26±29.36[a]
Average/Ecartype		40.27±31.58

Values assigned the same letters in superscript do not show significant statistical differences

Loranthaceae species are unevenly dispersed over the Hills. *T. globiferus*, *A. dodoneifolius* and *T. ophiodes* are respectively the most represented in the study area (Figure 2). These dispersed species are the most dense, that is to say the species for which we are more likely to encounter them on all the mountains in the study area. The other species which are less represented form clouds around the two (axes f1 and f2: 99.91%). These species represented in the form of a cloud are less dense and are less common in the study area.

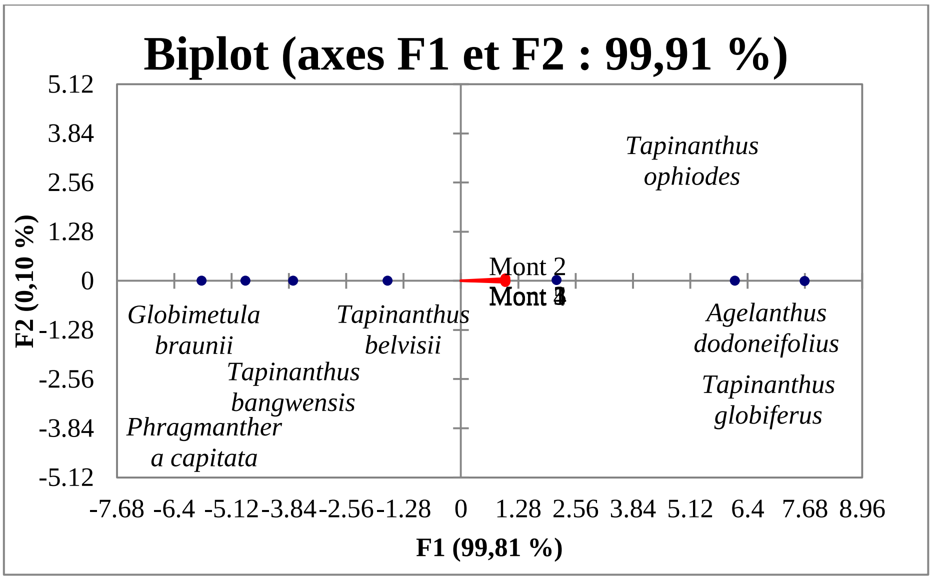

Figure 2: Dispersion of species on the Mountains

Density of Loranthaceae on the Mountains

Table 3 shows the density on the two sides of the Mandara Mountains. Between the two sides, the density of parasitic species is higher on the East side (82.07 ± 61.68 tufts / ha) than on the West side (77.83 ± 49.62 tufts / ha). Between the Loranthaceae, on the East Flank, *T. globiferus* is more abundant (150.11 ± 125.69 tufts / ha). It is followed by *A. dodoneifolius* so the average density is 120.24 ± 136.19 tufts / ha and *T. ophiodes* with an average density of 92.58 ± 104.9 tufts / ha; *T. belvisii* (71.78 ± 71.8 tufts / ha); *P. capitata* (56.19 ± 50.87 tufts / ha); *T. bangwensis* (48.44 ± 27.92 tufts / ha). On this slope, the least represented species is *G. braunii* with an average density of 35.14 ± 126.43 tufts / ha.

On the West side, *T. globiferus* has a higher density (143.42 ± 82.3 tufts / ha) but below the density on the East side. *A. dodoneifolius* comes next with an average density of 114.5 ± 87.3 tufts / ha; followed by *T. ophiodes* (82.03 ± 29.45 tufts / ha); *T. belvisii* (68.28 ± 70.94 tufts / ha); *P. capitata* (51.64 ± 40.54 tufts / ha); *T. bangwensis* (51.03 ± 56.87 tufts / ha) and *G. braunii* is less represented on this slope with an average density of 33.92 ± 99.23 tufts / ha. The analysis of variance (ANOVA) indicates that there is no difference between the two sides (P = 0.395> 0.05) while between the parasitic species the difference is highly significant (0.000 <0.001).

Table 3: Density of Loranthaceae on the Mountains

SPECIES	M1	M2	M3	M4	M5	AVERAGE/ECART
T.d.	347.71	343.96	347.71	347.71	358.75	349.17±5.6
T.g.	378.33	365.00	376.46	385.42	379.69	376.98±7.49
T.o.	278.33	286.88	276.04	273.13	275.42	277.96±5.32
T.ba.	152.92	153.33	155.00	150.21	159.58	154.21±3.46
T.be.	201.04	211.98	215.31	213.44	211.77	210.71±5.59
P.c.	173.75	172.50	171.35	177.81	170.63	173.21±2.83
G.b.	135.21	136.98	134.38	137.60	139.38	136.71±1.98
average/Ecart	238.18 ±97.17	238.66 ±93.17	239.46 ±95.94	240.76 ±97.43	242.17 ±97.5	239.85±96.15

M1= Mont 1(< 500m = M1+M2+M15) ; M2 = Mont 2 ([500m-600m [= M4+M5+M3) ; M3 = Mont 3 ([600m-700m [=M6+M7+M13) ; M4= Mont 4 ([700m-800m [= M8+M9+M14) ; M5 = Mont 5 (> 800m = M10+M11+M12) ; **Ecart** = Ecartype
A.d. : *Agelanthus dodoneifolius*, **T.g. :** *Tapinanthus globiferus*, **T.o. :** *Tapinanthus ophiodes*, **T.ba. :** *Tapinanthus bangwensis*, **T.be. :** *Tapinanthus belvisii*, **P.c. :** *Phragmanthera capitata*, **G.b. :** *Globimetula braunii*

On the same lines on the one hand and the same columns on the other hand, the values assigned the same superscript letters do not show statistically significant differences.

The analysis of the principal component variables (PCA) shows that the five (05)

Mounts are positively correlated with each other. Figure 3 shows the correlation between the different Mountains. The correlation is very strong (Pearson, r = 0.987) between Mont 3 and Mont 4, between Mont 3 and Mont 5 (0.986) and between Mont 1 and Mont 2 (Pearson, r = 0.942).

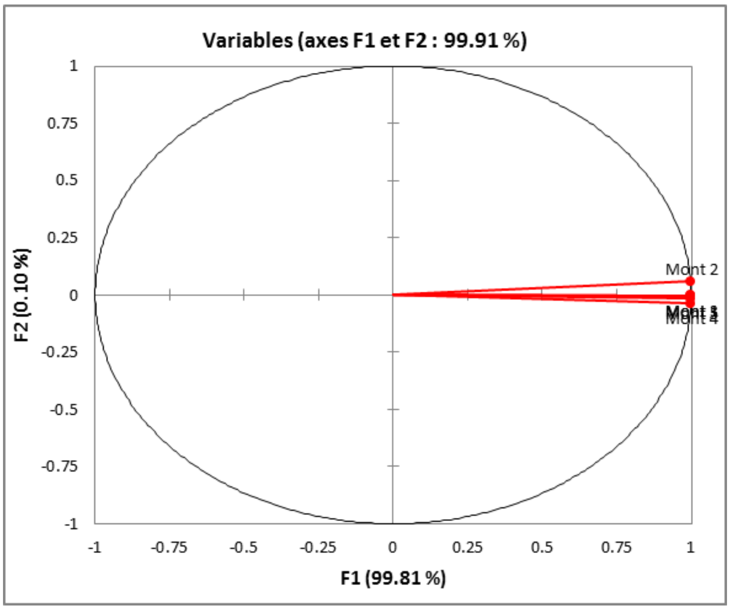

Figure 3: Correlation between the Mountains

Loranthaceae density on the slopes

Table 4 shows the density on the two sides of the Mandara Mountains. Between the two sides, the density of parasitic species is higher on the East side (82.07 ± 61.68 tufts / ha) than on the West side (77.83 ± 49.62 tufts / ha). Between the Loranthaceae, on the East Flank, *T. globiferus* is more abundant (150.11 ± 125.69 tufts / ha). It is followed by *A. dodoneifolius* so the average density is 120.24 ± 136.19 tufts / ha and *T. ophiodes* with an average density of 92.58 ± 104.9 tufts / ha; *T. belvisii* (71.78 ± 71.8 tufts / ha); *P. capitata* (56.19 ± 50.87 tufts / ha); *T. bangwensis* (48.44 ± 27.92 tufts / ha). On this slope, the least represented species is

G. braunii with an average density of 35.14 ± 126.43 tufts / ha.

On the West side, *T. globiferus* has a higher density (143.42 ± 82.3 tufts / ha) but below the density on the East side. *A. dodoneifolius* comes next with an average density of 114.5 ± 87.3 tufts / ha; followed by *T. ophiodes* (82.03 ± 29.45 tufts / ha); *T. belvisii* (68.28 ± 70.94 tufts / ha); *P. capitata* (51.64 ± 40.54 tufts / ha); *T. bangwensis* (51.03 ± 56.87 tufts / ha) and *G. braunii* is less represented on this slope with an average density of 33.92 ± 99.23 tufts / ha. The analysis of variance (ANOVA) indicates that there is no difference between the two sides (P = 0.395> 0.05) while between the parasitic species the difference is highly significant (0.000 <0.001).

Table 4: density of Loranthaceae species on the slopes

		EAST SIDE	WEST SIDE
Kinds	Species	Density	Density
Agelanthus	*Agelanthus dodoneifolius*	120.24±136.19[e]	114.5±87.3[e]
Tapinanthus	*Tapinanthus globiferus*	150.11±125.69[f]	143.42±82.3[f]
	Tapinanthus ophiodes	92.58±104.9[d]	82.03±29.45[d]
	Tapinanthus bangwensis	48.44±27.92[b]	51.03±56.87[b]
	Tapinanthus belvisii	71.78±71.8[c]	68.28±70.94[c]
Phragmanthera	*Phragmanthera capitata*	56.19±50.87[b]	51.64±40.54[b]
Globimetula	*Globimetula braunii*	35.14±126.43[a]	33.92±99.23[a]
Average/Ecart		82.07±61.68[a]	77.83±49.62[a]

On the same column, the values assigned the same letters in superscript do not show significant statistical differences

Loranthaceae density according to the altitudinal gradient

The density of Loranthaceae species varies between the plain and the Mount but also between the different altitude levels of the Mount ranging from the bottom (A1) to the top (A3). Between the different height differences, the summit of the Monts (A3) has a higher density (25.02 ± 12.65 tufts / ha) compared to the other altitude levels. It precedes the middle of the Mountains (A2) which has an average density of 21.83 ± 10.69 tufts / ha; the bottom (A1) therefore the average density is 18.19 ± 9.83 tufts / ha and the plain (A0) is the least dense zone in individuals (14.9 ± 8.87 tufts / ha). The average density of Loranthaceae species increases as one moves from the plain (A0) to the top of the Hills (A3). At the species level, the density of six species increases from bottom to top. These are *A. dodoneifolius*; *T. globiferus, T. ophiodes, T. belvisii*; *P. capitata* and *G. braunii*. On the other hand, the average density of *T. bangwensis* decreases as one goes from the plain (A0) to the top of the Hills. This species rather prefers the plain than the summit of the Mountains compared to the other species which, they rather prefer the summit. The analysis of variance (ANOVA) states that there is a highly significant difference between the Altitude levels (P = 0.000 <0.001).

Table 5: density of Loranthaceae species on altitudinal gradients

SPECIES	A0	A1	A2	A3	AVERAGE/ECART
T.d.	21.15	26.65	33.19	38.38	29.84±7.52
T.g.	28.75	33.22	38.73	44.75	36.36±6.92
T.o.	17.07	21.57	23.14	26.22	22±3.81
T.ba.	15.72	14.44	10.81	8.76	12.43±3.21
T.be.	11.36	16.13	20.00	22.54	17.51±4.87
P.c.	9.15	11.64	14.96	16.78	13.13±3.4
G.b.	1.11	3.71	11.99	17.72	8.63±7.63
Average/Ecart	14.9±8.87	18.19±9.83	21.83±10.69	25.02±12.65	19.99±10.07

A0= plain (< 500m) ; A1= Altitude 1 ([500m-700m [) ; A2 = Altitude 2 ([700m-900m [) ; A3= Altitude 3 (> 900m) ; **Ecart** = Ecartype

A.d. : *Agelanthus dodoneifolius*, **T.g. :** *Tapinanthus globiferus*, **T.o. :** *Tapinanthus ophiodes*, **T.ba. :** *Tapinanthus bangwensis*, **T.be. :** *Tapinanthus belvisii*, **P.c. :** *Phragmanthera capitata*, **G.b. :** *Globimetula braunii*

On the same lines on the one hand and the same columns on the other hand, the values assigned the same superscript letters do not show statistically significant differences.

Density of Loranthaceae interaction between Mountains and Slopes

The density of the two sides of each mountain varies from one mountain to another (table 6). Mount 5 is denser with an average density of 142.03 ± 3.87 tufts / ha for both sides. It is followed by Mont 4 which has an average density of 131.24 ± 4.36 tufts / ha for the two slopes; Mount 3 (120.67 ± 5.53 tufts / ha) for the two slopes; Mont 2 (114.16 ± 5.62 tufts / ha) combining the two sides and Mont 1 has the lowest density for the two sides (95.92 ± 5.09 tufts / ha). The analysis of variance shows that the difference is very significant between the different Mountains (P = 0.004). Between the two sides of each mountain, ANOVA does not report any significant difference (P> 0.05).

Table 6: density of Loranthaceae species of the interaction between the Mountains and the Slopes

	M1		M2		M3		M4		M5	
	East side	West side	East side	West side	East side	West side	East side	West side	East side	West side
T.d	154.38	146.46	175.42	159.17	183.75	179.58	191.04	183.75	216.88	200.21
T.g.	192.08	185.21	222.29	209.79	216.88	206.46	239.79	227.71	254.79	246.46
T.o.	116.67	109.58	107.71	100.00	140.42	122.08	156.46	135.42	183.54	158.54
T.ba.	38.96	36.46	78.54	75.00	79.58	75.63	100.63	97.50	76.04	98.13
T.be.	107.71	96.46	96.04	87.29	99.79	97.29	116.04	114.58	118.75	116.46
P.c.	61.25	52.08	89.38	78.96	94.79	84.79	90.83	83.75	85.21	87.71
G.b.	25.63	20.00	57.50	61.04	56.88	51.46	45.42	54.38	78.13	67.50
Average/ Ecart	99.52±56.73[a]	92.32±55.86[a]	118.13±58.88[b]	110.18±54.12[b]	124.58±58.28[c]	116.76±56.83[c]	134.32±65.95[d]	128.15±59.99[d]	144.76±73.25[e]	139.29±65.32[e]
	95.92±5.09[a]		114.16±5.62[ab]		120.67±5.53[abc]		131.24±4.36[bc]		142.03±3.87[c]	

Mont 1 (< 500m = M1+M2+M15) ; Mont 2 ([500m-600m [=M4+M5+M3) ; Mont 3 ([600m-700m [=M6+M7+M13) ; Mont 4([700m-800m [=M8+M9+M14) ; Mont 5(> 800m = M10+M11+M12) ; Ecart= Ecartype

A.d. : *Agelanthus dodoneifolius*, **T.g. :** *Tapinanthus globiferus*, **T.o. :** *Tapinanthus ophiodes*, **T.ba. :** *Tapinanthus bangwensis*, **T.be. :** *Tapinanthus belvisii*, **P.c. :** *Phragmanthera capitata*, **G.b. :** *Globimetula braunii*

On the same lines, values assigned the same superscript letters do not show statistically significant differences.

Density of Loranthaceae of interaction between slopes and altitudes

For the four Altitude levels combined, the mean density of Loranthaceae species varies from species to species (Table 7). *T. globiferus* shows a higher density of 899.38 ± 19.01 stumps / ha. It is followed by *A. dodoneifolius* (842.77 ± 19.23 tufts / ha). *T. ophiodes* occupies the third position with a density of 784.44 ± 19.64 tufts / ha. A density of 575 ± 15.12 tufts / ha is then recorded by *T. bangwensis*. The latter is followed by *T. belvisii* which obtains a density of 556.12 ± 5.26 tufts / ha. A relatively low density of 440.56 ± 7.5 tufts / ha is observed by *P. capitata* and the lowest density (378.89 ± 6.99 tufts / ha) is obtained by *G. braunii*. For the difference between species, the analysis of variance (ANOVA) specifies a highly significant difference (P = 0.000 <0.001).

Table 7: density of Loranthaceae species on the slopes with the four levels of Altitude

	EAST				WEST				
SPECIES	A0	A1	A2	A3	A0	A1	A2	A3	AVERAGE/ECART
A.d.	118.00	121.00	123.00	129.28	86.50	82.72	87.44	94.83	842.77±19.23[e]
T.g.	124.67	126.78	127.72	138.44	94.83	88.44	95.33	103.17	899.38±19.01[f]
T.o.	105.78	115.44	115.22	124.83	75.39	75.50	83.00	89.28	784.44±19.64[d]
T.ba.	86.89	82.11	77.44	92.61	50.39	57.72	60.78	67.06	575±15.12[c]

T.be.	64.11	65.44	71.89	77.06	67.06	63.28	71.89	75.39	556.12±5.26[c]
P.c.	55.22	54.33	55.22	65.39	42.06	49.39	54.67	64.28	440.56±7.5[b]
G.b.	41.89	48.78	49.67	55.94	33.72	45.50	50.22	53.17	378.89±6.99[a]

A0= plain (< 500m) ; A1= Altitude 1 ([500m-700m [) ; A2 = Altitude 2 ([700m-900m [) ; A3= Altitude 3 (> 900m) ; Ecart= Ecartype

A.d. : *Agelanthus dodoneifolius*, **T.g. :** *Tapinanthus globiferus*, **T.o. :** *Tapinanthus ophiodes*, **T.ba. :** *Tapinanthus bangwensis*, **T.be. :** *Tapinanthus belvisii*, **P.c. :** *Phragmanthera capitata*, **G.b. :** *Globimetula braunii*.

Values assigned the same letters in superscript do not show statistically significant differences.

Relative frequency of distribution of Loranthaceae species

The number of species of Loranthaceae parasitic on ligneous plants does not vary from one slope to another (P = 0.597). All 7 species of parasitic plants are present on the two slopes (Table 8). The parasitic flora common to both sides is made up of all seven species (*A. dodoneifolius, T. globiferus, T. ophiodes, P. capitata, T. bangwensis, T. belvisii and G. braunii). In both sides, A. dodoneifolius* and *T. globiferus* are the most frequent species with a frequency of 100% in both sides. *T. ophiodes* is more frequent on the East side (93.33%) than on the West side (86.66%). As for *T. bangwensis*, it has the same frequency of occurrence on both flanks (80%). *T. belvisii* is much more present on the West side (93.33%) than on the East side (86.66%). *P. capitata* and *G. braunii* are more frequent on the East side with respectively 66.66% and 40% than on the West side (40% and 26.66% respectively). In terms of species presence, there is no significant difference between the two sides. Depending on the frequency of presence, the analysis of variance (ANOVA) shows no very significant difference between the two sides (P = 0.597 <0.05). In terms of the frequency of species on the slopes, the analysis of variance (ANOVA) states a highly significant difference (P = 0.000 <0.001).

Table 8: Frequencies of presence of Loranthaceae species on the east and west slopes

SPECIES	RELATIVE FREQUENCY OF PRESENCE ON THE EAST SIDE (%)	RELATIVE FREQUENCY OF PRESENCE ON THE WEST SIDE (%)
Agelanthus dodoneifolius	100[e]	100a
Tapinanthus globiferus	100[e]	100a
Tapinanthus ophiodes	93.33[d]	86.66c
Tapinanthus bangwensis	80[c]	80c
Tapinanthus belvisii	86.66[c]	93.33b
Phragmanthera capitata	66.66[b]	40d
Globimetula braunii	40[a]	26.66e

On the same columns, the values assigned the same letters in superscript do not present statistically significant differences.

Diversity indices of Loranthaceae of the Mandara Mountains

The Shannon diversity index and the fairness of Pielou are higher on Mount 5 (0.328 and 0.120 respectively) which is made up of the Mounts whose plain has an Altitude greater than 800m (table 9) while these indices are more weak on Mount 1 where the plain is less than 500m, 0.317 for the Shannon index and 0.113 for the equitability of Piélou. This means that the diversity of Loranthaceae is less dense in Mount 1 where the plain has a low Altitude (ISH = 0.317; EQ = 0.113) compared to the Mount where the Altitude of the plain is greater than 800m (ISH = 0.328; EQ = 0.120).

Table 9: Loranthaceae diversity indices

PARAMETERS	M1	M2	M3	M4	M5
D	536.32	544.13	559.34	573.99	584.44
ISH	0.317	0.318	0.322	0.325	0.328
EQ	0.113	0.113	0.115	0.117	0.120

Mont 1 (< 500m = M1+M2+M15) ; Mont 2 ([500m-600m [=M4+M5+M3) ; Mont 3 ([600m-700m [=M6+M7+M13) ; Mont 4([700m-800m [=M8+M9+M14) ; Mont 5(> 800m = M10+M11+M12) ; D = Density ; ISH = Shannon's Index, EQ = Piélou's Equitability.

DISCUSSION

The taxonomic diversity of the host plants in our study is made up of 120 species belonging to 75 genera and grouped into 34 botanical families. These results are different from those of Houénon et al. (2012) who obtained a diversity of 105 species distributed in 85 genera and 33 families. Our results reveal that Combretaceae and Mimosaceae are the most represented with 13 species each, ie 38.24% for each family. Acacia is the most diverse genus with 10 species, or 8.33% of the host species. It is followed by *Combretum* and *Ficus* with 9 species each, ie 7.5% of the host plants for each genus. 18 genera or 24% are reported monospecific. These results are different from those of Souare *et al*., 2020 who obtained 34 species in the Diamaré plain located in the same Sudano-Sahelian zone and from those of Houénon *et al*., 2012 who showed in their study that *Ficus* is the most diverse genus with 5 species, or 5.9% of host plants. It is followed by *Albizia* with 4 species, ie 4.7% and Leguminosaceae represent the highest family with 25 species, ie 23.8%. The differences observed would be due to the Hills which are rich in biodiversity. In all of the 120 listed host species, 68 species or 56.66% of the host species are parasitized by 1 or 2 parasitic species and represent the first class (I) which is the class of host species not very sensitive to parasitism of Loranthaceae. These species include: *Haematostaphis barteri, Lannea acida, Lannea fructicosa, Sclerocarya birrea, Anona senegalesis, Hexalobus monopetalus, Vernonia thomsoniana, Stereospermum kunthianum, Adansonia digitata, Boswellia dalzieli, Commiphora Daniana, Commiphora africana, Piliostigma reticulatum, Capparis fascicularis, Boscia angustifolia* etc. The second class (II) of sensitive host species consists of 8 species or 6.66% of the host species that represent the species susceptible to Loranthaceae parasitism. Among these species are: *Balanites aegyptiaca, Tamarindus indica, Boscia senegalensis, Anogeissus leiocarpus, Dalbergia sisso'o, Acacia seyal, Ziziphus abyssinica, Citrus limon*. The third class (III) of host plants consists of species highly sensitive to Loranthaceae parasitism. It is represented by 4 species or 3.33% of the host species. These include Ziziphus mauritiana, Khaya senegalensis, Azadirachta indica and Diospyros mespiliformis. These parasitic sensitivity classes are different from those of Houénon et al., 2012 who indicated that in a sample of 105 identified host species, 79 species or 75.2% are infested with 1 or 2 species and represent class I (insensitive). They cited species such as *Caloptropis procera, Jatropha multifida, Khaya senegalensis, Persea americana, Triplochiton scleroxylon* and *Vitex doniana*. Class II of sensitive hosts includes 20 species or 19.1% including *Adansonia digitata, Ceiba pentandra, Irvingia gabonensis, Morinda lucida, Newbouldia laevis, Parkia biglobosa*. Class III (highly sensitive) is rich in 4 species, or 3.8%, namely: *Acacia auriculiformis, Citus reticulata, Senna siamea* and *Tectona grandis* and the last class which is class IV contains only *Citrus sinensis* which is the only plant- host with a very high parasitic sensitivity.

The Mandara Mountains of Cameroon are home to the Loranthaceae flora. Of the 7 genera (*Agelanthus, Englerina, Globimetula, Helixanthera, Phragmanthera, Tapinanthus* and *Viscum*) and 25 species reported in Cameroon (Balle, 1986 cited by Jiofack *et al*., 2007; Mony *et al*., 2014), the Loranthaceae of this area group 4 genera (*Agelanthus, Tapinanthus, Phragmanthera* and *Globimetula*) or 57.14% and 7 species (*T. globiferus, A. dodoneifolius, T. ophiodes, T. belvisii, T. bangwensis, P. capitata* and *G. braunii*) or 26.92%. These results do not corroborate those of Souare et al. 2020, which identified 3 genera (*Agelanthus, Tapinanthus* and *Phragmanthera*) and 9 species. This taxonomic diversity of 4 genera and 7 is higher than that obtained by Ahamide *et al*., 2015, who identified 3 genera (*Globimetula, Phragmanthera* and *Tapinanthus*) and 6 species in southern Benin, those of Boussim (1991, 2002) which inventoried 3 genera and 6 species in Burkina Faso. Similarly, these results are superior to those of 2 genera and 3 species observed in Lokomo in eastern Cameroon (Azo'o *et al*., 2013) and to those of 2 species of the same genus reported by Mony *et al*.. (2014) on the Logbessou Plateau in Douala, Cameroon but less than 6 genera and 19 species recorded in Côte d'Ivoire (Aké Assi, 1984), 6 genera and 25 species examined in Cameroon (Balle, 1982) and those by Aka *et al*. (2016) who identified eleven (11) species of parasitic plants in Côte d'Ivoire. In contrast, these results are close to those of Houénon *et al*. (2012) who inventoried 4 genera and 10 species in the Guinean and Sudan-Guinean areas in Benin. The differences observed between these different results would be due to the altitudinal gradients of the study areas but also to climatic factors.

Our study reveals that the abundance of parasitic species is variable with a dominance of *T. globiferus* (73.38 ± 37.48 tufts / ha). Our results are in contradiction with those of Amon *et al*. (2010) who instead showed that T. bangwensis dominates in Côte-d'Ivoire and de Mony *et al*. (2014) showing *T. ogowensis* dominates on the Logbessou plateau in Douala in Cameroon. This difference would be due to the fact that our study is focused on the hills while the previous studies were conducted in orchards. In the Sudano-Guinean Savannas of L'Adamaoua Cameroon, Mapongmetsem *et al*. (1998) found five species of parasitic plants on woody plants. Likewise, Boussim (1991) observed five species and three genera of parasitic plants on Shea butter in the savannas of Burkina Faso. For Soro *et al*. (2010), *P. capitata* is abundant at 74.82% in the forest zone of the sub-prefectures of Gagnoa and Ouragahio, in Côte d'Ivoire. Our study shows that the frequency of Loranthaceae species varies according to height difference, with hilltops as the preferred altitude. These results corroborate those obtained by Jiofack *et al*. (2007) who found that Loranthaceae species evolve with altitude in the Bafou group in Cameroon. These authors also reported that Loranthaceae species are characterized by their variable expansion from one level to another depending on the temperature fluctuation in altitude.

CONCLUSION

The Mandara Mountains present a very rich specific diversity, likely to be parasitized by Loranthaceae. In total, we inventoried 120 host species belonging to 34 families and 75 genera. Combretaceae and Mimosaceae are the most represented, each with 13 species, ie 38.24% for each family. Acacia is the most diverse genus with 10 species, or 8.33% of the host species. 18 genera or 24% of the flora are reported to be monospecific. These Mountains abound over their area a taxonomic diversity of Loranthaceae of four (4) genera (*Tapinanthus*, *Phragmanthera*, *Agelanthus* and *Globimetula*) and 7 species (*T. bangwensis*, *T. belvisii*, *T. globiferus*, *A. dodoneifolius*, *T. ophiodes*, *P. capitata* and *Globimetula braunii*). From the point of view of the ecological distribution of Loranthaceae species, *T. globiferus* is the most represented (125.66 ± 71.86 tufts / ha). It is followed by *A. dodoneifolius* (116.39 ± 53.74 tufts / h). Then it is *T. ophiodes* which comes with an average density of 92.65 ± 51.06 tufts / ha; *T. belvisii* has an average density of 70.24 ± 53.63 tufts / ha. *P. capitata* has an average density of 57.74 ± 27.2 tufts / ha. *T. bangwensis* has an average density of 51.4 ± 33.24 tufts / ha. *G. braunii* is the least represented parasitic species with an average density of 45.57 ± 19.01 tufts / ha on the Mandara Mountains. The diversity and frequency vary according to the Altitude and the slope of the hills. *T. globiferus* is most common in the Mandara Mountains, followed by *T. dodoneifolius*. These hemiparasites parasitize plants throughout their range in the Mandara Mountains. Knowledge of the diversity and altitudinal distribution of parasitic plants will contribute to their sustainable management on the Mandara Mountains in particular and on the Mountains of the World in general.

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