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Effect of habitat on diversity and composition of leaf litter ant species : implication for conservation management

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INTRODUCTION

Tropical rainforests are among the most important ecosysterm on Earth, due to their biological richness and their involvement in many biogeochemical cycles Ghazoul & Sheil (2010)

These ecosystems are nowadays subject to strong anthropogenic pressures which have harmful effects on the diversity and distribution of native species.

The future of tropical rain forests has never been more uncertain, as many of these forests are being rapidly destroyed and degraded through various forms of human impact, such as infrastructure development and agricultural expansion (Morris, 2010).

Deforestation

Agricultural Activity

Urbanization

Vayssiere *et al.* (2009).

Objective

The study aimed to assess the impact of land use management on the leaf-litter ant community of the Dja biosphere (Congo Basin) reserve, South Region of Cameroon.

Materials And Methods

Study location

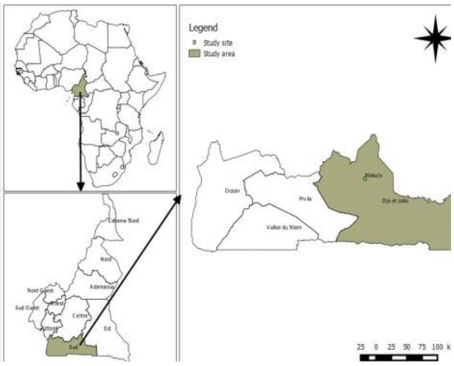


Figure 1: Map indicating the location of study site

Study period

November 2015 to June 2017

The climate: humid equatorial with bimodal rainfall **(Suchel, 1988).**

The annual precipitation varies between 1600 mm and 1700 mm

Evergreen forests

(Letouzey, 1985).

Description of study sites

Figure 2: Young cocoa farm

Figure 4 : Banana farm

Figure 5 : **Palm grove**

Figure 3 : Old cocoa

Figure 6: Forest

Sampling Methods

Honey-protein baiting trap , Hand collecting , Pitfall trapping , Berlese Funnel

Ant identification

Hölldobler & Wilson, 1990; Taylor, 2010 ; Fisher & Bolton, 2016.

Statistical analyses

Using R Solfware 3.01 Version to : Expected specific richness (ICE, Chao2) and sampling efforts, to carry out the diversities α (Shannon-Weaver H', Pielou Equitability (E) indices) and β (Bray Curtis and Kruskal-Wallis (H) chi-square test via procedure (GLM)

Results et Discussion

Evaluation of the sampling success : Use of nonparametric estimators

Habitats	Non parametric estimators					
	S	Chao1	SD.Chao1	ACE	SD.ACE	Mean
Banana farm	134	162(83.95)	13	161(84.47)	6	(84.21)
Old cocoa farm	173	206(84.46)	14	214(**81.30)**	7	(82.88)
Young cocoa farm	132	148(**89.86)**	9	153(86.27)	6	**(88.06)**
Forest	209	250(84.00)	16	250(86.66)	8	(85.33)
Palm grove	119	142(84.50)	12	141(85.10)	6	(84.80)

S obs:Specific richness, SD: Standard deviation; ICE= Incidence Coverage-based Estimator

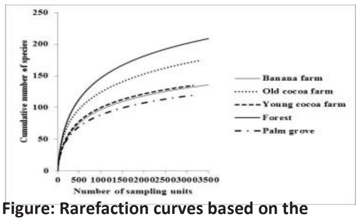
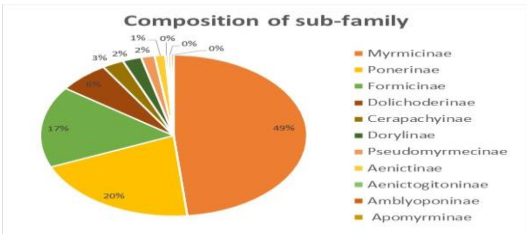


Figure: Rarefaction curves based on the progression of species richness at sampling sites

All five curves approached the saturation threshold (asymptote), indicating that species richness changed little at this point despite the increase in the sampling size . **(Longino 2000).**

Composition **of myrmecofauna : 11 sub-families**



Aenictogitoninae, Amblyoponinae and Apomyrminae with only 1 (0,32%) species

According to Savitha *et al.*, (2008) ,the species belonging to these subfamilies are of great behavioral and adaptive plasticity in the face of changes in environmental conditions.

Composition **of myrmecofauna**

306 species grouped into 56 genera were collected.

In 2007 Deblauwe & Dekoninck had only obtained a total of 145 species in the southern periphery of the Dja biosphere reserve in Cameroon. The difference between the numbers of species obtained by these researchers and our results could be explained by the differences in ecological environments (agrosystems versus natural forests), the structural complexity and continuity of the litter, diversification of nesting sites and heterogeneity (floristic diversity).

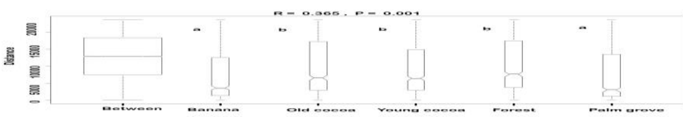
Ant diversity and distribution

Table: Variation of richness and specific diversity of myrmecofauna

Diversities index	Differents habitats					kruskal.test
	Banana farm	Old cocoa farm	Young cocoa farm	Forest	Palm oil farm	
Richness specific	134(22.64±9.24)a	173(28.07±11,36)a.b	132(22.12±7.44)a.c.e	209(32,5±14,22)a.b.f.g	119(20.91±8,09)a.d.e.h	X²=30.77;df=4; P< 0.0001***
shannon (H')	3.62(2.73±0.37)a	4.22(3±0.48)b.c	3.55(2.66±0.33)a.d.f	4.4(3.14±0,51)c,g.h	3.53(2.64±0,54)a.e.f.i	X²=42.06;df=4; P< 0.0001***
Hmax	4.91(3.03±0.45) a	5.15(3.22±0.55) a.c	4.89(3.03±0.4) a.d.e	5.34(3.35±0.57) b.c.f.g	4.78(2.91±0.62) a.d.e.h	X²=29.64;df=4; P< 0.0001***
Equitability(E)	0.74(0.91±0.05)a	0.82(0.93±0.03)b.c	0.73(0.88±0.06)a.d.e	0.83(0.94±0.03)b.c.f.g	0.74(0.91±0.04)a.d.f.h	X²=47.91;df=4; P< 0.0001***
Index of dominance	0.95(0.91±0.03)a	0.98(0.93±0.03)b.c	0.93(0.9±0.04)a.d.e	0.98(0.94±0.03)b.c.f.g	0.95(0.9±0.09)a.d.e.h	
N	660	660	660	660	660	X²=52.87;df=4; P< 0.0001***

X^2 : Kruskall-Wallis test; d.f. = 4, ***: high significant at 5 % confidence interval; different letters are statistical significant different according to pairwise comparisons; Mean ± Standard deviation, N= sampling unit

Figure : Similarity between habitats



The composition of vegetation which differs between these habitats on the one hand and the mode of management which operates differently in these environments on the other hand, would explain the differences observed. According to Philpott et al. (2014) then Ossala et al. (2015), the similarities, the dissimilarities in the specific composition between the habitats are linked to the mode of management of the environment and therefore to the different degree of disturbance of the ecosystem.

Conclusion

Anthropogenic disturbances affect the composition and spatial distribution of the soil myrmecofauna.