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Diversity and Host Range of Loranthaceae in Tombel Sub Division of Cameroon

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ABSTRACT

Hemiparasitic vascular plants of the Loranthaceae constitute an important part of biodiversity. Widely distributed throughout the world in tropical and temperate zones, the latter play an important role in the health of local populations. This study was conducted to explore baseline data on the diversity and host range of Loranthaceae in Tombel Sub-Division, Cameroon. This was achieved through a survey in forty (40) villages to identify species of mistletoe and host plants. Eight (8) species of Loranthaceae were found to parasitize 61 species belonging to 51 genera and 36 families. Phragmanthera capitata and Tapinanthus bangwensis were more frequent and common in the studied sites. The most parasitized host family were Euphorbiaceae, Fabaceae, Rutaceae and Malvaceae with 6, 5, 6 and 4 species each respectively. The most sensitive host species to the parasitism of Loranthaceae was T. cacao (hosting 8 parasitic plants). Mistletoe species with high specificity include: P. nigritana (PSp= 1.63%), T. preusii (PSP=4.91%) and T. ogowensis (PSp=3.72%).

Keywords: Cameroon, Diversity, Host range, Loranthaceae, Tombel Sub-Division.

I. INTRODUCTION

The process of plant evolution has caused some plants to completely or partially lose their autotrophism to become parasites to other plants (Noutcheu *et al*., 2013). A parasitic plant is a plant that directly attaches to another plant through haustorium, which is a specialized structure that forms a morphological and physiological link between the parasite and host (Yoshida *et al.*, 2016). All parasites induce marked changes in the dynamics of host population through the action of increase mortality, lower competitive ability and reduced fecundity (Dibong *et al*., 2010). These parasites penetrates the vascular tissues of their host with their haustoria and feed at the detriment of the host plant. This trophic embezzlement generally leads to reduction of biomass of the host plant that results to yield reduction (Ondoua *et al.*, 2016).

The vascular plant kingdom is estimated to have 4000 plants considered to be parasitic (Malcom and Gareth, 2004), of which about 1400 species are classified as mistletoes. These aerial hemiparasites and several species of terrestrial root-parasites are distributed within five families: Eremolepidaceae, Misodenraceae, Viscaceae, Santalaceae and Loranthaceae. The largest and most diverse of the mistletoe families is the Loranthaceae (Downey, 1998).

The Loranthaceae, locally and commonly called "African mistletoe" are phanerogams, hemiparasites, chlorophyllian and epiphytes that attach to the branches of their hosts through a sucker called the haustorium, which establishes contact with the host at the level of the xylem conductive tissues (Malani *et al.,* 2017). This haustorium penetrates into the vascular system of the host tree and absorbs water, inorganic ions, sugar, amino acid and other essential nutrients from the host xylem and phloem. These parasites take high quantities of mineral macro elements such as Na, K, Ca and Mg from their hosts. The relative proportion of the different ions depends on the Loranthaceae species and it host (Glatzel, 1983). The vegetative shoots are given off and later flowers and fruits are produced. The mistletoes thus form a bushy outgrowth on the host.

In Africa, Loranthaceae are found on many indigenous trees and a number of tree crops of economic importance, including citrus plants like *Citrus sinensis* L., *Psidium guajava* L., *Vitellaria paradoxa* Gaertn F., *Anacardium occidentale* L., *Mangifera indica* L., *Annona squamosal* L., *Azadirachta indica* L., *Acacia nilotica* , *Irvingia gabonensis, Dacryodes edulis* (G.Don.) H.J.Lam., *Carica papaya* L., *Persea Americana* L., *Capsicum annuum* L., *Terminalia neotaliala, Theobroma cacao* L., *Carapa procera, Hervea brassiliensis* Muell Arg., among many others (Dlama *et al.,* 2016). Loranthaceae causes abnormal growth and decrease in productivity due to reduction in the overall photosynthetic area of the host plants. They hinder the tree from giving off branches at the positions of attachment and deprive it of food that should be available for its other activities. Plants that are heavily infested by Loranthaceae hardly possess enough nutrients even for basic maintenance of growth and as such express signs of senescence and death (Ibrahim *et al.,* 2009). The damage they cause is economically and morphogenically variable depending on the parasitized woody species and severity of attack. Loranthaceae parasitism is a widespread ecological problem worldwide. It goes by many common names as a result of its nature and is referred to as “Children match” by the local population and “Cancer, and Gui” in French (Konrad *et al., 2017*).

Loranthaceae are distributed in tropical and subtropical region of the Americas, Africa, Asia and Australia, with a few extending to the temperate zone in Europe and East Asia, with more than 950 species distributed among 77 genera (Bing *et al.,* 2018).

In Cameroon, this family is represented by 26 species in 7 genera: *Agelanthus, Englerina, Glometula, Helixanthera, Phragmanthera, Tapinanthus* and *Viscum* (Balle, 1982). Research on Loranthaceae deals mostly with crop protection, programs and strategies for mechanical, chemical, biological and even integrated control have been developed to eradicate or at least reduce the invasion of these parasites in natural formations and plantations (Mpika *et al.,* 2016). The aim of this study is to assess the diversity and host range of Loranthaceae in the monomodal humid forest zone of Cameroon.

II.MATERIALS AND METHODS

2.1Site Description

The study was carried out in Tombel Sub Division, Southwest Region of Cameroon **(Fig 1)**. It is located between latitude 04º16’ & 05º15’ and longitude 09º13’ & 09º15’ (Melle *et al.,* 2017). It covers a surface of 1007km² with a population estimate of about 130075 inhabitants (Tombel Council, 2010). The sub-division is constituted of 72 villages led by chiefs of second and third class degree. The major tribal groups are Bakossi, Ngie, Kom, Igbo, Bayangi, Oroko, who take up agriculture as a major economic activity.

The relief is dominated by uplands with the principal one being the Kupe Mountain (2050m). The landscape is generally characterized by gentle slopes, deep valleys and some seasonal streams particularly “Esenze” which originates from the mountain. The climate is Equatorial type and is characterized by two seasons, dry season spanning from November to March and a raining season from April through October. Temperatures

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ranges from 23.9^{o} C and 25.7^{o} C all year round. The mean rainfall is about 2991mm a year (Melle *et al.*, 2017). The soil is extremely fertile composed of volcanic ash supporting rich natural forest and a wide variety of tropical crops both for local consumptions and export (Nkouathio *et al.*, 2002). A great variety of valuable timber species such as *Swietenia mahogany* Lam., *Entandrophragma cylindrium* (Sprague), *Milicia excels* (Welw.) Benth, are been exploited from the forest for local use but more for export. The most important crops of the area are: *Theobroma cacao*, *Musa paradisiaca*, *Musa acuminate* and *Xanthosoma sagittifolium*,and a wide range of fruit trees which are cultivated at varied scales.

The natural forest is rich in fauna like chimpanzees, gorillas, Drill, Red Colobus, Mangabey, Crown Monkey, Mona Monkey, Preuss Monkey, Putty Nosed Monkey, Red Eared Monkey, Tantalus, Cane Rat, Giant Rat, Porcupin, African Civet, Pangolin, Red River Hog, Red Duikers, Blue Duiker, Black Snake, Monitor Lizard, Python, and Viper, making hunting a profession of some inhabitants. The main economic activities are agriculture, livestock, hunting, fishing, trade and handcrafts (Nguemezi *et al.*, 2020).

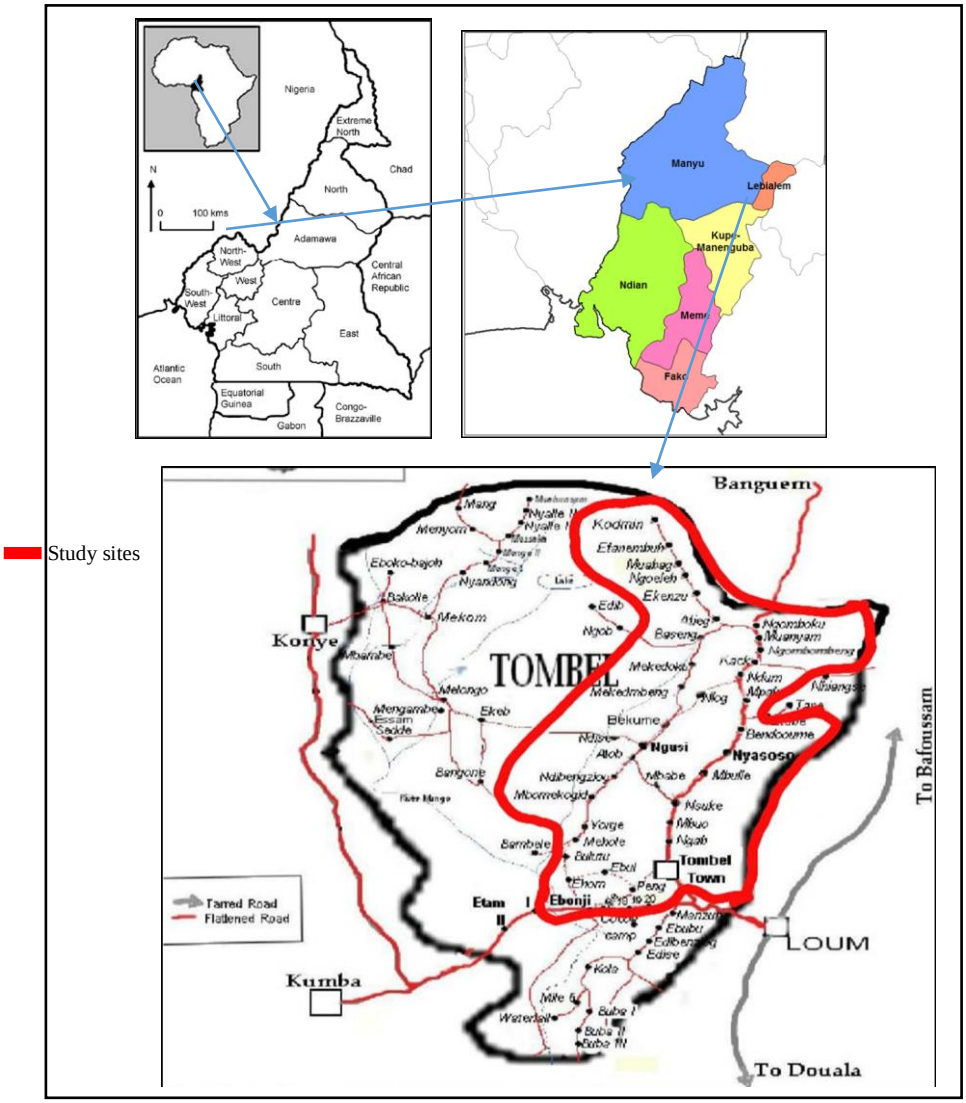

Figure 1: Study Location Tombel Sub Division, Southwest Region of Cameroon

2.2Identification of Loranthaceae species and potential host plants.

From the reconnaissance survey in December 2021, 40 out of the 72 villages found in the Sub Division were selected for the study based on security and accessibility. A field survey was carryout from March 2022 to May 2022; the peak flowering period for most Loranthaceae, since flower characteristics are the main diagnostic features of this family. At each site, a field survey was carried out along the roads, in farms, plantation, orchards, gardens by carefully examining the vegetation for the presence of mistletoes. Based on

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their inflorescence colour, leaf morphology (type, arrangement, shape, colour, and appearance) and fruit colour. Some species of mistletoe were identified alongside their host plants. Photographs and voucher specimens of mistletoe species and host plants were taken for the confirmation of their identity in Limbe Botanical Garden Herbarium and the National Herbarium in Yaounde.

2.3Assessment of parasitic specificity of Loranthaceae species and parasitic sensitivity of host plants

Parasitic specificity which refers to the number of host plant species affected by the parasitic plants with respect to the total number of host species, and the parasitic sensitivity which refers to the number of parasitic plants per host species (Houenon *et al.*, 2012) were determined. Based on the number of host plants of each parasitic species, they were grouped into weak specificity, moderate specificity and high parasitic specificity. The rate of parasitic specificity (PSp) of the mistletoe species was determined using the following formula:

PSp= NHSIPP/TNHS X 100…… Equation 1

Where;

PSp= parasitic specificity

NHSIPP: Number of host species infested by a parasitic plant

TNHS: Total number of host species (Hoffmann, 1994)

Parasitic sensitivity (PSe) was determined for each host plant according to the number of parasitic plant on a host species: little sensitive host (1 to 2 parasitic plants); sensitive host (3 to 4 parasitic plants); high sensitive host (5 to 6 parasitic plants); very high sensitive host (>7 parasitic plants) (Houenon *et al*., 2012)

III.RESULTS

From the survey, eight (8) Loranthaceae species were identified, distributed in five (5) genera: *Globimetula*, *Englerina*, *Helixanthera*, *Phragmanthera* and *Tapinanthus*. The genera *Tapinanthus* recorded the highest number of species, (3), while Phragmanthera recorded two species and *Englerina*, *Helixanthera* and *Globimetula* have one (1) species each. The species of Loranthaceae encountered during the study were; *Englerina* sp, *Globimetula braunii* (Engler) Van Tieghem, *Phragmanthera capitata* (Sprengel) S. Balle, *Tapinanthus ogowensis* (Engler) Danser, *Phragmanthera nigritana* (Hook.f.ex Benth.) Balle, *Tapinanthus preusii* (Engler) Van Tieghem, *Helixanthera mannii* (Oliver) Danser, *Tapinanthus bangwensis* (Engler &K. Krause) Danser, *Tapinanthus apodanthus* Sprague (Figure 2).

	
(a) *Englerina* sp	**(b) *Phragmanthera nigritana***

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© *Phragmanthera capitata*

(d) Helixanthera manii

(e) *Globimetula braunnii*

(f) *Tapinathus ogowensis*

(g) Tapinanthus preussii

(h) *Tapinathus bangwensis*

Figure 2: Loranthaceae species encountered and their diagnostic features in Tombel Sub Division. **a:** Flowers of Euglerina sp **b:** Flowers of *Phragmanthera nigritana* **c:** Flowers of *Phragmanthera capitata* **D:** flowers of *Helixanthera mannii* **e:** flowers of *Globimetula braunni* **f:** flowers of *Tapinanthus ogowensiss* **g:** flowers of *Tapinanthus preussi*. **h:** flowers of *Tapinanthus bangwensis*

Of all the Loranthaceae identified in the field, *Phragmanthera capitata* and *Tapinanthus apodanthus* were the most common and were present in all the studied sites. On the other hand, *Phragmanthera nigritana* was found only in five villages (Ngusi, Yorge, Ehom, Ebul and Ebonji) out of the 40 villages. The other species of Loranthaceae were fairly evenly distributed across the study site (Table 1).

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Table 1: Distribution of Loranthaceae in Tombel Sub Division

Localities	*P.c*	*T.p*	*T.o*	*H.m*	*P.n*	*Eug*	*T.b*	*G.b*
Kodmin	+			+			+	
Etanembuh	+			+			+	
Muabag	+			+			+	
Ngoeleh	+	+		+			+	
Ekenzu	+			+			+	
Dtieg	+			+			+	
Baseng	+		+	+		+	+	
Mekedaku	+		+	+		+	+	
Mekedmbeng	+		+	+		+	+	
Nlog	+			+		+	+	
Bekume	+		+	+		+	+	+
Ngusi	+	+	+	+	+	+	+	+
Ndise	+		+	+		+	+	+
Atob	+		+	+		+	+	+
Ndibengziog	+		+	+		+	+	+
Mbomekogid	+		+	+		+	+	+
Yorge	+		+	+	+	+	+	+
Mehole	+	+	+	+		+	+	+
Bulutu	+						+	
Ehom	+				+		+	+
Ebul	+		+		+		+	+
Ebonji	+		+		+	+	+	+
Mile 18	+					+	+	
Mile19	+					+	+	
Mile 20	+					+	+	
Peng	+					+	+	+
Tombel Town	+	+	+	+		+	+	+
Ngab	+		+	+		+	+	+
Mbuo	+		+	+		+	+	+
Nsuke	+					+	+	
Mbabe	+					+	+	
Mbulle	+					+	+	+
Nyasoso	+		+	+		+	+	+
Bendoume	+						+	
Mpako	+						+	
Ndum	+						+	
Kack	+						+	
Ngombombeng	+						+	
Muanyam	+						+	
Ngomboku	+					+	+	+

P.c, *Phragmanthera capitata;* **T.p**, *Tapinanthus preussi;* **T.o**, *Tapinanthus ogowensis;* **H.m**, *Helixanthera mannii;* **P.n**, *Phragmanthera nigritana;* **G.b,** *Globimetula braunii;* **Eug,** *Euglerina;* **T.b,** *Tapinanthus bangwensis,* + = present and - = absent

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Identification of host plant species of Loranthaceae in Tombel sub-division.

Host plants of Loranthaceae were trees and shrubs. Neither herbs nor lianas were found to be infested by the parasites. Amongst the host species censured, 59 were native species and 2 were exotic species (*Moringa oleifera* Lam. and *Citrus limon* (L.) Burn. F.).

A total of 61 host plants belonging to 36 families and 51 genera were found to be infested by these parasites. From the 61 infested species, 60 species belonging to 35 families were infested by *P.capitata*, 25 species belonging to 12 families were infested by *T. bangwensis*, one species belonging to one family was infested by *P. nigritana*, 7 host species belonging to 4 families were infested by *H.mannii*, 2 species belonging to 2 family were infested by *T. ogowensis* and 8 species belonging to 4 families were infested by *Euglerina* sp. In the sites where five Loranthaceae or more were present, their association doesn't seem to follow any rate. They can all parasitize the same host like *Theobroma cacao* and *Citrus spp*.

The Malvaceae, Rutaceae, Euphorbiaceae and Fabaceae had the highest number of individual infested species recorded (4, 6, 6 and 5 species each respectively), the rest of the families were less affected.

Parasitic specificity of Loranthaceae species and parasitic sensitivity of host plants

Regarding the parasitic specificity, three groups of parasitic plants were distinguished: weak parasitic specificity, average parasitic specificity and high parasitic specificity. The species with weak parasitic specificity were: *Phragmanthera capitata* (PSp = 98.36%), and *Tapinanthus bangwensis* (PSp = 42.62%). *Globimetula brunnii* (PSp =18.03%), *Globimetula braunii* (PSp = 13.11%) and *H. mannii* (PSp = 11.47%) showed average parasitic specificity. Three species, namely *P. nigritana* (PSp = 1.63%), *T. ogowensis* (PSp = 3.72%) and *T. preusii* (PSp = 4.91%) realized high parasitic specificity (Table 2). *Phragmanthera nigritana* is more specific on *Theobroma cacao*. *T. ogowensis* and *T. preusii* is specific on *Dacryodes edulis*.

Amongst the 61 host species, four classes were distinguished according to their parasitic sensitivity: class I (little sensitive) with 50 species, representing 82.96%, class II (sensitive) with 5 species, representing 8.19%, class III (high sensitive) with 5 species representing 8.19% and class IV (very high sensitive) with 1 species representing 1.63% of the whole infested host species.

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Table 2: List of Host plants and their susceptibility to Loranthaceae parasitism.

		Parasitic plants									
Families	**Host species**	**P.c**	**P.n**	**T.o**	**T.b**	**T.p**	**G.b**	**Eug**	**H.m**	**NP**	**PSe**
	Actinidia chinensis (A.Chev)									2	ls
Actinidiaceae	C.F.Liang	+			+						
Anacardiaceae	*Mangifera indica* L.				+					1	ls
Annonaceae	*Annonaceae muricata* L.	+								1	ls
Apocynaceae	*Rauvolfia vomitoria* Afzel	+			+					2	ls
Asteraceae	*Venonia amygdalina* Delile.	+			+					2	ls
	Schlefflera actinophylla									2	ls
Araliaceae	(Endl.) Harms	+			+						
	Polyscias fruticosa (L.)									2	ls
	Harms	+			+						
	Markhamia lutea (Benth.)									2	ls
Bignoniaceae	K. Schum.	+			+						
	Kigelia africana (Lam.)									1	ls
	Benth	+									
Bixaceae	*Bixa orellana* L.	+								1	ls
	Dacryodes edulis (G. Don.)									3	s
Burseraceae	H. J.Lam.	+		+		+					
Caricaceae	*Carica papaya* L.	+								1	ls
Cannabaceae	*Celtis laevigata* Willd.	+								1	ls
Clusiaceae	*Garcina kola* Heckel.	+								1	ls
Combretaceae	*Terminalia mantaly* H. Pers.	+								1	ls
Elaeagnaceae	*Elaeagnus angustifolia* L.	+								1	ls
Euphorbiaceae	*Manihot esculenta* Crantz.	+								1	ls
	Ricinodendron heudelotti	+								1	ls

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	(Baill.) *Heavea brassilliensis*									1	ls
	(Willd.) Mudl. Arg.	+								1	ls
	Jatropha cucas Linn.	+								1	ls
	Malutos oppositifolius (Geisel.) Mull. Arg.	+								1	ls
	Neoboutonia macrocalyx Pax.	+								1	ls
	Tetrapleura tetraptera (Schum.&.Thom.)	+								1	ls
Fabaceae	*Calliandra surinamensis* Benth	+								1	ls
	Leucaena leucocephala (Lam.) de Wit.	+								1	ls
	Calliandra calothyrsus Meism.	+								1	ls
	Abrus precatorius L.	+								1	ls
	Anthocleista grandiflora Gilg.	+								1	ls
Gentianaceae	*Irvingia gabonensis* (Augry_Lecomte et. O'Rorke) Baill.	+								1	ls
Irvingiaceae	*Persea americana* Mill	+			+		+	+	+	5	hs
Lauraceae	*Lagastroma speciosa* (L.) Pers.	+			+					2	ls
Lyrthaceae	*Grewia nervosa* (Lour.)	+								1	ls
Malvaceae											

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	Panigrahi										
	Theobroma cacao L.	+	+	+	+	+	+	+	+	8	vhs
	Cola nitida (Vent.) Schott & Endl.	+					+			2	ls
	Cola acuminata (P. Beauverd) Schott & Endl.	+								1	ls
	Khaya senegalensis (Deor.)									1	ls
Meliaceae	A. Jus.	+									
Moraceae	*Ficus exasperata* Vahl.	+			+	+	+			4	s
	Artocarpus altilis (Parkinson et. F. A. Zorn)	+			+					2	ls
	Ficus austracaledonica Vahl.	+			+					2	ls
Moringaceae	*Moringa oleifera* Lam.	+			+					2	ls
	Psidium guajava L.	+			+					2	ls
Oleaceae	*Ligustrum sinense* Lour.	+								1	ls
	Olea europaea L.	+								1	ls
Passifloraceae	*Passiflora edulis* Sims.	+								1	ls
	Bridelia micrantha (Hochst.)									2	ls
Phyllanthaceae	Baill	+			+						
Rosaceae	*Malus Pumila* Mill.	+								1	ls
	Prunus americana L.	+								1	ls
Rubiaceae	*Coffea robusta* L.	+			+		+		+	4	s
Rutaceae	*Citrus sinensis* (L.) Osbeck	+			+		+	+	+	5	hs
	Citrus maxima (Burn.) Herr	+			+		+	+	+	5	hs
	Citrus reticulata L.	+			+		+	+	+	5	hs

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	Citrus limon (L.) Burn. F.	+			+		+	+	+	5	hs
	Citrus aurantium L.	+			+		+	+		4	s
	Citrus aurantifolia (Christm.)	+			+		+	+		4	s
	Vitellaria paradoxa Gaertn. F.	+								1	ls
Sapotaceae	*Malacantha alnifolia* (Back.) Pere.	+			+					2	ls
	Solanum torvum SW.	+			+					2	ls
	Brugmansia suaveolens (Willd)	+								1	ls
Solanaceae	*Urera caracasana* (Jacq.) Gaudich. et. Griseb	+								1	ls
Urticaceae	*Cecropia obtusifolia* Bertol.	+								1	ls
Verbanaceae	*Duranta erecta L.*	+			+					2	ls
	PSp (%)	**98.36***	**1.63*****	**3.27*****	**42.62***	**4.91****	**18.03****	**13.11****	**11.47****		

P.c: *Phragmanthera capitata*, **T.p**: *Tapinanthus preussi*, **T.o***: ogowensis*, **H.m***: Helixanthera mannii*, **P.n***: Phragmanthera nigritana*, **Eug:** *Euglerina* sp, **T.b:** *Tapinanthus bangwensis* **G.b:** *Globimetula braunnii***, PSe:** Parasitic sensitivity **(ls:** little sensitive host, **s:** sensitive host, **hs:** high sensitive host**, vhs:** very high sensitive host**), PSp:** Parasitic specificity **(*:** weak specificity**, **:** average specificity**, ***:** high specificity), **NP:** number of parasites**, +** = present.

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IV. DISCUSSION

4.1 Loranthaceae species and host ranges

From the survey, four (4) genera of Loranthaceae were identified: *Phragmanthera* Van Tieghem, *Tapinanthus* Blume, *Globimetula* Van Tieghem, and *Helixanthera* Loureio. Native and exotic trees of Tombel sub division were attacked by eight (8) species of mistletoe. This number is bigger than that of Dibong *et al.*, (2011) and Djibrilla *et al.*, (2020) who found two (2) species and seven (7) species respectively in the Logbessou District and Far North Region of Cameroon. The differences in species numbers obtained could be due to differences in vegetation type and the extent of the study area. These mistletoes produced obovoid berries in clusters with a tubular corolla which is reminiscent of matchstick; these results are in line with the reports of Begho *et al*., (2007) on some observations on the fruit set and incidence of mistletoe on rubber trees in Nigeria. These parasites can be found alone or in association with one another, or a parasite can be found parasitizing another parasite on a host plant attached to branches of tree trunks or on the tip of the host plants. Mathiasen *et al*., (2008) reported that mistletoe requires much sunlight when establishing itself on a host, therefore, seeds that are deposited high in the canopy are often the most successful. They also reported a situation where a mistletoe parasitizes a mistletoe that is parasitizing another mistletoe on a host tree, which they termed "**epiparasitism**". In his work, *P. capitata* was observed to parasitize *T. bangwensis* on *Theobroma cacao*. These parasitic species usually appears as clumps on host plants.

Phragmanthera capitata and *Tapinanthus bangwensis* are ubiquitous and common in the studied sites. This could be because of the availability of host plants and favourable climate for the growth of these parasites. Jiofack *et al.*, (2007) who found that mistletoe species evolve with altitude in the Bafou group in Cameroon, also reported that Loranthaceae species are characterized by their variable expansion from one level to another depending on the temperature fluctuation in altitude. On the other hand, *P. nigritana* was found only on *Theobroma cacao* and found only in some localities. This could be attributed to its limited ability to parasitize other hosts.

No liana or herb was recorded to be infested by the parasites during the survey, and there are no known reports of mistletoes on liana. Most of the infested host plants include fruit crops and ornamental plants which are trees and shrubs. This could be as a result of the vegetation type and vegetation cover of the study area.

Rutaceae and Euphorbiaceae had the highest number of individual infested species recorded, followed by Malvaceae and Fabaceae. These could be because Tombel sub division is a forested and agricultural area where most cultivated crops falls within these families. This agrees with the work of Dibong *et al*., (2008) on the parasitism of host trees by the Loranthaceae in the region of Douala (Cameroon).

4.2 Parasitic specificity of Loranthaceae species and parasitic sensitivity of host plants

The most sensible host species to the parasitism of the Loranthaceae is *T. cacao, Citrus sps* and *Persea americana*. This could be attributed to the phyto-chemistry of these species. This corroborates the findings of Mony *et al.*, (2011) who showed that Annonaceae, Anacardiaceae, Burseraceae, Fabaceae, Lauraceae, Myrtaceae, Rutaceae and Sterculiaceae are sensitive to Loranthaceae. The host species abundant in the region but not drawn up into inventories, because of its resistance to the Parasitism of the Loranthaceae is *Bambusa vulgaris*.

Some Loranthaceae show a high degree of specificity in relation to the infested host. Here, *P. nigritana* parasitizes only *T. cacao*.

Some host species were found unique to each parasite while some were found common to all the parasite. *Theobroma cacao* was the only species infested by all the parasites, this could be because cocoa is abundant, the main cash crop cultivated by the population of the sub division. However, the resistance of *Mangifera indica* to Loranthaceae infestation according to literature was found to be breached during the field survey. It was infested by *Tapinanthus apondathus*. It could be observed that *Mangifera indica* is not very sensitive to hemiparasites and *Bambusa vulgaris* is resistant to parasitic plants in the study area. These results corroborate those of Ladoh *et al.,* (2017) and Amon *et al.,* (2020). These authors showed that *Mangifera indica* was parasitized in the city of Douala, Cameroon and Agni Sanwi from Aboisso and Maferé in Côte d'Ivoire respectively, and differ from those of Dibong *et al.,* (2008) which presented *Mangifera indica* as a resistant species to the parasitism of Loranthaceae. Boussim *et al.,* (1995) reported that the resistance of *Mangifera indica* to mistletoe was interspecific and can be attributed to the chemical composition or structural tissues of the host. However, the breach could be attributed to the climatic condition of the study area. This could be the development of antidote chemical by Loranthaceae to that of *Mangifera indica*. The development of Loranthaceae was largely conditioned by the nature of the host. Hariri *et al.,* (1991 sited in Dibong *et al.,* (2011) identified tannins, flavonoids and lignins as part of the factors involved in mistletoe resistance. Though it has been reported that mango tree has total resistance to Loranthaceae parasitism in Burkina Faso and Cameroon (Boussim *et al.,* 2004, Didier *et al.,* 2008); this findings has revealed that mistletoe could parasitize a variety of host plants, with special preference of potential suitable hosts. Contrary to the work of Dibong *et al.,* (2009), on Loranthaceae at Edea, Cameroon, they concluded that, Anarcadiaceae is parasitized by *Phragmanthera capitata* and remains the only case known in the country.

The distribution of mistletoe species did not demonstrated any uniformity, this could be as a result of multiple factors such as climatic factors (temperature, sunlight, altitude), vegetation changes and availability and abundance of host species and dispersers. This results are in line with Devkota *et al.,* (2009) who reported that climatic factors were found to be important in determining mistletoe distribution in a research diversity, distribution and host range of mistletoe in protected and unprotected areas of Central Nepal Himalayas.

The tufts of the parasites unite to the host branches so that the parasite is difficult to recognize from afar. Mimicry is a strategy for an organism to conceal and to escape from the action of predators. The mimicry of *T. ogowensis* to *Dacryodes edulis* and *T. bangwensis* on *Theobroma cacao* shows is a clear strategy for the parasites to escape their predator. This agrees with the work of Barlow and Wiens (1977) who found mistletoes have a weak chemical defense and are often tasty for herbivores.

V.CONCLUSION

This work shows that eight (8) species of Loranthaceae were found to parasitized a variety of trees and shrubs species. *Phragmanthera capitata* and *Tapinanthus apodanthus* were the most abundant and widely distributed in the study area. Euphorbiaceae, Fabaceae, Rutaceae and Malvaceae were the families with the highest number of infested individuals. However, *Theobroma cacao* was the most sensitive species to the parasistisms of these parasites and it was parasitized by all the mistletoes identified in the field.

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