ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 02, pp.46960-46976, February, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

CONTRIBUTION TO THE KNOWLEDGE OF THE SPECIFIC ASPECTS OF THE LESSER ANTILLES FLORA: THE VEGETATION INVERSIONS (THE CASE OF MARTINIQUE'S LOWER PLANT LEVEL)

***Philippe JOSEPH**

Professor of Ecology, Botany and Biogeography, University of the frenchWest Indies (Martinique)-UMR ESPACE DEV -BIORECA

ARTICLE INFO

Article History:
Received 18th November, 2016
Received in revised form
20th December, 2016
Accepted 25th January, 2017
Published online 28th February, 2017

Key words:
Lesser Antilles,
Martinique, Topography,
Bioclimates, Phytocenoses.

ABSTRACT

The main physical factors influencing the diversity of phytocenoses are the climate and geomorphology. The latter's various aspects can modify, for example, the spatiotemporal structure of the temperature, rainfall, humidity and evaporation. These changes result in a set of biotopes whose varied biocenotic responses correspond to a dense floristic mosaic. Among these responses, due to their small size, the vegetation inversions represent specific cases. To demonstrate this phenomenon, we used 73 stations of Martinique's lower level influenced by the dry sub-humid bioclimate and occupying each of the specific topographic facies. Using indicators and a multifactorial treatment (AFC), the data from the floristic inventories revealed the existence of a station whose flora is composed of mesophilous (evergreen tropical seasonal) species typical of the wet or even wet sub-humid bioclimate.

Citation: Philippe JOSEPH, 2017. "Contribution to the knowledge of the specific aspects of the lesser antilles flora: the vegetation inversions (the case of martinique's lower plant level)", *International Journal of Current Research*, 09, (02), 46960-46976.

INTRODUCTION

In many of the world's regions, the geomorphology affects the main climatic factors (Barthlott, Lauer and Placke, 1996; de Freitas *et al.*, 2014; Trejo-Torres and Ackerman, 2001). Within a biome, the orography defines the structure of the temperature and rainfall and consequently the evaporation and cloudiness (Bonde *et al.*, 2013; Imorou, 2013). From low areas to high elevations, these gradients of climatic factors result in a bioclimatic stratification associated with a vegetation floor (Thomson and Jones, 1990; Bian and Walsh, 1993). Each bioclimatic floor is colonized by specific species which also form singular phytocenoses (Takyu, Aiba and Kitayama, 2002; Brown, 1994). Consequently, from the base to the summits of the high or medium altitude mountains, these plant floors correspond to floristic belts, true witnesses of the factorial conditions of the biotopes (Basnet, 1992, Chen *et. al*, 1997). This phenomenon can be noted in both tropical and temperate environments (Yasuhiro, Hirofumi and Kihachiro, 2004). Generally, the topographic variations within a given territory influenced by the same climate result in a plurality of biotopes (Lippok *et al.*, 2014; Stoutjesdijk and Barkman, 2014). The effects of the general climate factors can be increased on ridges or decreased in valleys or gullies (Reed *et al.*, 2009; Bader and Ruijten, 2008; Dessalegn *et al.*, 2014). The result of an intra-oceanic subduction, the Lesser Antilles conform to these conditions. Although they are described as medium height mountains, because the peaks do not surpass 1500 meters in height, some parts of the Lesser Antilles are very contrasted (Germa *et al.*, 2010; Le Friant *et al.*, 2004). They are dotted with hills and mountain ranges which correspond to the old and new arches (Bouysse, 1984; Germa *et al.*, 2011). This geomorphological configuration has almost unexpected ecosystem consequences. In fact, we found that in the zones subject to the dry bioclimate (rainfall ≤ 1500 mm, high insolation, high evapotranspiration, low cloudiness), the bottoms of the enclosed valleys were colonized by species typical of the moderately humid or even wet bioclimates in some cases. Conversely, the windy peaks of the sectors influenced by the wet bioclimate often harbour a rather xerophilic flora (Joseph, 1997). In this paper, we will try to present this phenomenon which we named: "*Vegetation Inversion*".

****Corresponding author: Philippe JOSEPH***
Professor of Ecology, Botany and Biogeography, University of the frenchWest Indies (Martinique)-UMR ESPACE DEV -BIORECA

MATERIALS AND METHODS

Materials

Martinique is a mountainous microsystem which is highly diversified from a topographical point of view (Germa, 2011). The result is a large multiplicity of biotopes, species, biocenoses, ecosystems, physiognomies and landscapes (Joseph, 2013). The current high human density leads to dysfunctions within the ecosystems, some of which affect their self-organisation processes (Joseph and Baillard, 2016). With a strong human footprint and a multitude of life forms, mainly plant ones, Martinique is one of the 24 hotspots of planetary biodiversity: the Caribbean one (Myers *et al.*, 2000; Mittermeier *et al.*, 2011; Brooks *et al.*, 2006; Olson *et al.*, 2001; Helmer *et al.*, 2002). In general, the island of Martinique is a land exhibiting climatic risks, telluric and ecological risks whose ecological footprint is superior to the ecosystem capacities of the environments (Bellwood *et al.*, 2003; Spalding and Kainuma, 2004). The orography and the seasonal aerological dynamics (the trade winds) result in a coastal rainfall allotment from the coast to the highest altitudes which is related to the floor structuring of the ecosystem potential (Taylor and Alfaro, 2005; Jose *et al.*, 1996; Lugo *et al.*, 1981). From 0 to 800 meters, we can potentially find: evergreen tropical seasonal forests of lower horizon and xeric facies (lower floor), tropical seasonal evergreen forests, tropical sub-montane rainforests (upper floor) and tropical montane rainforests (upper floor). During the pre-colonial period these forests had reached their optimum development: they had reached their climatic stages (Joseph, 1997). After the island was colonized in the 17th century, the anthropization with different intensity and frequency led to a great diversity of phytocenoses identifiable in particular by specific physiognomies (Baillard, 2016; Hatzenberger, 2000 and 2001). These correspond to phases of ecosystem evolution [successional intermediaries (Joseph, 2016)] and are composed of varying proportions of species with various ecological strategies (Webb *et al.*, 2002). The pioneer (generalist), transitional (mixed status) and terminal (specialized) species predominate respectively in the pioneer, post-pioneer and

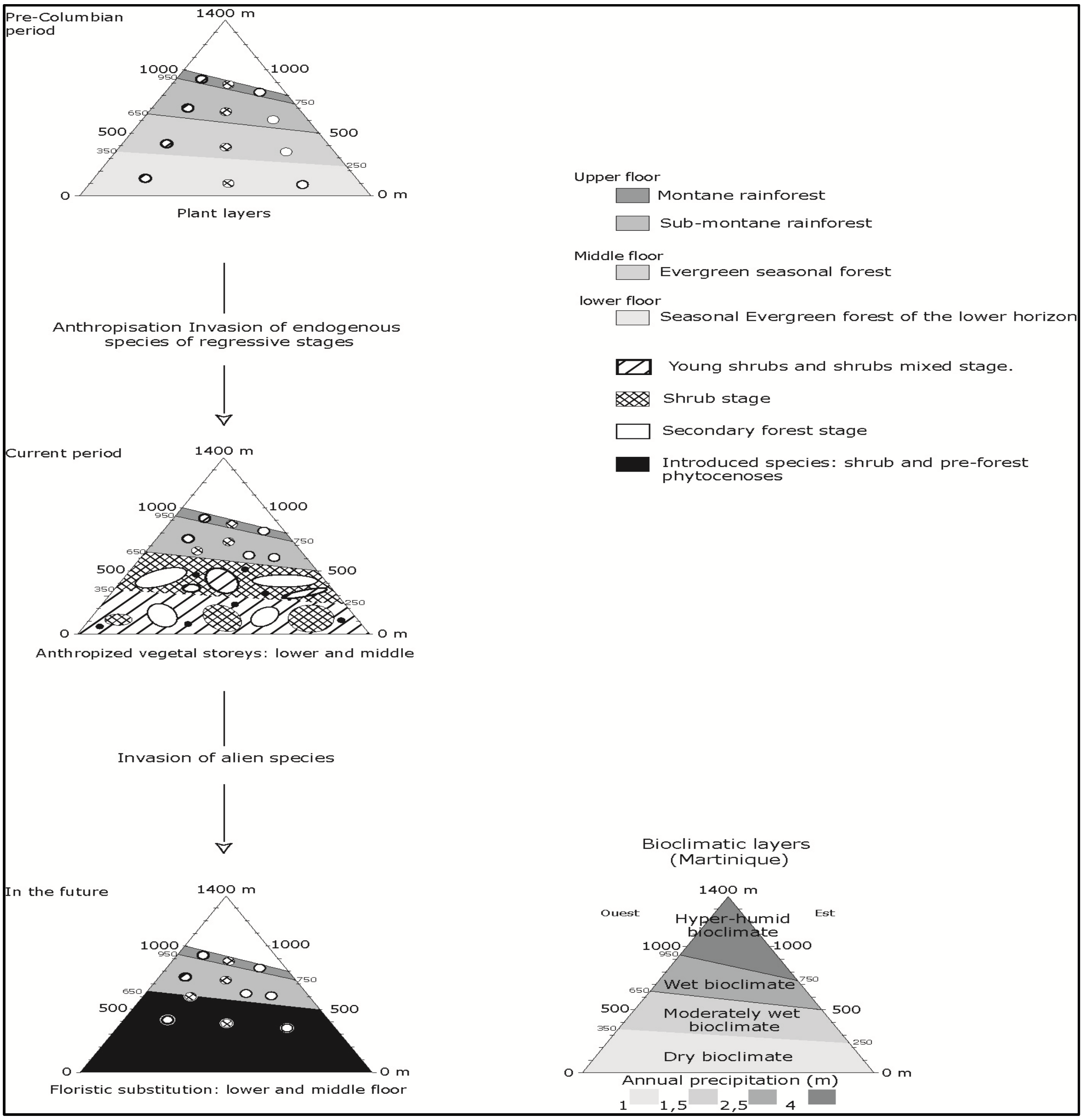


Fig. 1. Schematic representation of the bioclimatic and vegetation floors (Amerindian and current period)

No study is able to prove it, but it seems that in addition to the orographic rainfall the island also experiences the sylvatic rainfall linked to the intra-vegetation water cycle (Joseph, 2012). In the Lesser Antilles, as in Martinique, the ecosystem potential is sylvatic (Figure 1).

climax stages (Joseph, 2016). Figures 1 and 2 distinctly show the evolution of the vegetation in the Lesser Antilles and the different stages of plant succession. Under the cumulative effects of human activities, the shrub, pre-forest and young secondary forest stages are now spatially dominant. Figures 1 and 2 reflect the general trends. The current floristic mosaic is both the result of the geomorphology and anthropization. In fact, on the bottom of the valleys and on the ridges the modification of certain environmental factors results in the establishment of specific phytocenoses with regard to the macroclimate.

Methods

To highlight this "vegetation inversion" phenomenon, we carried out floristic inventories in the southern part of Martinique where the plant formations are mainly xerophilic.

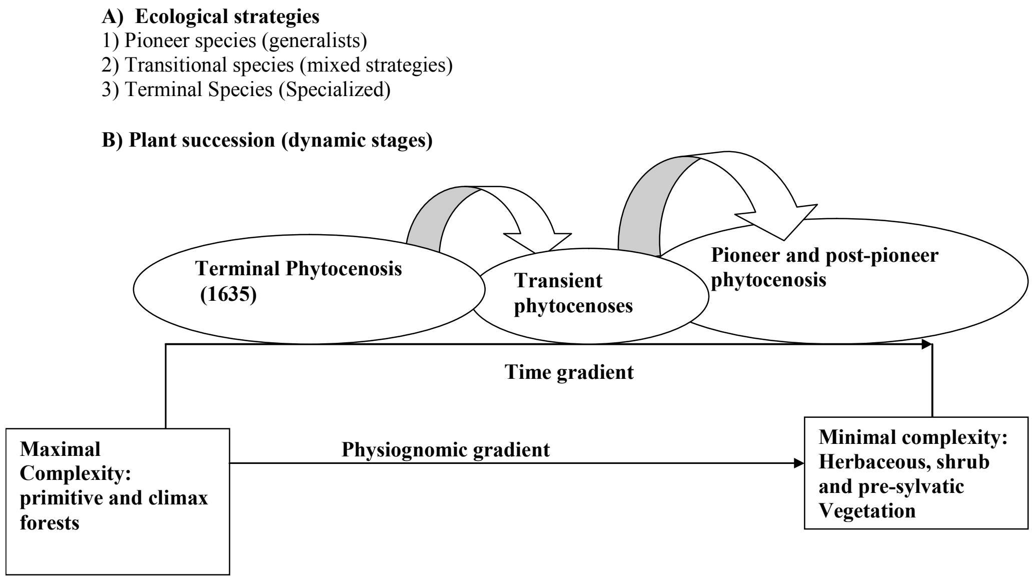


Fig. 2. Phytocenotic evolution under anthropic constraints since the 17th century

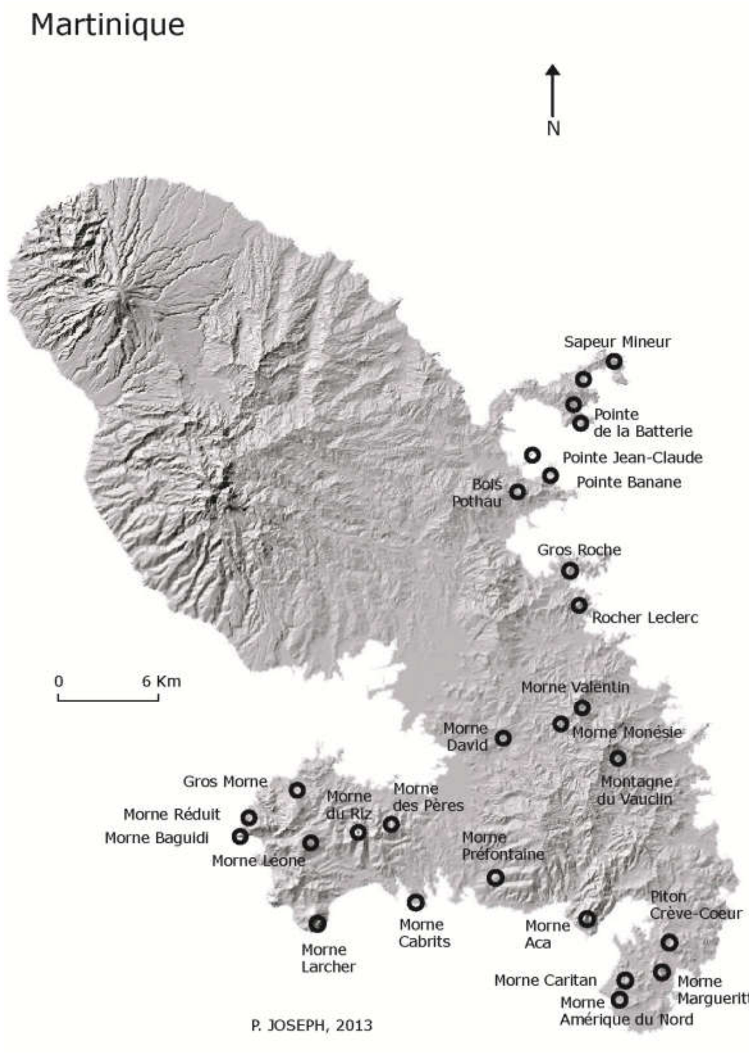


Fig. 3. The study areas

We recorded 73 stations with varied topography: the bottom of valleys, ridges, windward and leeward slopes (Figure 3). Each station corresponds to a transect subdivided into quadrats from which we quantified several parameters: number of species, diameter of tree taxa [starting from 2.5 cm and at 1.33 from the ground (international standard)], their heights and the height of their first ramifications. The aim was to characterize the survey stations from a floristic, structural and architectural point of view. The indices were used to show the population relations between species and their diversity (the index of Shannon-Weaver : Watterson, 1974; Wohl *et al.*, 2004; Magnussen and Boyle, 1995) and their equitable distribution. The distribution index [Id=fr×d/fr: fr (relative frequency), d (density)] and the Dominance Index (ID=Id×ST: [1])] respectively give us data on the distribution of species populations and their dominance relationships.

The diversity index or the intra-biotic index characterizes the abundance distribution of a population by a parameter (Longuet-Higgins, 1971; Hennink and Zeven, 1990). This specific diversity (informatic diversity) is calculated using the Shannon -Weaver function: $H'=\Sigma Pi \log2(Pi)$] with i=1 to n, Pi is the relative frequency of species i. The greater the number of species with adjacent neighbouring frequencies, the greater the intra-biotic index. Maximum diversity is the case where all species are represented in the same population F [$H'max = \log2(N)$, where N is the total number of species in the species stock]. The intra-biotic index is complemented by the equitability or equidistribution index ($E=H'/Hmax$) which provides information on the degree of achievement of the potential maximum diversity. The factorial analysis of the correspondences (AFC) carried out using the XLSTAT statistical software allows us to differentiate biographical data per the main ecological factors.

RESULTS

Minimal areas, specific richness and phytocenotic diversity

The survey stations correspond to variable minimal areas. Figures 4, 5 & 6 show examples of minimal areas ranging from 500m² for groups in the shrub stage to 800m² for those belonging to the young forest stages: naturally, there is an entire series of intermediaries. These inventories allowed us to count 66 Families corresponding respectively to 169 Genera and 232 Species (Table 1, Annexes 1 & 2). Table 1 gives us a fairly precise idea of the diversity of the taxonomic components of Martinique's lower vegetation floor.

Intra-biotic diversity, equitability and Phytocenotic diversity

Figures 7 and 8 show that the intra-biotic diversity varies from one station to another and must be correlated to the size of the minimal survey areas, which are a function of their degree of evolution. Unlike the index of diversity, the index of equitability or even distribution reaches a very high rate. It is often close to the total degree of richness of the different stations (Figures 7 & 8). The few examples of "Annex 3 concerning ACA stations 1 to 25, are indicators of the organisation of the plant cover in a phytocenotic mosaic composed of a large number of units of various sizes, ages and floristic processions.

[1] Sum of the populations section areas of each species measured from 2.5 centimetres and at 1.33 centimetres.

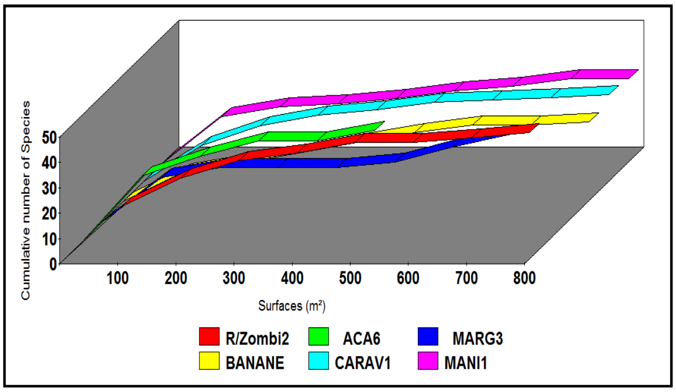


Fig. 4. Example of minimal area

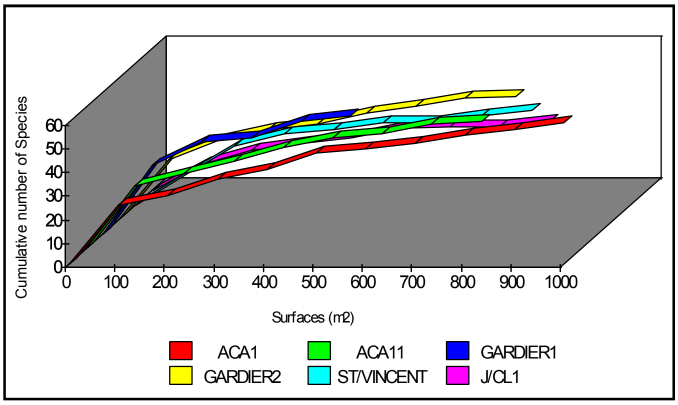


Fig. 5. Example of minimal area

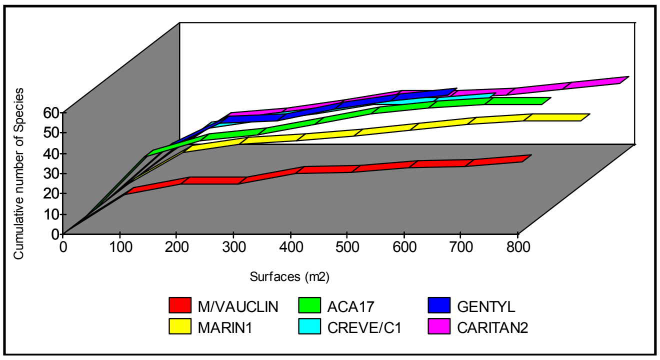


Fig. 6. Example of minimal area

Density, station distribution of diameters and heights

The population counts of the different species indicate an overall preponderance of diameters between 2.5 cm and 5 cm in relation to the dominance of microphanerophytes and nanophanerophytes (Figures 9a, 10 & 11). The density of the individuals is variable in each station as well as for all the study stations (Figure 9b). One consequence is a strong competition for the occupation of space and the distance of exclusion between relatively weak individuals.

Structure of the stations, the physiognomies of individuals and species

The Factorial Analysis of Matches presents in the first two factorial plans the distribution of the 73 stations and the 232 species which are subdivided into two groups (Figure 12). Group I species associated with the ACA 25 station seem to have a bioclimatic affinity different from those of the other stations (group II).

Table 1. The best represented families, genera and species (Annex 2)

Family	Gender	Species	Family	Gender	Species
Acanthaceae	1	1	Mimosaceae	6	11
Agavaceae	2	2	Moraceae	5	7
Anacardiaceae	2	2	Myrsinaceae	1	1
Annonaceae	1	2	Myrtaceae	7	19
Apocynaceae	3	3	Nyctaginaceae	1	3
Aquifoliaceae	1	1	Ochnaceae	1	1
Araceae	1	4	Olacaceae	2	2
Araliaceae	1	1	Oleaceae	2	2
Arecaceae	3	3	Oxalidaceae	1	1
Asteraceae	1	1	Passifloraceae	1	2
Bignoniaceae	2	2	Phytolacaceae	2	2
Bombacaceae	2	2	Piperaceae	2	6
Boraginaceae	4	7	Poaceae	2	2
Bromeliaceae	5	5	Polygalaceae	3	3
Burseraceae	1	1	Polygonaceae	1	3
Cactaceae	2	2	Rhamnaceae	2	2
Caesalpiniaceae	5	5	Rhyzophoraceae	1	1
Canellaceae	1	1	Rosaceae	1	1
Capparidaceae	3	7	Rubiaceae	13	16
Celastraceae	5	5	Rutaceae	5	9
Clusiaceae	2	2	Sapindaceae	6	7
Combretaceae	1	1	Sapotaceae	4	7
Commelinaceae	1	1	Simaroubaceae	3	3
Erytroxylaceae	1	1	Smilacaceae	1	1
Euphorbiaceae	6	10	Solanaceae	2	2
Fabaceae	6	8	Sterculiaceae	3	3
Flacourtiaceae	2	2	Strelitziaceae	1	1
Lauraceae	3	7	Theophrastaceae	1	1
Loranthaceae	1	1	Thymeleaceae	1	1
Melastomaceae	2	2	Ulmaceae	1	1
Malpighiaceae	4	5	Verbenaceae	6	6
Malvaceae	1	1	Vitaceae	1	1
Meliaceae	3	5	Zygophyllaceae	1	1

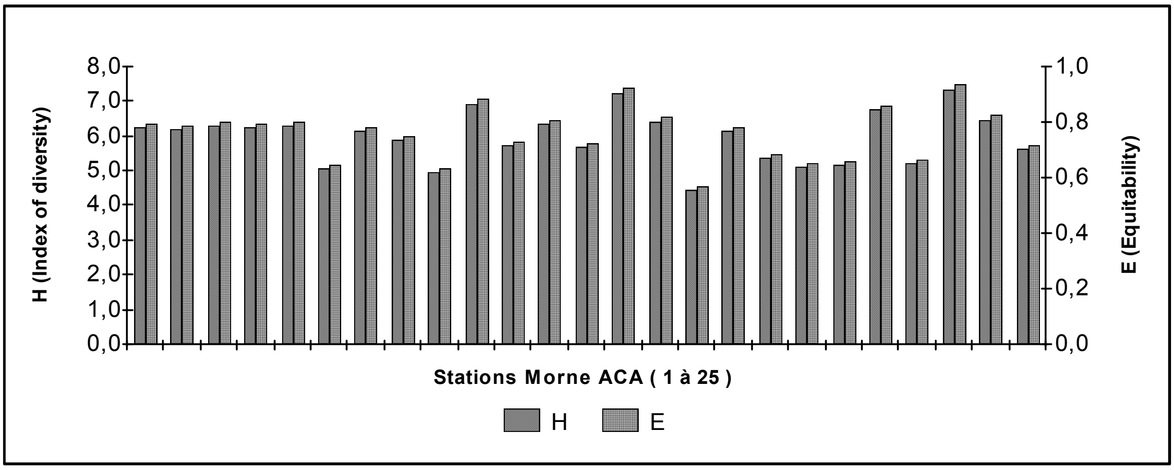
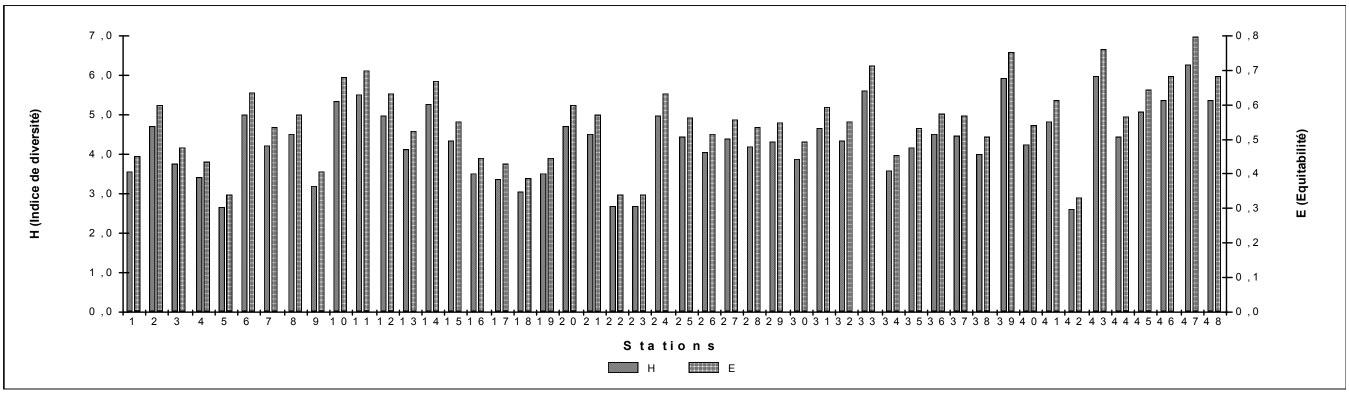


Figure 7. Diversity and Equity Index (Morne Aca Stations)



1 : amérique/2 : carav1/ 3 : carav2/ 4 : singe/ 5 : brumel/6 : banane/7 : caritan1/8 : caritan2/ 9 : caritan3/ 10 : crèvc1/ 11 : crèvc2/12 : gardier1/13 : gardier2/14 : gardier3/15 : gentyl/ 16 : j/claude1/17 : j/claude2/ 18 : j/claude3/ 19 : joli1/ 20 : joli2/21 : mani1/22 : mani2/ 23 : mani3/ 24 : marg1/ 25 : marg2/ 26 : marg3/ 27 : marin1/ 28 : marin2/ 29 : marin3/ 30 : larcher1/ 31 : larcher2/ 32 : réduit1/ 33 : réduit2/ 34 : valentin/ 35 : vauclin/ 36 : larose1/ 37 : larose2/ 38 : pothiau/ 39 : préfont1/ 40 : préfont2/ 41 : leclerc1/ 42 : leclerc2/43 : rsp1/44 : rsp2/ 45 : rsp3/ 46 : rsp4/ 47 : zombi1/48 : zombi2 (Annexes 1 & 2).

Fig. 8. Diversity and Equity Index

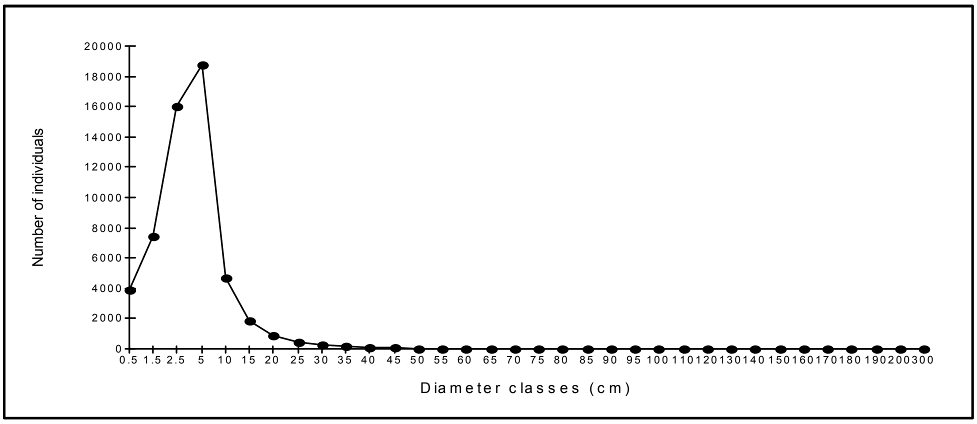


Fig. 9a. stem distribution for all stations

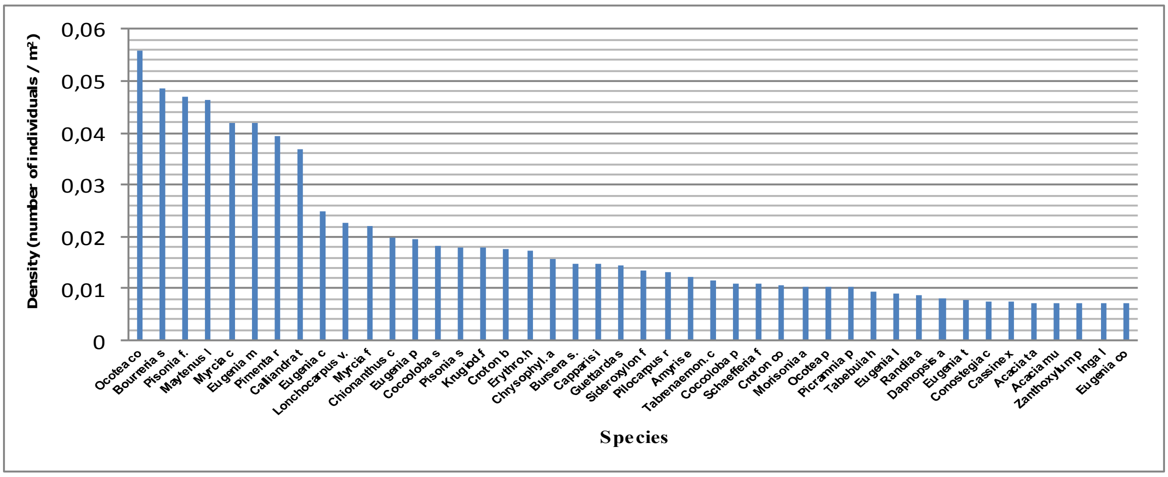
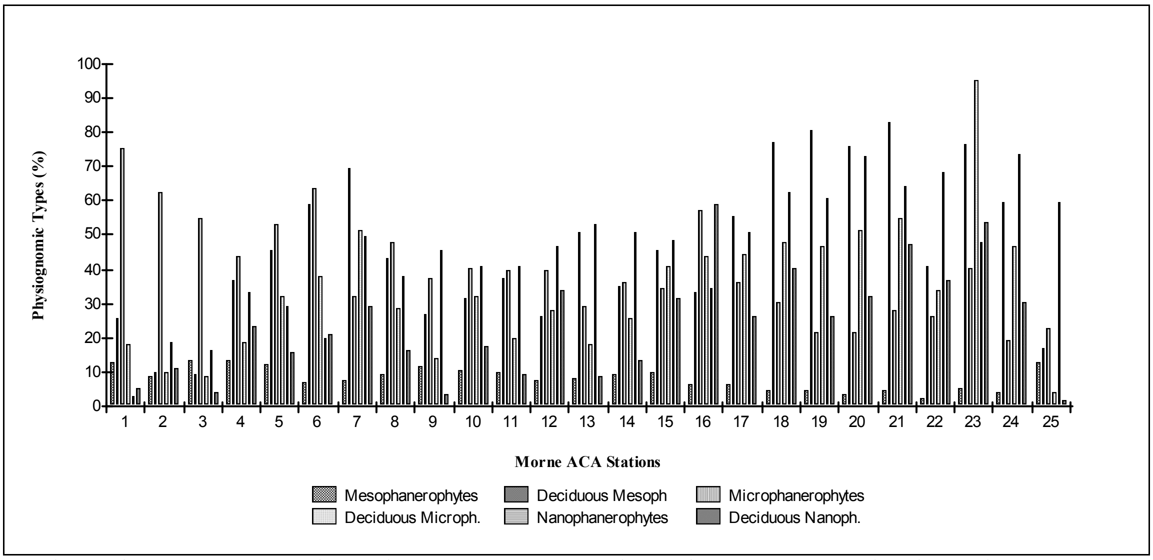


Fig. 9b. Density of the main species populations for all stations (Annex 2)



Megaphanerophytes (>40m), Macrophanerophytes (25<H<40m), mesophanerophytes (8<H<25m), microphanerophytes (2 m<H<8 m), nanophanerophytes (0.5 m <H <2 m).

Fig. 10. Example of physiognomic types of individuals and deciduous nature

The main species of ACA station 25 are mesophilous or hygro-mesophilous and may be subdivided into:

- remaining species of a former more advanced formation and their regenerations: *Eugenia oerstedeana* (rare tree and lower floor sciaphilous species), *Quararibea turbinata* (rare tree and sciaphilous to semi-sciaphilous species of the middle floor), *Guarea macrophylla* [rare tree and helio-sciaphilous plant (Joseph, 1997) of the upper floor, its regenerations can be sciaphilous or semi-sciaphilous],
- Chablis species: Heliconia *caribaea* (large heliophilous herbaceous species of the great gaps), *Piper amalago*, *Piper reticulatum* and *Piper dilatatum* (heliophilous shrub of the medium-sized gaps), *Inga laurina* (semi-heliophilous tree of small gaps,) and *Ficus nymphaeifolia* (heliophilous tree of small gaps),

- Anthropophyte autochthonous fruit and heliophilous species: *Artocarpus altilis* (mesophanerophyte), *Persea americana* (microphanerophyte), *Spondias mombin* (macrophanerophyte), *Theobroma cacao* (microphanerophyte).

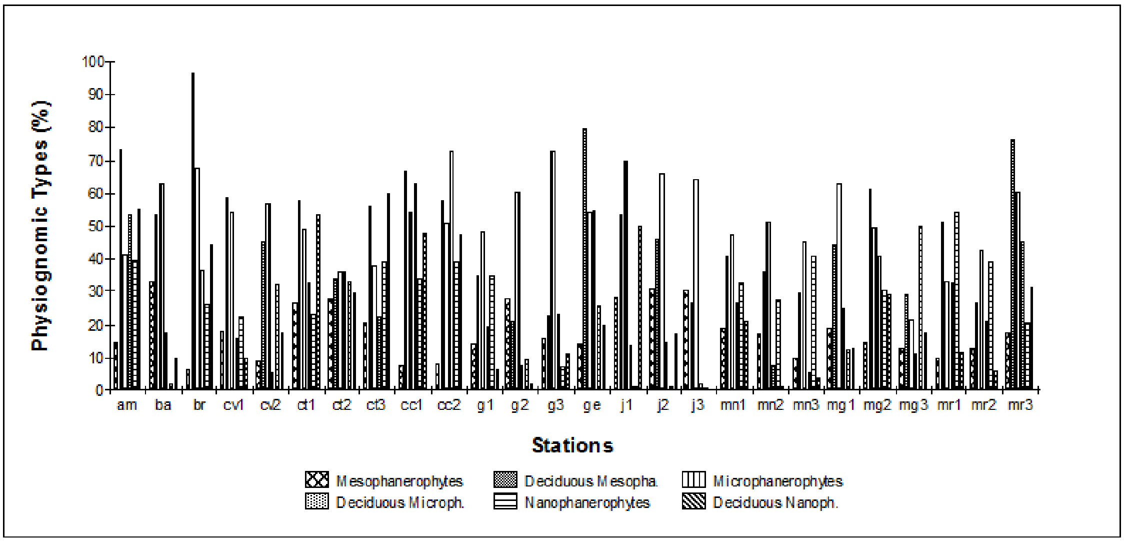
The other stations which concentrate at the intersection of the 1 & 2 factorial axes (group II) have a large number of species in common (Figure 12). Nevertheless, subgroups seem to be individualized. Station ACA 25 represents a bias that minimizes discrimination within group II.

typical of the wet or wet sub-humid bioclimate. Therefore, we can logically state that there are elements that modify certain climatic factors and which form the basis of this vegetation inversion phenomenon.

DISCUSSION

Minimal Areas

The minimal measured areas result from the fact that the survey stations are located on different topographic facies and



am : Morne Amérique/ ba : Pointe Banane/br : Pointe Brumel/ cv1 : Caravelle1/ Caravelle 2/ ct1 : Morne Caritan 1/ Morne Caritan 2/ Morne Caritan 3/ cc 1 : Crève Cœur 1 / cc2 : Crève Cœur 2/ g1: Morne Gardier 1/ g2: Morne Gardier / g3: Morne Gardier /ge : Morne Gentyl/ j1:Pointe Jean Claude 1/ j2: Pointe Jean Claude 2/ j3: Pointe Jean Claude 3 /mn 1: Morne manioc 1/mn 2: Morne manioc 2/ mn 3: Morne manioc 3/mg 1: Morne marguerite 1/ mg 2: Morne marguerite 2/ mg3 : Morne marguerite 3/mr 1: Morne Berry 1/ mr 2: Morne Berry 2/ mr 3 : Morne Berry 3. Mégaphanérophytes (>40 m), macrophanérophytes (25<H < 40 m), mésophanérophytes (8 m < H < 25 m), microphanérophytes (2 m < H < 8 m), nanophanérophytes (0,5 m < H < 2 m).

Fig. 11. Example of physiognomic types of individuals and deciduous nature (Annex 1)

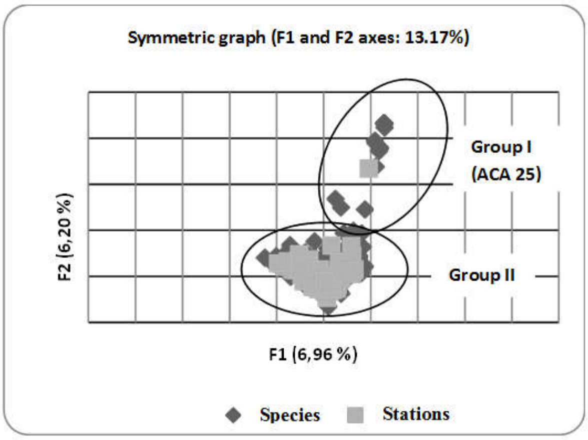


Fig. 12. Structure of species and stations

We have eliminated ACA 25 from the data table to try to highlight any differences between the other stations. The AFC obtained from the new data table (214 species -72 stations) shows a different distribution of stations and species reflecting the following aspects: degrees of evolution of plant formations expressed by physiognomic types, soil types and levels of habitat xericity (Figures 13 & 14). These elements clearly show that the ACA 25 station and the others are not ecologically similar. Despite the fact that all the plant survey stations are influenced by the dry sub-humid bioclimate, the taxa that make up the formations of the ACA 25 station are

do not belong to the same level on the scale of temporal evolution or plant succession. Anthropization has led to the introduction of phytocenoses of different ages, structures, architectures and floristic compositions. The observed physiognomies simply reflect these conditions. There is a kind of interweaving of eco-units belonging to different dynamic stages and presenting diversified floristic combinations.

Phytocenotic diversity

Due to the topographical variations that lead to changes in the environment, to which we add ancient and recent human activities, the plant groups are as diverse as they are varied. It seems that from the same collection of floristic species (a functional group, McGrady-Steed and Morin, 2000; Coomes and Grubb, 2003), these mesological factors result in multiple plant associations with a wide variety of specific dominances (Annex 3).

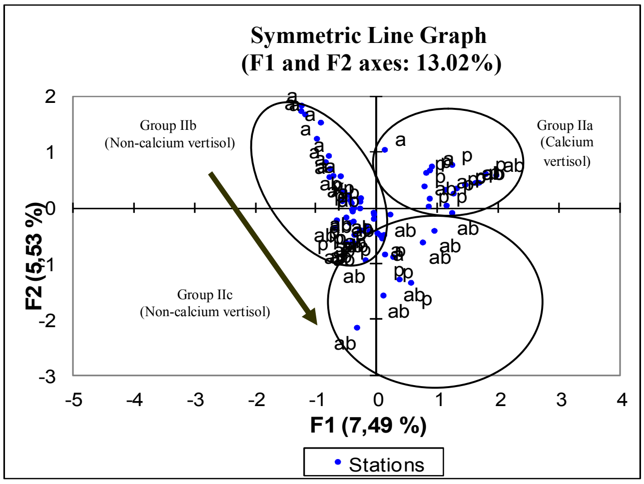


Fig. 13. Distribution of the physiognomy types in relation to the stations

Box. 1 - Stations (Annex 1)

Group IIa : marg1, marg2, marg3, mani1, mani2, mani3, marin1, marin2, marin3, ameri1, joli1, joli2, caritan1, caritan3, caritan2,
Group IIb : aca3, r/sp3, aca2, gardier1, aca13, aca1, r/zombi2, aca5, gardier3, aca9, aca15, aca11, gardier2, aca4, aca10, aca14, banane1, aca17, aca8, pothiau1, aca12.
Group IIc : genty1, m/valent1, m/vauclin1, aca6, aca7, aca16, aca18, aca19, aca20, aca21, aca22, aca23, aca24, m/larche1, m/larche2, p/larose1, p/larose2, j/claude1, j/claude2, j/claude3, creve/c1, creve/c2, carav1, carav2, m/reduit1, m/reduit2, r/leclerc1, r/leclerc2, prefont1, prefont2, r/sp1, r/sp2, r/sp4, r/zombi1, tête/s1, brumel1.

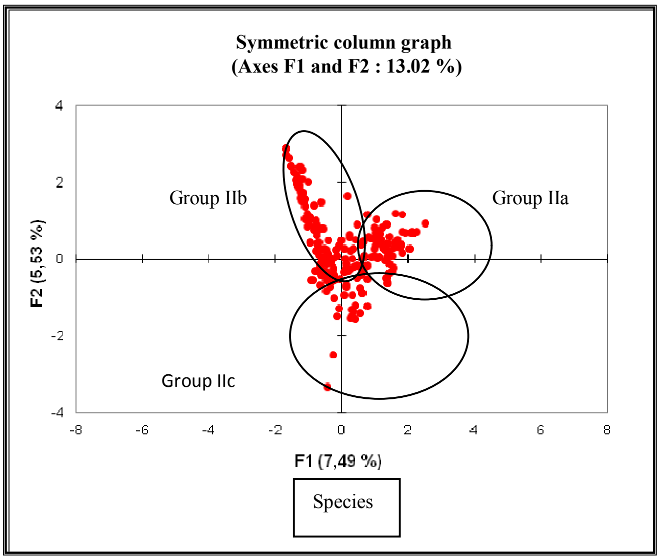


Fig. 14. Distribution of the species per station

Intra-biotic diversity and equitability

The specific diversity results from both human activities and the structure and architecture of the phytocenoses. For the entire group A sylvatic formations (Annex 1), the vertical distribution of tree crowns creates exchange surfaces which result in an interior environment that favours certain plants.

Box. 2 - Species (Annexe 2)

Group IIa : *Acacia tamarindifolia, Acacia tenuifolia, Aegiphila martinicensis, Annona reticulata, Canella winterana, Capparis baducca, Capparis cynophallophora, capparis indica, Casearia decandra, Cedrela odorata, Ceiba pentandra, Celtis iguanaea, Chiococa alba, Chionanhus compacta, Cissus verticillata, Citharexylum spinosum, Coccothrinax barbadensis, Conostegia calyptrata, Cordia alliodora, Cordia collococca, Crateva tapia, Crossopetalum rhacoma, Croton corylifolus, Ficus americana, Ficus citrifolia, Forestiera rhamnifolia, Guaiacum officinale, Gouania lupuliodes, Heteropterys purpurea, Hylocereus trigonus, Krugiodendron ferreum, Laetia thamnia, Leucaena leucocephala, Lonchocarpus sericeus, Macfadyena unguis-cati, Maclura tinctoria, Malpighia coccigera, Manilkara zapota, Manilka bidentata, Melicoccus bijugatus, Ocotea cernua, Oreopanax capitatus, Passiflora suberosa, Paulinia cururu, Piper amalago, Pisonia aculeata, Pithecellobium unguis-cati, Randia nitida, Rochefortia spinosa, Schaefferia frutescens, Schoepfia schreberi, Securidaca diversifolia, Sideroxylon foetidissimum, Sideroxylon obovatum, Solanum racemosum, Spondias mombin, Tabernaemontana citrifolia, Urvillea ulmacea, Ximenia americana, Zanthoxylim flavum, Zanthoxylum monophyllum, Zanthoxylum spinifex.*

Group IIb : *Allophyllus racemosus, Andira inermis, Antirhea coriacea,Brosimum alicastrum, Buchenavia tetraphylla, Calyptranthes elegans, Cassipourea guianensis, Chrysophyllum argenteum, Clusia major, Cordia sulcata, Cupania americana, Dalbergia monetaria, Eugenia axillaris, Eugenia gregii, Exostema sanctae-luciae, Exothea paniculata, Faramea occidentalis, Ficus nymphaeifolia, Geophila repens, Guarea glabra, Guazuma ulmifolia, Ilex nitida, Inga ingoides, Inga laurina, Ixora ferrea, Lasiacis sp., Licania leucosepala, Licaria sericea, Lonchocarpus heptaphyllus, Myrcia fallax, Myrcia leptoclada, Myrcia splendens, Ocotea leucoxylon, ocotea patens, ocotea eggersiana, Odontonema nitidum, Ormosia monosperma, Palicourea crocea, Passiflora laurifolia, Paulini plumieri, Persea americana, Pharus sp, Piper dilatatum, Plinia pinnata, Pouteria semecarpifolia, Quararibea turbinata, Simarouba amara, Smilax guianensis, Sterculia caribaea, Theobroma cacao Vitex divaricata,*

Group IIc : *Acacia muricta , Acacia retusa, Acacia sp., Actinostemon caribaeus, Aeckmea lingulata, Agave caribaeicola, Aiphanes sp., Amyris elemifera, Annona muricata, Anthurium lanceolatum, Anthurium guldinguii, Anthurium grandifolium, Anthurium palmatum, Ardisia obovata, Argythamnia polygama, Bernardia corensis, Bourreria succulenta, Bromelia plumieri, Bunchosia glandulosa, Bursera simaruba, Byrsonima spicata, Calliandra tergemina, Capparis flexuosa, Capparis coccolobifolia, Cassine xylocarpa, Cecropia schreberiana, Cestrum sp., Chamaecrista nictitans, Citru sp., Coccoloba pubescens, Coccoloba swartzii, Coccoloba venosa, Cordia martinicensis, Cornutia pyramidata,Croton bixoides, Croton flavens, Croton guildingii, Croton hicinus, Daphnopsis americana, Erithalis fruticosa, Erythrina corallodendrum, Erythroxylon havanense, Eugenia confusa, Eugenia cordata, Eugenia ligustrina, Eugenia monticola, Eugenia pseudopsidium, Eugenia tapacumensis, Garcinia humilis, Gliricidia sepium, Gonzalagunia hirsuta, Guettarda odorata, Guettarda scabra, Guzmania lingulata, Haematoxylum campechianum, Hymenaea courbaril, Jacquinnia armillaris, Lantana involucrata, Lonchocarpus punctatus, Mangifera indica, Mapighia matinicensis, Margaritaria nobilis, Maytenus laevigata, Miconia laevigata, Mimosa ceratontia, Morisonia americana, Myrcia citrifolia, Myrcianthes fragrans, Myrciaria floribunda, Ouratea guildingii, Peperomia magnoliifolia, Peperomia myrtfolia, Peperomia nigropunctata, Petrea kohautiana, Phoradendron tinerviumr Picramnia pendantra, Pilocarpus racemosus, Pilosocereus royeni, Pimenta racemosa, Pisonia fragrans, Pisonia suborbiculata, Plumeria alba, Psychotria microdon, Psychotria nervosa, Randia aculeata, Rauvolfia viridis, Rivinia humilis, Rheoo spathacea, sansevieria hyacinthoides, Swietenia macrophylla, Swietenia mahagoni, Syagrus amara, Tabebuia heterphylla, Tamarindus indica, Tillandsia utriculata, Tounefortia bicolor, Tragia volubilis, Trichostigma octandrum, Triphasia trifolia, Wedelia calycina, Zanthoxylum caribaeum, Zanthoxylum punctatum.*

At the stations in this group A, anthropization resulted in the selective choice of plant species for the purposes of domestic work. Forest groups that are not balanced, because they consist of eco-units (Oldeman, 1989) belonging to various successional stages (Joseph, 2012) reflect these conditions.

These (these forest groupings) are of different ages, spatial dimensions and floristic compositions. The great spatial and temporal heterogeneity occurs with the existence of a multitude of "installation and expansion" sites (Joseph, 2016) "and is reflected in high levels of diversity and equitability".

We place the following stations in this category:

MORNE ACA2 /MORNE ACA3 / MORNE ACA 25/ MORNE ACA 4 / MORNE ACA 1 / MORNE ACA 11 / MORNE ACA 13 / MORNE GARDIER / MORNE ACA 9 / MORNE GARDIER 1 / ROCHER ZOMBI 1 / RAVINE-SAINT-PIERRE 3 / MORNE GARDIER 2 / BOIS POTHAU (Annex 1).

specific diversity can be assimilated to their capacity to host plant species or to the diversity of their installation and expansion sites, reflecting the station's ecological conditions (Joseph, 2016). Finally, the stations in group C (shrub physiognomic type, (Annex 1) consist mainly of shrub plant associations reflecting a deep regression of the original vegetation. All formations that make up this group C are "transitional representatives" and also belong to the progressive or regressive extra-sylvatic cycles. The argument used previously to explain the differences in diversity and equitability between stations is applicable here. Ultimately, we suspect that the structural heterogeneity of the plant associations is affected by a host of low amplitude heterogeneities of topographic and edaphic or even

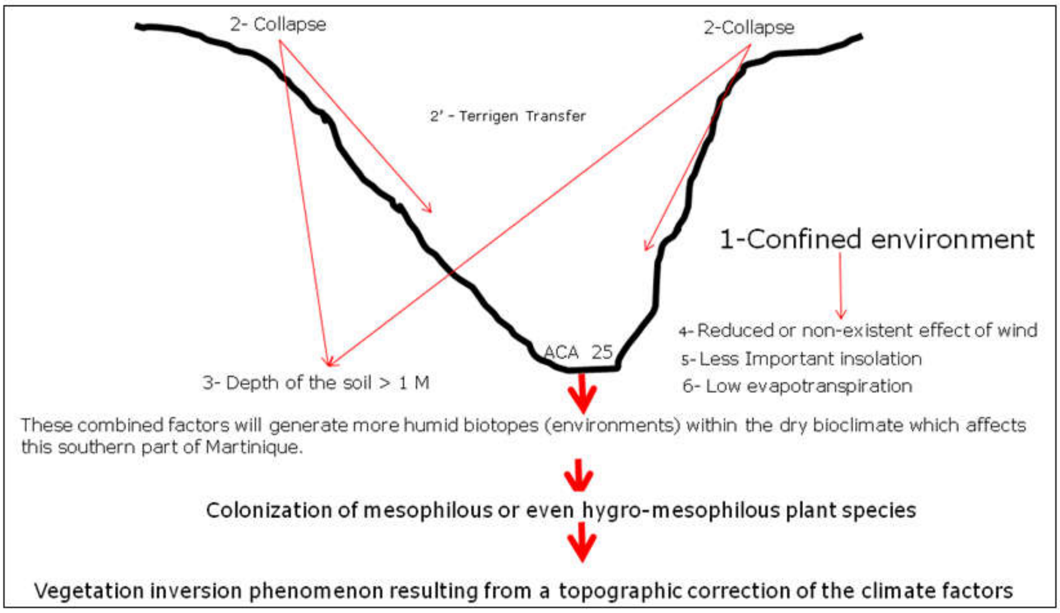


Fig. 15. Combined factors affecting vegetation inversion

Other stations in this physiognomic group (group A) have lower indices of diversity and correspond to forest formations among the more structured that appear to be balanced (more stable in their dynamic stage). In other words, the majority of plant communities belong almost at the same stage of evolution (Annex 1): POINTE JEAN-CLAUDE 1 / POINTE JEAN-CLAUDE 2 / MORNE MANIOC 2 / MORNE MANIOC 3

The secondary phytocenoses of group B (Annex 1) are in an intermediate position. The mechanisms that generate the great floristic diversity of these open environments are difficult to identify. Considering that the mesological differences between stations in this group are not significant, we can explain the variations in observed diversity[2]. Despite having a significant tree population, some high diversity inventory stations affected by the regular effects of anthropogenic or zoo-anthropogenic factors are dominated by shrub taxa. The result is a very strong interweaving of successional cycles[3], some of which are not sylvatic and are called "extra-sylvatic" (Joseph, 1997). Irrespective of the qualitative and quantitative ratio of trees and shrubs, other stations in this group B are more homogeneous and seem less affected by anthropization. Their microclimatic type. The latter are accentuated by anthropogenic ecosystemic regression and result in specific and community diversity.

Density, station distribution of diameters and heights

During their various phases of growth each individual occupies a volume resulting from a matrix of factorial constraints and corresponds to the installation and expansion site (Joseph, 2016) or the Oldeman ecotope (Oldeman, 1989). The latter leads to the existence of exclusion distances between plant specimens which is necessary for their morphogenetic development within a population and which vary according to the age of the formations. The distribution of the physiognomy perfectly corroborates the above-mentioned facts concerning the physiognomic types since the vast majority of the stations are dominated by microphanerophytes as well as nanophanerophytes with relatively high station densities.

How to explain the vegetation inversion phenomenon?

Several combined parameters lead to wetter conditions in the valley where the ACA station is located (Figure 12). The runoff water more easily transfers the terrigenous particles torn from the anthropized slopes (Figure 15) to it: this is the phenomenon of colluvion. By sedimentation these colluvions create an increase in the soil depth; which locally corresponds to a greater capacity of water retention and therefore to a

[2] Since the climatic and soil factors (physical factors) are not very variable, only anthropization seems to influence the evolution of vegetation.

[3] The transition from one stage to another during a plant succession seems to be carried out according to a cyclical process, which we call a dynamic intra-stage process subdivided into three phases: initiation, expansion, maturity.

greater water reserve usable by the plants (Figure 15). An additional factor is the secluded nature of the location, (narrow valley) characterised by poor ventilation which limits the evapotranspiration and affords a less important insolation because the sunshine is effective later in the morning and its intensity decreases earlier in the afternoon. Logically, this reality is the result of a reduction in the day and night differences in moisture, temperature and evapotranspiration. Therefore, the phenomenon of inversion results from a phytocenoses regression on the slopes[4] due to human activity resulting in an increase in the water reserve by increasing the soil depth soil and a topographical correction of the main climatic factors. Vegetation inversion phenomenon resulting from a topographic correction of the climate factors

Conclusion

Despite their small size, due to their contrasting geomorphology, the mountainous Lesser Antilles modify the structure of the main macro-climatic factors and create a plurality of biotopes. The latter are colonized by phytocenoses as numerous as they are varied both from a structural and architectural point of view as well as from a floristic point of view. In addition to the effects of topography, the impacts of human activities increase the complexity of the floristic combinations and consequently increase the biocenotic diversity. Unlike the lower islands, the ridges, the protected slopes, valleys and gullies of the mountainous islands represent as many topographic facies which participate in the installation of specific plant groups. On the wind exposed ridges of the zones influenced by the wet bioclimate and in the valleys of the sites subjected to the dry sub-wet bioclimate, the observed formations belong respectively to the sub-humid wet bioclimate (also the dry sub-humid bioclimate) and the sub-humid wet bioclimate (also the wet bioclimate). This topographic correction of climatic factors is an important element in the biocenosis mosaic characteristic of the small mountainous islands of the West Indies. This phenomenon of vegetation inversion induced by the geomorphological model mainly explains the richness of the floristic units of the island systems in other geographical regions.

Acknowledgements

We thank the Territorial Collectivity of Martinique (CTM: local government) which supported this research through financial subsidies and made possible the publication of this article.

REFERENCES

Bader, M. Y.and Ruijten, J. J. 2008. A topography□based model of forest cover at the alpine tree line in the tropical Andes. *Journal of Biogeography*, *35*(4), 711-723.

Baillard, K. 2016. The Effects of Anthropization on the Coastal Island Vegetation: The Example of the Mangrove Forest of the Bay of Fort-de-France (Martinique). *International Journal of Recent Research and Review*, *9*(2),1-4.

Barthlott, W., Lauer, W. and Placke, A. 1996. Global Distribution of Species Diversity in Vascular Plants: Towards A World Map Of Phytodiversity (Globale Verteilung der Artenvielfalt Höherer Pflanzen: Vorarbeiten zu einer Weltkarte der Phytodiversität). *Erdkunde*, 317-327.

Basnet, K. 1992. Effect of topography on the pattern of trees in Tabonuco (Dacryodes excelsa) dominated rain forest of Puerto Rico. *Biotropica*, 31-42.

Bellwood, D. R., Hoey, A. S. and Choat, J. H. 2003. Limited functional redundancy in high diversity systems: resilience and ecosystem function on coral reefs. *Ecology letters*, *6*(4), 281-285.

Bian, L. and Walsh, S.J. 1993. Scale dependencies of vegetation and topography in a mountainous environment of Montana. *The Professional Geographer*, *45*(1), 1-11.

Bonde, L., Ouedraogo, O., Kagembega, F. and Boussim, J.I. 2013. Impact des gradients topographique et anthropique sur la diversité des formations ligneuses soudaniennes. *Bois et forêts des tropiques*, (318), 15-25.

Bouysse, P. 1984. The lesser antilles island-arc-structure and geodynamic evolution. *Initial Reports of the Deep Sea Drilling Project*, *78*(AUG), 83-103.

Brooks, T.M., Mittermeier, R.A., da Fonseca, G.A., Gerlach, J., Hoffmann, M., Lamoreux, J. F., ... and Rodrigues, A.S. 2006. Global biodiversity conservation priorities. *science*, *313*(5783), 58-61.

Brown, D. G. 1994. Predicting vegetation types at treeline using topography and biophysical disturbance variables. *Journal of Vegetation Science*, *5*(5), 641-656.

Chen, Z.S., Hsieh, C.F., Jiang, F.Y., Hsieh, T.H. and Sun, I. F. 1997. Relations of soil properties to topography and vegetation in a subtropical rain forest in southern Taiwan. *Plant Ecology*, *132*(2), 229-241.

Coomes, D.A. and Grubb, P.J. 2003. Colonization, tolerance, competition and seed-size variation within functional groups. *Trends in Ecology & Evolution*, *18*(6), 283-291.

de Freitas, J.A., Rojer, A.C., Nijhof, B.S.J. and Debrot, A.O. 2014. Landscape ecological vegetation map of Sint Eustatius (Lesser Antilles). Royal Netherlands Academy of Arts and Sciences. Netherlands.

Dessalegn, D., Beyene, S., Ram, N., Walley, F. and Gala, T. S. 2014. Effects of topography and land use on soil characteristics along the toposequence of Ele watershed in southern Ethiopia. *Catena*, *115*, 47-54.

Germa, A., Quidelleur, X., Labanieh, S., Chauvel, C. and Lahitte, P. 2011. The volcanic evolution of Martinique Island: Insights from K–Ar dating into the Lesser Antilles arc migration since the Oligocene. *Journal of Volcanology and Geothermal Research*, *208*(3), 122-135.

Germa, A., Quidelleur, X., Labanieh, S., Lahitte, P. and Chauvel, C. 2010. The eruptive history of Morne Jacob volcano (Martinique Island, French West Indies): Geochronology, geomorphology and geochemistry of the earliest volcanism in the recent Lesser Antilles arc. *Journal of Volcanology and Geothermal Research*, *198*(3), 297-310.

Hatzenberger, F. 2000. The historic evolution of the Haitian forest. *Forest history: international studies on socio-economic and forest ecosystem change. CABI Publishing, Wallingford, Oxon, UK*, 65-78.

Hatzenberger, F. 2001. *Paysages et végétations des Antilles*. Paris, KARTHALA Editions, p. 508.

Helmer, E.H., Ramos, O., del MLópez, T., Quiñónez, M. and Diaz, W. 2002. Mapping the forest type and land cover of Puerto Rico, a component of the Caribbean biodiversity hotspot. *Caribbean Journal of Science*, *38*(3/4), 165-183.

[4] Passage from forest formations to shrub formations.

Hennink, S. and Zeven, A. C. 1990. The interpretation of Nei and Shannon-Weaver within population variation indices. *Euphytica*, *51*(3), 235-240.

Imorou, I.T. 2013. Effects of abiotic factors on the spatial distribution of plant groups in the Sudano-Guinean transition zone of Benin. International Journal of Biological and Chemical Sciences, 7 (6), 2178-2192.

Jose, S., Gillespie, A.R., George, S.J. and Kumar, B.M. 1996. Vegetation responses along edge-to-interior gradients in a high altitude tropical forest in peninsular India. *Forest Ecology and Management*, *87*(1), 51-62.

Joseph, P. 1997. *Dynamique, écophysiologie végétales en bioclimat sec à la Martinique,* Thèse de doctorat, Université des Antilles et de la Guyane, 941 p., annexes,111 p.

Joseph, P. 2012. The vegetation of the Lesser Antilles: floristic diversity and ecosystemic dynamics. *International Journal of Environmental Studies*, *69*(5), 816-833.

Joseph, P. 2013. Mount pele, an ecoclimatic gradient generator. *Acta Geographica Debrecina. Landscape & Environment Series*, *7*(1), 27.

Joseph, P. 2016. Contribution to the Knowledge of the Vegetation Dynamics Processes in the Lesser Antilles. *International Journal of Science and Research (IJSR),* 466-477.

Joseph, P. and Baillard, K. 2016 . The Lesser Antilles, True Laboratories for the Study of Forest Systems the Evolution (from the Inventory of Plant Species to the Dynamics of the Anthropized Landscapes). *Open Access Library Journal*, *3*(08), 1.

Le Friant, A., Harford, C. L., Deplus, C., Boudon, G., Sparks, R. S. J., Herd, R. A. and Komorowski, J. C. 2004. Geomorphological evolution of Montserrat (West Indies): importance of flank collapse and erosional processes. *Journal of the Geological Society*, *161*(1), 147-160.

Lippok, D., Beck, S.G., Renison, D., Hensen, I., Apaza, A.E. and Schleuning, M. 2014. Topography and edge effects are more important than elevation as drivers of vegetation patterns in a neotropical montane forest. *Journal of Vegetation Science*, *25*(3), 724-733.

Longuet-Higgins, M.S. 1971. On the Shannon-Weaver index of diversity, in relation to the distribution of species in bird censuses. *Theoretical population biology*, *2*(3), 271-289.

Lugo, A.E., Schmidt, R. and Brown, S. 1981. Tropical forests in the Caribbean. *Ambio*, 318-324.

Magnussen, S. and Boyle, T.J.B. 1995. Estimating sample size for inference about the Shannon-Weaver and the Simpson indices of species diversity. *Forest Ecology and Management*, *78*(1), 71-84.

McGrady-Steed, J. and Morin, P.J. 2000. Biodiversity, density compensation, and the dynamics of populations and functional groups. *Ecology*, *81*(2), 361-373.

Mittermeier, R.A., Turner, W.R., Larsen, F.W., Brooks, T.M. and Gascon, C. 2011. Global biodiversity conservation: the critical role of hotspots. In *Biodiversity hotspots* (pp. 3-22). Springer Berlin Heidelberg.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A. and Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature*, *403*(6772), 853-858.

Oldeman, R.A.A. 1989. Dynamics in tropical rain forests. *Tropical forests: botanical dynamics, speciation and diversity*, 3-21.

Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V., Underwood, E.C., ... and Loucks, C.J. 2001. Terrestrial Ecoregions of the World: A New Map of Life on Earth A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity. *BioScience*, *51*(11), 933-938.

Reed, D.N., Anderson, T.M., Dempewolf, J., Metzger, K. and Serneels, S. 2009. The spatial distribution of vegetation types in the Serengeti ecosystem: the influence of rainfall and topographic relief on vegetation patch characteristics. *Journal of Biogeography*, *36*(4), 770-782.

Spalding, M. and Kainuma, M. 2004. Mangroves. *Encyclopedia of Forest Sciences*, 1704-1712.

Stoutjesdijk, Ph., Barkman, J.J. 2014. Microclimate, Vegetation & Fauna. Brill Academic Publishers. p. 237.

Takyu, M., Aiba, S.I. and Kitayama, K. 2002. Effects of topography on tropical lower montane forests under different geological conditions on Mount Kinabalu, Borneo. *Plant Ecology*, *159*(1), 35-49.

Taylor, M.A. and Alfaro, E.J. 2005. Central America and the Caribbean, climate of. In *Encyclopedia of World Climatology* (pp. 183-189). Springer Netherlands.

Thomson, A.G. and Jones, C. 1990. Effects of topography on radiance from upland vegetation in North Wales. *International Journal of Remote Sensing*, *11*(5), 829-840.

Trejo□Torres, J.C. and Ackerman, J.D. 2001. Biogeography of the Antilles based on a parsimony analysis of orchid distributions. *Journal of Biogeography*, *28*(6), 775-794.

Watterson, G.A. 1974. Models for the logarithmic species abundance distributions. *Theoretical Population Biology*, *6*(2), 217-250.

Webb, C.O., Ackerly, D.D., McPeek, M.A. and Donoghue, M.J. 2002. Phylogenies and community ecology. *Annual review of ecology and systematics*, 475-505.

Wohl, D.L., Arora, S. and Gladstone, J.R. 2004. Functional redundancy supports biodiversity and ecosystem function in a closed and constant environment. *Ecology*, *85*(6), 1534-1540.

Yasuhiro, K., Hirofumi, M. and Kihachiro, K. 2004. Effects of topographic heterogeneity on tree species richness and stand dynamics in a subtropical forest in Okinawa Island, southern Japan. *Journal of Ecology*, *92*(2), 230-240.

Annex 1. Main mesological characteristics of the stations, Physionomies and land surfaces

TP: Physiognomic Type (Group A: Structured sylvatic formations, Group B: pre-forest to young forest formations, Group C: Pre-sylvatic to shrub formations) / Exp. : Exposure [V / O: West Side - V / E: East Side - PP: Protected Plateau - C: Peak - PE: Exposed Plateau -Val. : Valley / S : Soils (: F : Ferrisoils– I : inter-grade ferrisoil/vertisoil – V : Vertisoil) / PS : Soil depth / Pré. : Rainfall.

Stations	TP	PS	Exp.	S	Pre.	Slope	ST	Stations	TP	PS	Exp.	S	Pre.	Slope	ST
1-Morne Aca1	GA	1,5	V/O	F	1600	14°	3,15	38-Pointe Jean Claude1	GA	<1	V/O	F	1500/1600	15°	5,23
2-Morne Aca2	GA	>1,5	V/O	F	1600	0°	2,94	39-Pointe Jean Claude2	GB	<0,8	V/O	F	1500/1600	35°	5,65
3-Morne Aca3	GA	1,5	V/O	F	1600	10°	4,65	40-Pointe Jean Claude3	GA	<1	P.S	F	1500/1600	7°	4,89
4-Morne Aca4	GA	1,5	V/O	F	1600	20°	4,43	41-Morne Joli cœur 1	GB	<0,8	V/E	V	1300/1500	25°	3,8
5-Morne Aca5	GB	<1	V/O	F	1600	20°	4,38	42-Morne Joli cœur 2	GB	<0,8	V/E	V	1300/1500	30°	4,15
6-Morne Aca6	GB	<0,8	V/O	F	1600	15°	7,1	43-Morne Manioc 1	GB	<0,8	P.S	V	1300/1500	0°	4,45
7-Morne Aca7	GC	<0,8	V/O	F	1600	22°	3,41	44-Morne Manioc 2	GB	<0,8	V/E	V	1300/1500	20°	3,81
8-Morne Aca8	GC	<0,8	V/O	F	1600	0°	2,64	45-Morne Manioc 3	GB	<0,8	V/O	V	1300/1500	25°	7,76
9-Morne Aca9	GA	<0,8	V/O	F	1600	20°	3,55	46-Morne Marguerite1	GC	<0,8	P.S	V	1300/1500	0°	4.38
10-Morne Aca10	GC	<0,8	V/O	F	1600	20°	3	47-Morne Marguerite 2	GC	<0,8	V/O	V	1300/1500	25°	4.12
11-Morne Aca11	GA	<0,8	V/O	F	1600	20°	2,56	48-Morne Marguerite 3	GB	<0,8	V/O	V	1300/1500	32°	3,2
12-Morne Aca12	GB	<0,8	V/O	F	1600	20°	2,67	50-Morne Berry 1	GB	<0,8	V/E	V	1300/1500	32°	3,5
13-Morne Aca13	GA	<0,6	V/O	V	1400	21°	1,85	51-Morne Berry 2	GA	<1	V/E	V	1300/1500	40°	3,5
14-Morne Aca14	GB	<0,6	V/O	V	1400	20°	2,2	52-Morne Berry 3	GC	<0,6	C	V	1300/1500	10°	6,95
15-Morne Aca15	GC	<0,6	V/O	V	1400	20°	2,78	53-Morne Larcher1	GB	0,62	P.S	V	1250/1500	0°	3,25
16-Morne Aca16	GC	<0,3	V/O	V	1400	30°	2,17	54-Morne Larcher2	GC	<0,3	V/E	V	1250/1500	35°	3.4
17-Morne Aca17	GC	<0,8	V/O	V	1400	0°	2.66	55-Morne Valentin	GB	0,74	V/O	V	1500/2000	35°	5,77
18-Morne Aca18	GC	<0,6	V/O	V	1400	20°	3,4	56-Montagne du Vauclin	GB	<0,8	V/E	F	1600/1800	20°	3,44
19-Morne Aca19	GC	<0,8	V/O	V	1400	5°	3,7	57-Pointe La-Rose1	GB	0,8	Val.	V	1250/1500	20°	3,4
20-Morne Aca20	GC	<0,6	V/O	V	1400	20°	4,8	58-Pointe La-Rose2	GB	>1,5	Val.	V	1250/1500	0°	3,27
21-Morne Aca21	GC	<0,6	V/E	V	1400	20°	4,34	59-Bois Pothau	GA	>1	V/E	F	1500/2000	25°	5,72
22-Morne Aca22	GC	<0,5	V/E	V	1250	30°	2,42	60-Morne Préfontaine1	GB	>1	V/O	V	1500/2000	0°	3,07
23-Morne Aca23	GC	<0,8	V/E	V	1250	15°	2,72	61-Morne Préfontaine2	GB	≤0,8	PP	V	1500/2000	25°	3,72
24-Morne Aca24	GC	<0,8	V/E	V	1250	20°	2,08	62-Rocher Leclerc1	GB	≤0,6	V/E	V	1250/1500	22°	4,07
25-Morne Aca25	GA	<0,8	V/E	V	1500	30°	8,81	63-Rocher Leclerc2	GC	≤1,5	C	V	1250/1500	0°	1,48
26-Pointe Banane	GB	>1	PP	V	1500	0°	4,37	64-Ravine Saint-Pierre 1	GC	>1	Val.	V	1300/1500	0°	2.56
27-Pointe Brumel	GC	0,3	VE	F	1250/1500	20°	1,7	65-Ravine Saint-Pierre 2	GC	≤0,8	Val.	V	1300/1500	15°	4,14
28-Morne Amérique	GA	<0,6	V/E	V	1300/1500	20°	3,63	66-Ravine 67-Saint-Pierre 3	GA	≤0,8	Val.	V	1300/1500	15°	3,23
29-Morne Caritan1	GB	<0,6	V/O	V	1300/1500	30°	4,22	68-Ravine Saint-Pierre 4	GC	≥0,6	Val	V	1300/1500	25°	3
30-Morne Caritan2	GB	<0,8	C	V	1300/1500	0°	4,12	69-Caravelle 1	GB	0,9	Val.	F	1250/1500	20°	4,1
31-Morne Caritan3	GB	<0,8	V/E	V	1300/1500	30°	3,36	70-Caravelle 2	GB	>1,5	V/O	F	1250/1500	0°	2,24
Piton 32-Crève Cœur 1	GC	<0,6	V/O	V	1250/1500	25°	2,37	71-Rocher Zombi1	GB	≤0,6	C	V	1300/1500	0°	3,5
Piton 33-Crève Cœur 2	GC	<0,6	V/E	V	1250/1500	20°	2,19	72-Rocher Zombi2	GA	≤0,8	V/O	V	1300/1500	30°	4,3
34-Morne Gardier1	GA	<0,8	V/O	I	1500/2000	35°	4,3	73-Tête de singe	GC	0,2	V/O	V	1250/1500	0°	0,85
35-Morne Gardier2	GA	>1	PE	I	1500/2000	0°	3,22	74-Morne Réduit1	GC	0,62	V/E	V	1250/1500	20°	2.12
36-Morne Gardier3	GA	<0,8	V/E	I	1500/2000	30°	3,9	75-Morne Réduit2	GC	0,2	V/E	V	1250/1500	35°	1,49
37-Morne Gentyl	GC	<0,6	V/O	V	1300/1500	30°	3,46								

Annex 2 - List of species and physiognomic types

Family	Species	Type	Status
Mimosaceae	*Acacia muricata*	tree	Mésophanérophyte
Mimosaceae	*Acacia retusa*	liana	
Mimosaceae	*Acacia sp*	shrub	Microphanéropyte
Mimosaceae	*Acacia tenuifolia*	liana	
Mimosaceae	*Acacia tamarindifolia*	shrub	
Mimosaceae	*Leucaena leucocephala*	tree	Microphanérophyte
Mimosaceae	*Inga laurina*	tree	Mégaphanérophyte
Mimosaceae	*Inga ingoides*	tree	Mégaphanérophyte
Mimosaceae	*Mimosa ceratonia*	liana	
Mimosaceae	*Calliandra tergemina*	shrub	Microphanérophyte
Mimosaceae	*Pithecellobium unguis-cati*	shrub	Microphanérophyte
Bromeliaceae	*Aeckmea lingulata*	grass	
Bromeliaceae	*Bromelia plumieri*	grass	
Bromeliaceae	*Guzmania lingulata*	grass	
Bromeliaceae	*Pitcairnia angustifolia*	grass	
Bromeliaceae	*Tillandsia utriculata*	Grass / epiphyte	
Verbenaceae	*Aegiphila martinicensis*	shrub	Microphanérophyte
Verbenaceae	*Citharexylum spinosum*	tree	Mésophanérophyte
Verbenaceae	*Cornutia pyramidata*	tree	Mésophanérophyte
Verbenaceae	*Lantana involucrata*	shrub	Microphanérophyte
Verbenaceae	*Petrea kohautiana*	liana	
Verbenaceae	*Vitex divaricata*	tree	Mégaphanérophyte
Rutaceae	*Amyris elemifera*	tree	Mésophanérophyte
Rutaceae	*Citrus sp*	tree	Microphanérophyte
Rutaceae	*Zanthoxylum caribaeum*	tree	Mégaphanérophyte
Rutaceae	*Zanyhoxylum spinifex*	tree	Mésophanérophyte
Rutaceae	*Zanthoxylum flavum*	tree	Mégaphanérophyte
Rutaceae	*Zanthoxylum monophyllum*	tree	Mésophanérophyte
Rutaceae	*Zanthoxylum punctatum*	tree	Microphanérophyte
Rutaceae	*Pilocarpus racemosus*	tree	Microphanérophyte
Sapindaceae	*Allophyllus racemosus*	tree	Mésophanérophyte
Sapindaceae	*Cupania americana*	tree	Mésophanérophyte
Sapindaceae	*Paullinia cururu*	liana	
Sapindaceae	*Paullinia plumieri*	liana	
Sapindaceae	*Exothea paniculata*	tree	Mésophanérophyte
Sapindaceae	*Melicoccus bijugatus*	tree	Mésophanérophyte
Araceae	*Anthurium acaule*	grass	
Araceae	*Athurium guildinguii*	grass	
Araceae	*Anthurium grandifolium*	grass	
Araceae	*Anthurium palmatum*	Liana / grass	
Euphorbiaceae	*Actinostemon caribaeus*	shrub	Nanophanérophyte
Euphorbiaceae	*Argythamnia polygama*	Sub-shrub	Nanophanérophyte
Euphorbiaceae	*Bernadia corensis*	Sub-shrub	Nanophanérophyte
Euphorbiaceae	*Croton corylifolius*	shrub	Microphanérophyte
Euphorbiaceae	*Croton bixoides*	shrub	Microphanérophyte
Euphorbiaceae	*Croton falvens*	shrub	Microphanérophyte
Euphorbiaceae	*Croton hircinus*	shrub	Nanophanérophyte
Euphorbiaceae	*Margaritaria nobilis*	tree	Mégaphanérophyte
Euphorbiaceae	*Tragia volubilis*	liana	
Agavaceae	*Agavace caribaeicola*	grass	
Fabaceae	*Andira inermis*	tree	Mégaphanérophyte
Fabaceae	*Gliricidia sepium*	tree	Microphanérophyte
Fabaceae	*Lonchocarpus domingensis*	tree	Mésophanérophyte
Fabaceae	*Lonchocarpus pentaphyllus*	tree	Mésophanérophyte
Fabaceae	*Lonchocarpus violaceus*	tree	Mésophanérophyte
Fabaceae	*Ormosia monosperma*	tree	Mésophanérophyte
Fabaceae	*Dalbergia monetaria*	liana	
Fabaceae	*Eryhrina corallodendrum*	tree	Microphanérophyte
Myrsinaceae	*Ardisia obovata*	tree	Microphanérophyte
Moraceae	*Artocarpus altilis*	tree	Mésophanérophyte
Moraceae	*Brosimum alicastrum*	tree	Mégaphanérophyte
Moraceae	*Maclura tinctoria*	tree	Mésophanérophyte
Moraceae	*Ficus americana*	tree	Mésophanérophyte
Moraceae	*Ficus citrifolia*	tree	Mésophanérophyte
Moraceae	*Cecropia schreberiana*	tree	Mésophanérophyte
Moraceae	*Ficus nymphaeifolia*	tree	Mésophanérophyte
Annonaceae	*Annona muricata*	tree	Microphanérophyte
Annonaceae	*Annona reticulata*	tree	Microphanérophyte
Rubiaceae	*Antirhea coriacea*	tree	Mésophanérophyte
Rubiaceae	*Chiococca alba*	liana	
Rubiaceae	*Chione venosa*	tree	Mésophanérophyte
Rubiaceae	*Gonzalagunia hirsuta*	shrub	Nanophanérophyte
Rubiaceae	*Erithalis fruticosa*	shrub	Nanophanérophyte
Rubiaceae	*Exostema sanctae-luciae*	tree	Mésophanérophyte
Rubiaceae	*Faramea occidentalis*	tree	Microphanérophyte
Rubiaceae	*Geophila repens*	Liana / grass	
Rubiaceae	*Guettarda odorata*	tree	Mésophanérophyte
Rubiaceae	*Guattarda scabra*	tree	Mésophanérophyte

Rubiaceae	*Ixora ferrea*	tree	Microphanérophyte
Rubiaceae	*Psychotria microdon*	Liane / shrub	
Rubiaceae	*Psychotria nervosa*	shrub	Nanophanérophyte
Rubiaceae	*Randia aculeata*	shrub	Nanophanérophyte
Rubiaceae	*Randia nitida*	shrub	Nanophanérophyte
Rubiaceae	*Palicourea crocea*	shrub	Nanophanérophyte
Arecaceae	*Aiphanes minima*	tree	Mésophanérophyte
Arecaceae	*Aiphanes erosa (St/Vincent)*	tree	Mésophanérophyte
Arecaceae	*Coccothrinax barbadensis*	tree	Mésophanérophyte
Arecaceae	*Rhyticocos amara*	tree	Mésophanérophyte
Boraginaceae	*Bourreria succulenta*	tree	Microphanérophyte
Boraginaceae	*Cordia alliodora*	tree	Mésophanérophyte
Boraginaceae	*Cordia martinicenisis*	shrub	Microphanérophyte
Boraginaceae	*Cordia sulcata*	tree	Mésophanérophyte
Boraginaceae	*Cordia collococca*	tree	Mésophanérophyte
Boraginaceae	*Rochefortia spinosa*	tree	Mésophanérophyte
Boraginaceae	*Tournefortia bicolor*	liana	
Combretaceae	*Buchenavia tetraphylla*	tree	Mégaphanérophyte
Malpighiaceae	*Bunchosia glandulosa*	tree	Microphanérophyte
Malpighiaceae	*Heteropterys purpurea*	liana	
Malpighiaceae	*Malpighia coccigera*	shrub	Nanophanérophyte
Malpighiaceae	*Malpighia martinicensis*	shrub	Microphanérophyte
Malpighiaceae	*Byrsonima spicata*	tree	Mégaphanérophyte
Simaroubaceae	*Picramnia pentandra*	tree	Nanophanérophyte
Simaroubaceae	*Picrasma exelsa*	tree	Microphanérophyte
Simaroubaceae	*Simarouba amara*	tree	Mégaphanérophyte
Capparidaceae	*Capparis baduca*	shrub	Microphanérophyte
Capparidaceae	*Morisonia americana*	tree	Microphanérophyte
Capparidaceae	*Capparis indica*	tree	Microphanérophyte
Capparidaceae	*Crateva tapia*	tree	Mésophanérophyte
Capparidaceae	*Capparis hastata*	tree	Microphanérophyte
Capparidaceae	*Capparis flexuosa*	Liana/ shrub.	
Capparidaceae	*Capparis cynophallophora*	tree	Microphanérophyte
Ulmaceae	*Celtis iguanaea*	liana	
Flacourtiaceae	*Casearia decandra*	tree	Microphanérophyte
Flacourtiaceae	*Laetia thamnia*	tree	Microphanérophyte
Rhyzophoraceae	*Cassipourea guianensis*	tree	Mésophanérophyte
Oleaceae	*Chionanthus compacta*	tree	Mésophanérophyte
Oleaceae	*Forestiera rhamnifolia*	tree	Microphanérophyte
Sapotaceae	*Chrysophyllum argenteum*	tree	Mésophanérophyte
Sapotaceae	*Manilkara zapota*	tree	Mésophanérophyte

Sapotaceae	*Manilkara bidentata*	tree	Mégaphanérophyte
Sapotaceae	*Sideroxylon obovatum*	tree	Mésophanérophyte
Sapotaceae	*Sideroxylon foetidissimum*	tree	Mégaphanérophyte
Sapotaceae	*Pouteria semecarpifolia*	tree	Mégaphanérophyte
Sapotaceae	*Pouteria multifolia*	tree	Mésophanérophyte
Vitaceae	*Cissus verticillata*	liana	
Clusiaceae	*Clusia mojor*	Shrub / epiphyte	Microphanérophyte
Clusiaceae	*Garcinia humilis*	tree	Mésophanérophyte
Polygonaceae	*Coccoloba pubescens*	tree	Mésophanérophyte
Polygonaceae	*Coccloba swartzii*	tree	Mésophanérophyte
Polygonaceae	*Coccoloba venosa*	tree	Mésophanérophyte
Melastomaceae	*Conostegia calyptrata*	shrub	Microphanérophyte
Melastomaceae	*Miconia laevigata*	shrub	Microphanérophyte
Celastraceae	*Cassine xylocarpa*	tree	Mésophanérophyte
Celastraceae	*Maytenus laevigata*	tree	Mésophanérophyte
Celastraceae	*Crossopetalum rhacoma*	shrub	Nanophanérophyte
Celastraceae	*Gyminda latifolia*	tree	Mésophanérophyte
Celastraceae	*Schaefferia frutescens*	tree	Microphanérophyte
Solanaceae	*Cestrum sp*	shrub	Microphanérophyte
Solanaceae	*Solanum racemosum*	shrub	Nanophanérophyte
Myrtaceae	*Calyptranthes elegans*	tree	Mésophanérophyte
Myrtaceae	*Eugenia axillaris*	tree	Mésophanérophyte
Myrtaceae	*Eugenia confusa*	tree	Mésophanérophyte
Myrtaceae	*Eugenia ligustrina*	shrub	Microphanérophyte
Myrtaceae	*Eugenia monticola*	tree	Mésophanérophyte
Myrtaceae	*Eugenia oerstedeana*	tree	Mésophanérophyte
Myrtaceae	*Eugenia pseudopsidium*	tree	Mésophanérophyte
Myrtaceae	*Eugenia tapacumensis*	tree	Mésophanérophyte
Myrtaceae	*Eugenia cortada*	tree	Microphanérophyte
Myrtaceae	*Eugenia hodgei*	tree	Microphanérophyte
Myrtaceae	*Eugenia gregii*	tree	Microphanérophyte
Myrtaceae	*Myrcia citrifolia*	tree	Microphanérophyte
Myrtaceae	*Myrcia fallax*	tree	Mésophanérophyte
Myrtaceae	*Myrcia leptoclada*	tree	Microphanérophyte
Myrtaceae	*Myrciaria floribunda*	tree	Microphanérophyte
Myrtaceae	*Pimenta racemosa*	tree	Mésophanérophyte
Myrtaceae	*Myrcia splendens*	tree	Microphanérophyte
Myrtaceae	*Plinia pinnata*	tree	Microphanérophyte
Canellaceae	*Canella winterana*	tree	Mésophanérophyte
Meliaceae	*Cedrela odorata*	tree	Mésophanérophyte
Meliaceae	*Guarea glabra*	tree	Mésophanérophyte
Meliaceae	*Guarea macrophylla*	tree	Mésophanérophyte

Meliaceae	*Swietenia macrophylla*	tree	Mésophanérophyte
Meliaceae	*Swietenia mahagoni*	tree	Mésophanérophyte
Thymeleaceae	*Dapnopsis americana*	tree	Microphanérophyte
Erytroxylaceae	*Erytroxylum havanense*	tree	Microphanérophyte
Theophrastaceae	*Jacquinia armillaris*	shrub	Nanophanérophyte
Rhamnaceae	*Gouania lupuloides*	liana	
Rhamnaceae	*Krugiodendron ferreum*	tree	Mésophanérophyte
Sterculiaceae	*Guazuma ulmifolia*	tree	Mésophanérophyte
Sterculiaceae	*Sterculia caribaea*	tree	Mésophanérophyte
Sterculiaceae	*ThEobroma cacao*	tree	Microphanérophyte
Zygophyllaceae	*Guaiacum officinale*	tree	Microphanérophyte
Caesalpiniaceae	*Haematoxylon campechianum*	tree	Mésophanérophyte
Caesalpiniaceae	*Hymenaea courbaril*	tree	Mégaphanérophyte
Caesalpiniaceae	*Senna obtusifolia*	shrub	Nanophanérophyte
Caesalpiniaceae	*Chamaecrista nictitans*	shrub	Nanophanérophyte
Caesalpiniaceae	*Swartzia simplex(St-Vincent)*	tree	Microphanérophyte
Caesalpiniaceae	*Tamarindus indica*	tree	Mésophanérophyte
Strelitziaceae	*Heliconia caribaea*	grass	
Cactaceae	*Hylocereus trigonus*		
Cactaceae	*Pilocereus royeni*	shrub	Nanophanérophyte
Aquifoliaceae	*Ilex nitida*	tree	
Poaceae	*Lasiacis divaricata*	grass	
Poaceae	*Pharus latifolius*		
Lauraceae	*Licaria sericea*	tree	Mésophanérophyte
Lauraceae	*Persea americana*	tree	Microphanérophyte
Lauraceae	*Ocotea coriacea*	tree	Mésophanérophyte
Lauraceae	*Ocotea patens*	tree	Mésophanérophyte
Lauraceae	*Ocotea leucoxylon*	tree	Mésophanérophyte
Lauraceae	*Ocotea eggersiana*	tree	Mégaphanérophyte
Lauraceae	*Ocotea cernua*	tree	Mésophanérophyte
Rosaceae	*Licania leucosepala*	tree	Mégaphanérophyte
Bignoniaceae	*Macfadyena unguis-cati*	liana	
Bignoniaceae	*Tabebuia heterophylla*	tree	Mésophanérophyte
Bignoniaceae	*Tabebuia pallida(S/Vincent)*	tree	Mésophanérophyte
Anacardiaceae	*Mangifera indica*	tree	Mésophanérophyte
Anacardiaceae	*Spondias mombin*	tree	Mégaphanérophyte
Acanthaceae	*Odontonema nitidum*	grass	
Oxalidaceae	*Oxalis frutescens*	grass	
Ochnaceae	*Ouratea guildinguii*	tree	Mésophanérophyte
Araliaceae	*Oreopanax capitatus*	Shrub / epiphyte	Microphanérophyte
Piperaceae	*Peperomia magnoliifolia*	grass	
Piperaceae	*Peperomia myrtifolia*	Grass / saxatile	
Piperaceae	*Piper amalago*	shrub	Nanophanérophyte
Piperaceae	*Piper dilatum*	shrub	Nanophanérophyte
Piperaceae	*Piper reticulatum*	shrub	Nanophanérophyte
Piperaceae	*Peperomia nigropunctata*	Grass / epiphyte	
Passifloraceae	*Passiflora suberosa*	liana	
Passifloraceae	*Passiflora laurifolia*	liana	
Malvaceae	*Pavonia spinifex*	shrub	Nanophanérophyte
Loranthaceae	*Phoradendron trinervium*	Grass / epiphyte	
Burseraceae	*Bursera simaruba*	tree	Mésophanérophyte
Nyctaginaceae	*Pisonia aculeata*	liana	
Nyctaginaceae	*Pisonia fragrans*	tree	Mésophanérophyte
Nyctaginaceae	*Pisonia suborbiculata*	tree	Microphanérophyte
Apocynaceae	*PLumeria alba*	tree	Microphanérophyte
Apocynaceae	*Rauvolfia viridis*	tree	Microphanérophyte
Apocynaceae	*Tabernaemontana citrifolia*	tree	Microphanérophyte
Commelinaceae	*Roheo spatacea*	grass	
Pytolacaceae	*Rivinia humilis*	Sub-shrub	Nanophanérophyte
Pytolacaceae	*Trichostigma octandrum*	liana	
Bombacaceae	*Ceiba pantandra*	tree	Mégaphanérophyte
Bombacaceae	*Quararibea turbinata*	tree	Mésophanérophyte
Agavaceae	*Sansevieria trifasciata*	grass	
Smilacaceae	*Smilax guianensis*	liana	
Olacaceae	*Ximenia americana*	tree	Microphanérophyte
Olacaceae	*Schoepfia schreberi*	shrub	Nanophanérophyte
Polygalaceae	*Securidaca diversifolia*	liana	
Asteraceae	*Wedelia calycina*	grass	
Malpighiaceae		liana	
Rutaceae	*Triphasia trifolia*	shrub	Nanophanérophyte
Sapindaceae	*Urvillea ulmacea*	liana	
Euphorbiaceae	*Croton guidinguii*	shrub	Nanophanérophyte
Myrtaceae	*Myrcianthes fragrans*	tree	Mésophanérophyte

Annex 3 - Some structural features of the "Morne ACA" stations

Land area (ST: m²), Natural Mortality (MN: m² / number of individuals), Anthropogenic mortality (MA: m² / number of individuals), Survey area (SR: m²). Formations of Structuring Species: CES: Percentage compared to the total land area of the station / number of individuals).

Station Aca1, S.R= 1050 m² , S.T= 4,14 m² , M.N= 1,21 m²/73 ind., M.A= 0,037 m²/4 ind.
C.E.S : Coccoloba swartzii(20,4/49)/Byrsonima spicata (6,7/5)/ Bursera simaruba (4,8/4)/ Buchenavia tetraphylla(4,2/5)/ Bourreria succulenta(2,5/ 8) / Coccoloba pubescens(4,12/15) / Eugenia pseudopsidium (5,2/52)/Ficus nymphaeifolia(3,5/2)/ Guettarda scabra (3,86/8)/Inga laurina (8,16/23)/Myrcia fallax (6,16/66)/Octea patens (3,1/98)

Station Aca2, S.R= 750 m², S.T= 2,76 m², M.N= 1,38 m²/76 ind., M.A= 0,063 m²/18 ind.
C.E.S : Buchenavia tetraphylla (7,1/3)/ Cassipourea guianensis (5,4/57)/Coccoloba swartzii (11,8/17) /Eugenia pseudopsidium (3,87/20)/Inga laurina (10/14)/Myrcia fallax(7,5/78)/Ocotea eggersiana (4/14)/Pimenta racemosa (12,9/14) / Pisonia fragrans(5,98/11)

Station Aca3, S.R= 750 m², S.T= 4,36 m², M.N= 0,95 m²/60 ind., M.A= 0,17m²/21 ind.
C.E.S : Exostema sanctae-luciae(2,61/4)/Hymenaea courbaril(11,9/3)/ Ilex nitida(2,6/13)/Inga laurina(10/14)/ Licaria sericea(8,44/17)/ Myrcia fallax(2,52/48)/Ocotea eggersiana(22,24/29)/Ocotea patens (2,52/21)/Pisonia fragrans(6,2/9)/Simaruba amara(8,62/4)/Zanthoxylum flavum(2,88/1)/ Sterculia caribaea(3,15/4)/

Station Aca4, S.R= 800 m², S.T= 4,43 m², M.N= 0,78 m²/59 ind., M.A= 0
C.E.S : Buchenavia tetraphylla(5,26/3)/Byrsonima spicata(10,22/4)/Coccoloba pubescens (3,35/13)/Eugenia confusa (3,81/54)/Manilkara bidentata (24,6/18) /Maytenus laevigata(4,53/34)/Myrcia fallax (4/152)/Pimenta racemosa(4,8/27)/Pisonia fragrans (3,4/22)/Sideroxylon foetidissimum(3,34/1)/

Station Aca5, S.R= 750 m², S.T= 4,11 m², M.N= 0,41 m²/65 ind., M.A= 0,016 m²/8 ind.
C.E.S : Bursera simaruba(12,11/10)/Byrsonima spicata(5,42/4)/ Chionanthus compacta(3/26)/Coccoloba pubescens(3/12)/ Coccoloba swartzii(3,2/17)/Eugenia confusa(4,4/63)/Tabebuia heterophylla(5,82/4)/Zanthoxylum flavum(7,15/6)/

Station Aca6, S.R= 500 m², S.T= 4,44 m², M.N= 0,24 m²/29 ind., M.A= 0
C.E.S **:** *Bourreria succulenta(2,9/26)/Buchenavia tetraphylla(2,96/7)/Bursera simaruba(3,78/6)/Byrsonima spicata(5,42/2)/Coccoloba pubescens(3,3/13)/Coccoloba swartzii(8,5/22)/Eugenia confusa(3/63)/Guettarda scabra(11,8/59)/Manilkara bidentata(30,4/5)/ Maytenus laevigata (3,7/56)/Ocotea coriacea (3,2/43)/ Pilocarpus racemosus (4/86)/ Pimenta racemosa(4,85/6)/*

Station Aca7, S.R= 800 m², S.T= 3,41 m², M.N= 0,31 m²/124 ind., M.A= 0
C.E.S : Bourreria succulenta(7/12)/Byrsonima spicata(7,1/33)/ Coccoloba swartzii(5,45/35)/Daphnopsis americana(7,4/27)/ Guettarda scabra(8,62/109)/Tabebuia heterophylla(40/27)/

Station Aca8, S.R= 700 m², S.T= 2,31 m², M.N= 0,2 m²/32 ind., M.A= 0,02 m²/8 ind.
C.E.S : Bursera simaruba(8,22/11)/ Byrsonima spicata(4,93/7)/Coccoloba swartzii(14,98/20)/Inga laurina(4,6/8)/Lonchocarpus violaceus(7,96/15)/Pimenta racemosa(11,17/86)/

Station Aca9, S.R= 500 m², S.T= 2,22 m², M.N= 0,2 m²/32 ind., *M.A= 0,007 m²/2 ind.*
C.E.S : Byrsonima spicata(40/1)/Buchenavia tetraphylla(14,26/9)/Guarrea glabra(7/88)/Inga laurina(5,2/9)/Myrcia fallax(7/110)/Ocotea eggersiana(17/13)/Ormosia monosperma(11,17/86)/

Station Aca10, S.R= 800 m², S.T= 3 m², M.N= 0,14 m²/79 ind., M.A= 0,044 m²/5 ind.
C.E.S : Buchenavia tetraphylla(5,8/6)/Bursera simaruba(10/9)/Byrsonima spicata(8,5/7)/Chionanthus compacta(4,11/16)/ Coccoloba pubescens(3,22/12)/Coccoloba swartzii(7,8/21)/Eugenia confusa(7,4/37)/Eugenia pseudopsidium(3,2/48)/ Ilex nitida(9,2/7)/Maytenus laevigata(2,46/15)/Ocotea eggersiana(4,8/10)/Pimenta racemosa(7,55/29)/ Pisonia fragrans(4,21/24)/

Station Aca11, S.R= 800 m², S.T= 2,56 m², M.N= 0,74 m²/140 ind., M.A= 0
C.E.S : Bourreria succulenta(2,77/28)/Bursera simaruba(4,51/6)/Byrsonima spicata(13,6/8)/Cassipourea guianensis(3,3/60)/Chionanthus compacta(3/7)/Coccoloba pubescens(4,8/17)/Coccoloba swartzii(11,77/19)/Eugenia monticola(3/65)/Eugenia pseudopsidium(2,42/34)/Inga laurina(9/9)/Lonchocarpus violaceus(4/5)/Myrcia fallax(4,3/112)/Ocotea patens(3,42/63)/Pimenta racemosa(7,55/29)/Pisonia fragrans(4,21/24)/

Station Aca12, S.R= 800 m², S.T= 2,67 m², M.N= 0,3 m²/89 ind., M.A= 0
C.E.S : Bursera simaruba(12,5/10)/Coccoloba swartzii(21,6/55)/Eugenia confusa(3,66/59)/Exothea paniculata(7/7)/Lonchocarpus violaceus(3,47/8)/Maytenus laevigata(9,76/95)/Ocotea coriacea(3,3/77)/Pimenta racemosa(9,57/20)/Pisonia suborbiculata(3,5/60)/Simaruba amara(4,42/5)/

Station Aca13, S.R= 800 m², S.T= 1,85 m², M.N= 0,2 m²/77 ind., M.A= 0,005 m²/3 ind.
C.E.S : Byrsonima spicata(8/7)/Croton corylifolius(4,86/20)/Eugenia monticola(3,8/35)/ Eugenia pseudopsidium(3,62/14)/
Guazuma ulmifolia(12,42/4)/Inga laurina(6,17/8)/Lonchocarpus violaceus(17,67/8)/Mangifera indica(17,7/13)/
Myrcia fallax(4,65/92)/

Station Aca14, S.R= 880 m², S.T= 2,42 m², M.N= 0,5 m²/88 ind., M.A= 0,07 m²/25 ind.
C.E.S : Bourreria succulenta(3/27)/Buchenavia tetraphyalla(8,4/7)/Bursera simaruba(4,96/9)/Byrsonima spicata(10,54/8)/Coccoloba pubescens(3,4/18)/Coccoloba swartzii(8/16)/Eugenia confusa(7,6/33)/Guettarda scabra(2,97/7)/Maytenus laevigata(2,6/32)/Ocotea eggersiana(4,5/6)/Pimenta racemosa(11,7/54)/

Station Aca15, S.R= 880 m², S.T= 2,78 m², M.N= 0,55 m²/96 ind., M.A= 0,14 m²/53 ind.
C.E.S : Bursera simaruba(14,4/10)/Byrsonima spicata(10,93/10)/Coccoloba swartzii(13,85/32)/Maytenus laevigata(8,33/65)/Pimenta racemosa(4,17/6)/Pisonia fragrans(4,4/29)/

Station Aca16, S.R= 420 m², S.T= 1,14 m², M.N= 0,056 m²/20 ind., M.A= 0,003 m²/2 ind.
C.E.S : Amyris elemifera(3,63/19)/Bursera simaruba(17,45/24)/Coccoloba swartzii(11,64/9)/Eugenia confusa(39,3/148)/

Station Aca17, S.R= 800 m², S.T= 2,66 m², M.N= 0,15 m²/87 ind., M.A= 0
C.E.S : Ocotea coriacea(2,66/75)/Pimenta racemosa(1,88/43)/Tabebuia heterophylla(2,74/7)/Bourreria succulenta(2,63/57)/
Bursera simaruba(4,13/10)/Byrsonima spicata(23,72/13)/Lonchocarpus violaceus(8,53/11)/Pisonia fragrans(6,69/48)/
Capparis hastata(2/42)/Coccoloba swartzii(2,9/20)/Daphnopsis americana(2,3/18)/Erythroxylum havanense (2,25/23) /Eugenia pseudopsidium(2,63/67)/Guettarda scabra(2,44/10)/

Station Aca18, S.R= 750 m², S.T= 3,18 m², M.N= 0,36 m²/73 ind., M.A= 0,006 m²/2 ind.
C.E.S : Amyris elemifera(3,5/61)/Acacia muricata(48,52/121)/Myrcia citrifolia(2,1/210)/Bunchosia glandulosa(2,9/42)/
Bourreria succulenta(3,39/120)/Guettarda scabra(2,46/24)/Bursera simaruba(3,9/5)/Eugenia confusa(10,3/219)/
Pisonia fragrans(3,2/36)/

Station Aca19, S.R= 800 m²,S.T= 3,7 m², M.N= 0,37 m²/138 ind.,M.A= 0,02 m²/12 ind.
C.E.S : Acacia muricata(11,2/44)/Bourreria succulenta (2,35/176)/Buchenavia tetraphylla(12,7/7)/Byrsonima spicata(6,13/13)/Coccoloba swartzii(2,78/13)/Eugenia monticola(2,7/229)/Haematoxyloncampechianum(5,5/11)/Lonchocarpus violaceus(5,5/29)/Pisonia fragrans(3,7/104) /Tabebuia heterophylla(14,86/15)/

Station Aca20, S.R= 400 m², S.T= 2,4 m², M.N= 0,09 m²/46 ind., M.A= 0,02 m²/13 ind.
C.E.S : Acacia muricata(9,46/60)/Coccoloba swartzii(2,9/12)/Eugenia monticola(3,2/222)/Guettarda scabra(7,2/45)/
Haematoxylon campechianum(21,8/10)/Tabebuia heterophylla(34,48/3)/

Station Aca21, S.R= 400 m², S.T= 2,17 m², M.N= 0,09 m²/40 ind., M.A= 0,001 m²/2 ind.
C.E.S : Acacia muricata(26,15/98)/Bourreria succulenta(2,3/120)/Coccoloba pubescens(4,87/39)/
Coccoloba swartzii(4,5/15)/Eugenia confusa(22,95/38)/Eugenia pseudopsidium(2,16/21)/Guettarda scabra(4,34/31)/Tabebuia heterophylla(4,6/5)/

Station Aca22, S.R= 400 m², S.T= 1,22 m², M.N= 0,11 m²/67 ind., M.A= 0,33 m²/125 ind.
C.E.S : Amyris elemifera(3,4/58)/Bourreria succulenta(8,26/151)/Bursera simaruba(2,6/7)/Byrsonima spicata(7,34/8)/Coccoloba swartzii(4,25/36)/Daphnopsis americana(4,32/26)/Erythroxylum havanense(30,82/109)/Eugenia confusa(6,3/147)/
Pilocarpus racemosus(6/103)/Pimenta racemosa(2,33/63)/Pisonia fragrans(4,25/203)/Tabebuia heterophylla(3,4/8)/

Station Aca23, S.R= 800 m², S.T= 2,72 m², M.N= 0,4 m²/88 ind., M.A= 0,0007 m²/1 ind.
C.E.S: Bursera simaruba(4,92/4)/Calliandra tergemina(24,2/836)/Casearia decandra(2,5/19)/Guazuma ulmifolia(3,73/4)/Guettarda scabra(6,74/27)/Inga laurina(3/9)/Lonchocarpus violaceus(8,82/31)/Pimenta racemosa(2,2/188)/Pisonia fragrans(5,46/105)/Tabebuia heterophylla(30,2/20)/

Station Aca24, S.R= 800 m², S.T= 2,1 m², M.N= 0,34 m²/88 ind., M.A= 0
C.E.S : Coccoloba swartzii(10,2/36)/Lonchocarpus violaceus(9,8/74)/Pimenta racemosa(17,7/336)/

Station Aca25, S.R= 800 m², S.T= 8,81 m², M.N= 0,33 m²/37 ind., M.A= 0
C.E.S: Artocarpus altilis(1,8/3)/Ficus nymphaeifolia(39/5)/Guarea macrophylla(1,46/116)/Lonchocarpus violaceus(1,72/5)/
Mangifera indica(13,2/29)/Persea americana(2,2/4)/Pisonia fragrans(2,54/10)/Simaruba amara(8,3/4)/Spondias mombin(21,8/14)/

****