



LEGUMINOSAE IN PICINGUABA, SERRA DO MAR STATE PARK, SÃO PAULO, BRAZIL

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INTRODUCTION

Considered the fifth most endangered and rich in species area in the world, the Atlantic Forest is presently reduced to small forest fragments, which represent just 7,6% of the original formation. The major part of the continuous remains of the Atlantic Forest is mainly located in the coasts of São Paulo and Paraná states, mainly due to the irregular topography of the Serra do Mar and Serra de Paranapiacaba (Leitão Filho 1994). In São Paulo, where there is only 5% of native forests with little anthropic action, the facade of the Serra do Mar shows up as the main forest remains (Kronka *et al.*, 2003). The biodiversity for the Ombrophylus Dense Forest, known as a whole as Atlantic Forest, is of approximately 20 thousand plant species, more than 8 thousand of which are endemic (Myers *et al.*, 2000).

The Leguminosae family, constituted of around 727 genera and 19,327 species (Lewis *et al.*, 2005), is the second largest family of the dicotyledons and the second economically most important in the world, second only to the Poaceae. Ecologically important, they are well adapted to the first colonization and exploration of diverse environment partly due to its association with nitrogen fixing bacteria or with ectomycorrhiza. Bacteria of the genus *Rhizobium*, housed in root nodules found on many legume species, are able to convert nitrogen gas from the air into ammonia (a soluble form of nitrogen accessible to other plants) and as such these legumes are extremely valuable as natural fertilizers (Lewis 1987). Around 188 genera and 2,100 species were catalogued in Brazil, which occurrence is very significant in the majority of the vegetation types, especially in the Atlantic Forest (Lima 2000). Floristic inventories and phytosociological studies accomplished in several regions of the Atlantic Forest are already offering evidences of the importance of the family in the composition and structure of this biome (Cesar & Monteiro 1995, Mori *et al.*, 1981, Silva & Leitão - Filho 1982, Garcia & Monteiro 1997a and 1997b, Assis 1999, Tabarelli & Mantovani 1999, Sanches *et al.*, 1999, Oliveira - Filho & Fontes 2000, Lacerda 2001, Guilherme *et al.*, 2004), however, floristic studies accomplished in differ-

ent remain areas of the Atlantic Forest, specially surveys of the subfamilies species Caesalpinioideae and Mimosoideae are rare.

OBJECTIVES

This paper aims at surveying the floristic taxa of the Leguminosae family in Picinguaba, Serra do mar State Park, São Paulo, Brazil.

MATERIAL AND METHODS

The study area is located in the northeast of São Paulo state, in Picinguaba, Serra do mar State Park between 23°18' - 23°22' S and 44°47' - 44°52' W and is about 30 km² (7 km towards east - west direction and up to 9 km towards north - south direction). The altitudes vary from the Restinga, Forest close to the sea level, to the vegetation at the top of the mountain, between 1,200 and 1,320 meters of altitude, where the high fields domain. The climate is tropical moist (Setzer 1966), with no dry season, with average annual rain fall superior to 2,200 mm. The soils, in general, are acid, poor in nutrients, with high aluminum levels and organic matter and low fertility (Lacerda 2001). The floristic survey involved collecting of herbs, shrubs, trees and lianas and was done monthly between 2006 and 2009 going through tracks in the different phytophysiognomies, bounded according to the following altimetric tracks: Restinga Forest, that stands above sandy belts, at the sea level up to an altitude of 50 meters; Low Land Ombrophylus Dense Forest (LLODF), situated at the foothills of the mountain in altitudes which vary from 50 - 100 meters; Sub Montana Ombrophylus Dense Forest (SMODF) which occurs in altitudes between 100 - 500 meters and Montana Ombrophylus Dense Forest (MODF) situated between an altitude of 500 - 1200 meters. In this paper as in Biota Gradient Project as a whole (in which this research is included) we started adopting a different classification system from the one proposed by Veloso *et al.*, (1991), mainly

due to the fact that the Restinga Forest (which stands above sandy soils) is very different from the Forest with occurs in the foothills and the slope of the mountain. All the collected material is incorporated to the UEC Herbarium collection. The field work also includes observations on the environment where the species were found, the plants habit, flowering and fruiting periods and further data which cannot be obtained from the dry material, as well as photographic registers. The final list was completed with the collection from other botanics deposited in the herbarium in the state of São Paulo, as the SP, SPF and ESA, from the herbarium of other states which contain collections from the area, as HB, MBM, R and RB, from overseas herbariums (NY and US) and from other researchers from the Biota Gradient Project. The identification of the species was done on the basis of the specific literature, the comparison with other herbarium species and/or when necessary the consultation of other specialists. The elaboration of the analytic key to the identification of the genera and species with confirmed occurrence in the studied area was done on the basis of morphologic characters of pressed specimens. The amplitude of the variation in the descriptions of the species is observed in the examined material.

RESULTS AND DISCUSSION

110 Leguminosae species were collected in the studied area, distributed in the following subfamilies: Papilionoideae (8 tribes, 28 genera and 66 species) being 37 shrubs, 19 trees and 10 lianas; Mimosoideae (3 tribes, 9 genera and 30 species) being 7 shrubs, 18 trees and 5 lianas; and Caesalpinioideae (4 tribes, 7 genera and 14 species), being 5 shrubs, 8 trees and 1 liana. The genera with the largest species number were *Inga*, *Mimosa* and *Machaerium* (8 spp.); *Desmodium* (6 spp.); *Aeschynomene* and *Crotalaria* (5 spp.) and *Acacia*, *Chamaecrista* and *Vigna* (4 spp.). The tribes with the largest species number are the Dalbergieae (24 spp.), Phaseoleae (19 spp.) and Mimoseae (14 spp.).

The species which presented abundant flowering and/or a large number of individuals are the *Chamaecrista desvauxii*, *Schizolobium parhayba*, *Senna multijuga*, *Tachigali multijuga*, *Copaifera langsdorffii* and *Copaifera trapezifolia* (Caesalpinioideae); *Inga marginata*, *Inga striata*, *Inga capitata*, *Macrosamanea pedicellaris*, *Mimosa bimucronata*, *Piptadenia gonoachanta* (Mimosoideae); *Crotalaria vitellina*, *Dalbergia ecastophyllum*, *Dalbergia frutescens*, *Desmodium leiocarpum*, *Erythrina speciosa*, *Lonchocarpus cultratus*, *Machaerium declinatum*, *Mucuna urens*, *Vigna luteola*, *Sophora tomentosa*, *Swartzia simplex* and *Swartzia oblata* (Papilionoideae).

On the other hand, *Senna macranthera*, *Hymenaea courbaril* (Caesalpinioideae); *Acacia miersii*, *Anadenanthera colubrina*, *Leucaena leucocephala*, *Piptadenia adiantoides* (Mimosoideae); *Andira ormosioides*, *Crotalaria pallida*, *Dioclea rufescens*, *Machaerium vellosianum*, *Ormosia minor*, *Rhynchosia phaseoloides* and *Zornia glabra* (Papilionoideae) are rarely found in the studied area.

The Restinga Forest presented the largest number of species (90), being 54 exclusively from this forest formation. Next is the LLODF totalizing 44 species, 6 being exclusive. In

the SMODF, 23 species were found, but no exclusive taxa was found. This happens because, in general, they also occur below the established quota to this phytophysiognomie (in the FODTB) or immediately above, in the MODF. The Montana Ombrophylus Dense Forest (MODF) presented the lowest number of species (20), 5 of them being exclusive from this phytophysiognomie. These results confirmed the expected for the Leguminosae family: a reduction in the number of taxa in higher altitudes.

The appearance of certain species is associated with a specific vegetational formation or has its preferred environment situated in a specific altitude, as verified for the *Abarema lusoria*, *Centrosema virginianum*, *Dalbergia ecastophyllum*, *Erythrina speciosa*, *Macrosamanea pedicellaris*, *Senna pendula*, *Sophora tomentosa* and *Vigna luteola*, for example, that were found only in the Restinga Florest. From the 50 meters of altitude, where the LLODF begins, up to the 500 meters, where the SMODF ends, it was registered the presence of the *Bauhinia angulosa*, *Copaifera langsdorffii*, *Copaifera trapezifolia*, *Hymenaea courbaril*, *Acacia paniculata*, *Inga capitata*, *Inga striata*, *Pseudopiptadenia leptostachya* and *Zollernia ilicifolia*. Between 1,000 and 1,200 meters of altitude, in the limits of the MODF, *Ormosia minor*, *Swartzia acutifolia* and *Inga sessilis* were found.

Standing out for occupying all the altimetric tracks from the Restinga Forest to the Montana Ombrophylus Dense Forest, are the species *Dalbergia frutescens*, *Inga marginata*, *Machaerium aculeatum* and *Machaerium dimorphandrum*. The number of Leguminosae species in Picinguaba, which was 51 in a study accomplished in the coastal plain (0 - 50 meters of altitude) by Garcia & Monteiro in 1997, was enlarged in more than 70%, totalizing 90 species, considering the same altitudinal variation.

CONCLUSION

The Leguminosae family is well represented in the Ombrophylus Dense Forest in Picinguaba (110 species), confirming the premise that its species play an important role in the composition and structure of this forest. The Papilionoideae subfamily was the one which presented the largest species number (66) and the one which has more trees (19), shrubs (37) and lianas (10) as seen in other surveys as well as in studies developed in other places in the Serra do Mar.

The Leguminosae family, although very well represented in all the studied altitudinal tracks, presented itself as more abundant in lower altitude areas.

The Restinga Florest, which has a large number of Leguminosae species which only occur in this vegetation piece, was the formation which presented the most different composition from the other formations.

The Picinguaba Ombrophylus Dense Forest has a superior number of Leguminosae species than presented in previous papers, considering the same altitudinal variation, indicating that this family's contribution to the flora of the forest formations in the North seacoast of São Paulo state should be more significant than previously estimated.

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