

Orchidaceae Flora of Joinville, Santa Catarina, Brazil

Flora de Orchidaceae de Joinville, Santa Catarina, Brasil

Werner Siebje **MANCINELLI**^{1,3} & Karin **ESEMANN-QUADROS**²

ABSTRACT

The objective of this work was to conduct a floristic study of Orchidaceae in the municipality of Joinville (Santa Catarina, Brazil), which occurred from 2006 to 2015. The municipality is mainly covered with Atlantic Forest between 0 and 1,335 m elevation. For the family, 211 species within 90 genera were recorded. The richest genera are *Epidendrum* (17 spp.), *Pabstiella* (15 spp.), *Acianthera* (14 spp.), *Anathallis* (8 spp.) and *Octomeria* (8 spp.). The majority of the species are epiphytes (82%), 11% are terrestrial, and the remaining 7% are hemi-epiphytes, rupicolous or myco-heterotrophic. Two species, *Grobya guiselii* and *Homalopetalum joinvillense*, are known only from Joinville.

Keywords: Atlantic Forest; Floristic; Orchids; South Brazilian.

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RESUMO

Este trabalho teve como objetivo realizar o estudo florístico de Orchidaceae em Joinville (Santa Catarina – Brasil), que ocorreu entre 2006 e 2015. O município é caracterizado principalmente pela mata atlântica nativa, que pode ser encontrada entre as altitudes de 0 e 1.335 m. A família possui 211 espécies distribuídas em 90 gêneros. Os gêneros mais ricos são *Epidendrum* (17 spp.), *Pabstiella* (15 spp.), *Acianthera* (14 spp.), *Anathallis* (8 spp.) e *Octomeria* (8 spp.). A maioria das espécies ocorre como epífita (82%), 11% são terrícolas, e hemiepífitas, rupícolas e mico-heterotróficas representam 7%. Até o momento, duas espécies são conhecidas apenas para Joinville: *Grobya guiselii* e *Homalopetalum joinvillense*.

Palavras-chave: Florística; mata atlântica; orquídeas; sul do Brasil.

INTRODUCTION

Orchidaceae is one of the largest families of angiosperms, with approximately 24,500 species (DRESSLER, 2005), and has a cosmopolitan distribution, with exception to the polar regions and deserts (DRESSLER, 1981). In Brazil, there are 2,553 species of Orchidaceae (BARROS *et al.*, 2015), and Santa Catarina is the seventh richest state in orchids, where there are 570 species (BARROS *et al.*, 2015; MANCINELLI; SMIDT, 2012; MANCINELLI; SMIDT, 2015; SIQUEIRA *et al.*, 2014; SIQUEIRA *et al.*, 2015).

The municipality of Joinville, located in northern Santa Catarina, has large areas of the Atlantic Forest biome and possess vegetation formations from sea level, where there are mangroves, to the tops of the Serra do Mar where there is transition into mixed ombrophilous forest (*Araucaria* forest). Various researchers have collected Orchidaceae species in the region, such as João Barbosa Rodrigues, A. Schwacke, H. Schenk, Ernst Ule, Raulino Reitz, Frederico Hoehne and Guido Pabst (PABST, 1951; 1952; 1953; 1954; 1956). In the municipality, a study about terrestrial orchids recorded 16 species (HOGREFE, 2010). Collections from Joinville have resulted in the following three new species of orchids: *Epidendrum denticulatum* Barb. Rodr. (COGNIAUX, 1898-1902), *Grobya guiselii* F.Barros & R.Lourenço (BARROS; LOURENÇO, 2004) and *Homalopetalum joinvillense* Mancinelli & E.C.Smidt (MANCINELLI; SMIDT, 2015).

The objectives of the present study were to create a list of Orchidaceae species that occur in the municipality of Joinville and to provide information about the distribution of these species in the diverse vegetation formations in the region.

¹ Herbário Joinville, Universidade da Região de Joinville, Rua Paulo Malschitzki, n.º 10, Bairro Bom Retiro, CEP 89219-710, Joinville, SC, Brasil.

² Programa de Pós-Graduação em Engenharia Florestal, Universidade Regional de Blumenau, Blumenau, SC, Brasil.

³ Autor para correspondência: werner.mancinelli@yahoo.com.br.

MATERIAL AND METHODS

Joinville is located between 26°18'05''S and 48°50'38''W, occupies an area of 1,183 km², and is between sea level and 1,335 m elevation. It borders the municipalities of Garuva, Campo Alegre, Araquari, Guaramirim, Schroeder, Jaraguá do Sul and São Francisco do Sul (FIPPUJ, 1993).

The region has a hot and humid climate, without a dry season, and is classified as a mesothermal climate (Cf) by Köppen (FIPPUJ, 1993). The average annual temperature is 22°C, the annual precipitation index is approximately 1,908.9 mm and the relative humidity of the air is high and averages 85% (FIPPUJ, 1993).

According to Klein (1978) and Knie (2002), the vegetation formations that occur in Joinville are the following: mangrove, along the edge of Babitonga Bay; lowland dense ombrophilous forest, on terra firma soils to 30 m; submontane dense ombrophilous forest, between 30 and 400 m; montane dense ombrophilous forest, between 400 and 1,000 m; high montane dense ombrophilous forest (cloud forest), above 1,000 m; high altitude grasslands (*campo rupestre*), open fields at the tops of mountains, generally above 1,000 m; and mixed ombrophilous forest, in the foothills of Serra do Mar, characterized by the presence of *Araucaria angustifolia* (Bertol.) Kuntze.

Orchid specimens collected in the municipality were analyzed from the herbaria FLOR, HBR, FUEL, FURB, JOI, UPCB, HB, MBM and SP (abbreviations follow THIERS, 2015). Collections with questionable determinations or of cultivated plants were excluded. Fieldwork was conducted between 2006 and 2015. The material collected was processed according to Fidalgo and Bononi (1989) and deposited in the herbaria JOI and UPCB. Identification of the species was standardized based on Barros *et al.* (2015).

To calculate the similarity of the species with other studies about Orchidaceae in the region, Sorensen's similarity index was used, as described by Cullen *et al.* (2004); the formula $S = 2.C / (A+B)$ was used, where C is the number of species common to both samples, A is the number of species in one sample and B is the number of species in the other sample.

RESULTS AND DISCUSSION

A total of 211 species of Orchidaceae, distributed in 90 genera, were registered (Table 1). This corresponds to 37% of the species cited for Santa Catarina. Notable genera include *Epidendrum* L. (17 spp.), *Pabstiella* Brieger & Senghas (15 spp.), *Acianthera* Scheidw. (14 spp.), *Anathallis* Barb. Rodr. (8 spp.) and *Octomeria* R. Br. (8 spp.). Some species were not found in the field, herbaria or in the SpeciesLink database (CRIA, 2015), but were cited in the literature. These were *Epidendrum denticulatum* Barb.Rodr. (COGNIAUX, 1898–1902); *Leptotes unicolor* Barb.Rodr. (COGNIAUX, 1898–1902) and *Lophiaris pumila* (Lindl.) Braem (PABST, 1953).

For uncommon species, represented by no more than two collections (based on specimens in the herbaria FLOR, HBR, FUEL, FURB, JOI, UPCB, HB, MBM and SP, the literature [MANCINELLI; SMIDT, 2012], and the SpeciesLink database [CRIA, 2015] for Santa Catarina and the municipality), notable species were *Barbosela trilobata* Pabst (Figure 1A), *Campylocentrum callostachyum* (Barb. Rodr.) Cogn. (Figure 1B), *Campylocentrum* aff. *pachyrrhizum* (Rchb.f) Rolfe (Figure 1C), *Dryadella aviceps* (Rchb.f.) Luer (Figure 1D), *Grobya guiselii* and *Homalopetalum joinvillense* (Figure 1E); the latter two were only recorded for Joinville.



Figure 1 – A: *Barbosela trilobata* Pabst; B: *Campylocentrum callostachyum* (Barb. Rodr.) Cogn.; C: *Campylocentrum* aff. *pachyrrhizum* (Rchb.f) Rolfe; D: *Dryadella aviceps* (Rchb.f.) Luer; E: *Homalopetalum joinvillense* Mancinelli & E.C. Smidt. Fotos: Jader R. Rampinelli and Werner S. Mancinelli.

According to Siqueira *et al.* (2014), species with the conservation status of “vulnerable” are the following: *Anathallis gehrtii* (Hoehne & Schltr.) F.Barros (Figure 2A), *Dryadella lilliputiana* (Cogn.) Luer (Figure 2B), *Cattleya guttata* Lindl. (Figure 2C-D), *Grandiphyllum divaricatum* (Lindl.) Docha Neto (Figure 2E), *Lepanthopsis floripecten* (Rchb.f.) Ames (Figure 2F), and *Pabstiella carinifera* (Barb. Rodr.) Luer (Figure 2G). Only *Anathallis pabstii* (Garay) Pridgeon & M.W. Chase (Figure 2H) is listed as “endangered” (SIQUEIRA *et al.*, 2014).

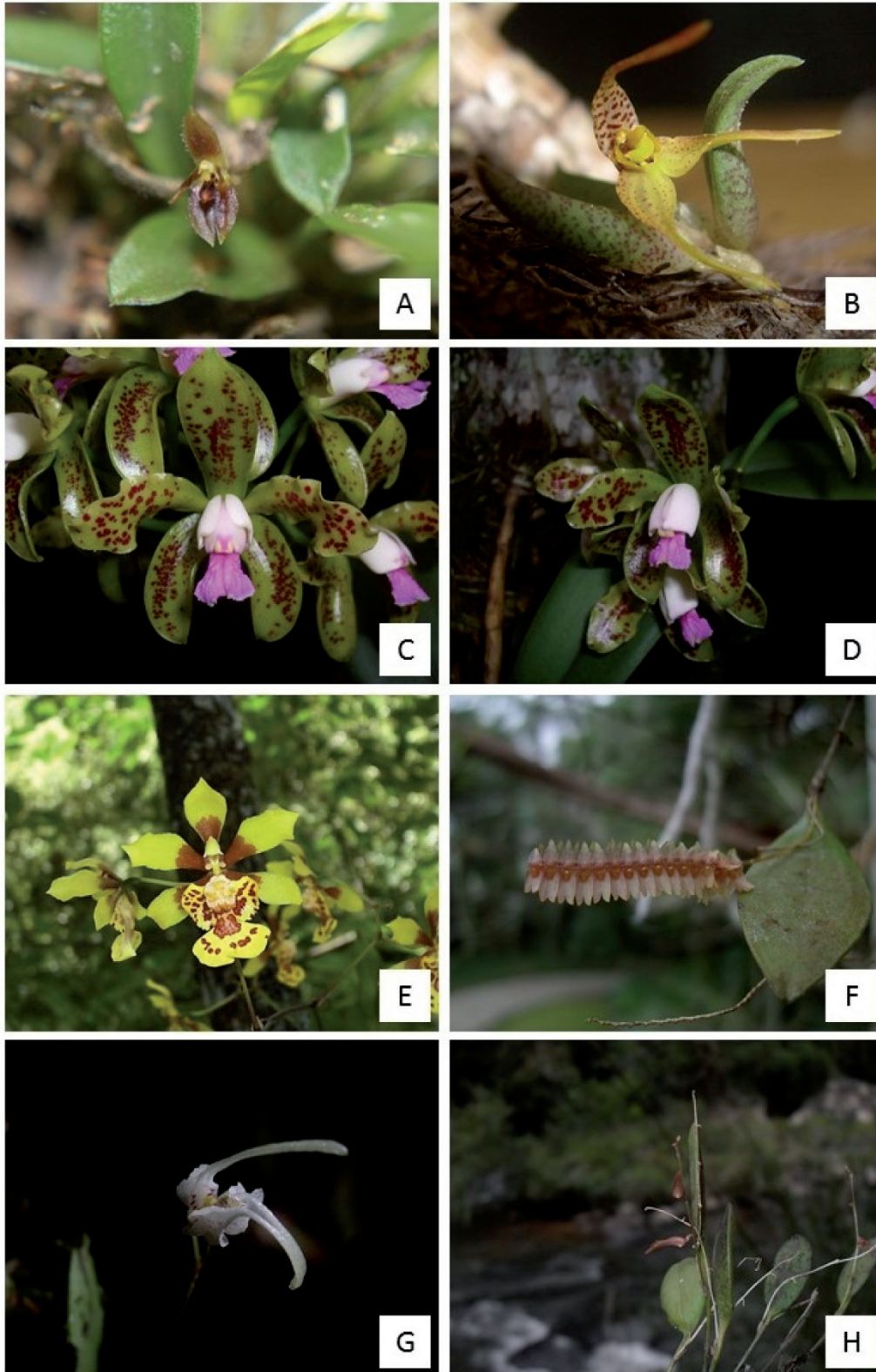


Figure 2 – A: *Anathallis gehrtii* (Hoehne & Schltr.) F.Barros; B: *Dryadella lilliputiana* (Cogn.) Luer; C and D: *Cattleya guttata* Lindl.; E: *Grandiphyllum divaricatum* (Lindl.) Docha Neto; F: *Lepanthopsis floripecten* (Rchb.f.) Ames; G: *Pabstiella carinifera* (Barb.Rodr.) Luer; H: *Anathallis pabstii* (Garay) Pridgeon & M.W. Chase. Fotos: Werner S. Mancinelli.

For habit (Table 1; Figure 3), the species observed were the following: exclusively epiphytic (82%); exclusively terrestrial (11%); species that can be epiphytic or terrestrial, or epiphytic or rupicolous (1.4% each); species that are myco-heterotrophic, hemi-epiphytic or aquatic, or species that can be rupicolous or terrestrial (0.95% each); and species that can be terrestrial or rupicolous (0.4%, only 1 species). No species observed were exclusively rupicolous.

Table 1 – List of Orchidaceae species from Joinville. Habit: AQ – aquatic; EP – epiphytic; HE – hemi-epiphytic; MI – myco-heterotrophic; RU – rupicolous; TE – terrestrial; (†) = voucher specimen destroyed / unknown. Vegetation formations: M – mangroves; FODTB – lowland dense ombrophilous forest; FODSB – submontane dense ombrophilous forest; FODM – montane dense ombrophilous forest; FODAM – high montane dense ombrophilous forest; C – high montane grasslands; FOM – mixed ombrophilous forest; S.I. – without informations.

Nome científico	Forma vida	Voucher	Formação veget.
<i>Acianthera alborosea</i> (Kraenzl.) Luer	EP	W.S.Mancinelli 895 (JOI)	FODM
<i>Acianthera auriculata</i> (Lindl.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 881 (JOI)	FODSM
<i>Acianthera crepiniana</i> (Cogn.) Chiron & van den Berg	EP	W.S.Mancinelli 963 (JOI)	FOM
<i>Acianthera glanduligera</i> (Lindl.) Luer	EP	W.S.Mancinelli 696 (JOI)	FODTB/FODSM
<i>Acianthera hygrophila</i> (Barb.Rodr.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1292 (JOI)	FOM
<i>Acianthera jordanensis</i> (Brade) F.Barros	EP	W.S.Mancinelli 1463 (JOI)	FODAM
<i>Acianthera macropoda</i> (Barb.Rodr.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1281 (UPCB)	FODTB/FODSM
<i>Acianthera oligantha</i> (Barb.Rodr.) F.Barros	EP	W.S.Mancinelli 1079 (UPCB)	FODSM
<i>Acianthera panduripetala</i> (Barb.Rodr.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1499 (JOI)	M/FODTB
<i>Acianthera pardipes</i> (Rchb.f.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1133 (JOI)	FODSM
<i>Acianthera pubescens</i> (Lindl.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1524 (JOI)	FODSM
<i>Acianthera saundersiana</i> (Rchb.f.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 897 (JOI)	M/FODTB/ FODSM/FODM
<i>Acianthera sonderiana</i> (Rchb.f.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1293 (JOI)	FOM
<i>Acianthera strupifolia</i> (Lindl.) Pridgeon & M.W.Chase	EP	R. Reitz 3801-A (HBR)	S.I.
<i>Alatiglossum longipes</i> (Lindl.) Baptista	EP	W.S.Mancinelli 1364 (UPCB)	FODM
<i>Anathallis dryadum</i> (Schltr.) F.Barros	EP	W.S.Mancinelli 1088 (JOI)	FODM
<i>Anathallis gehrtii</i> (Hoehne & Schltr.) F.Barros	EP	W.S.Mancinelli 812 (JOI)	FODM
<i>Anathallis linearifolia</i> (Cogn.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 804 (JOI)	FODM/FODAM
<i>Anathallis obovata</i> (Lindl.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 886 (JOI)	FODSM/FODM
<i>Anathallis pabstii</i> (Garay) Pridgeon & M.W. Chase	EP	W.S.Mancinelli 1517-C (JOI)	FODM
<i>Anathallis rubens</i> (Lindl.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 744 (JOI)	FODSM/FODM
<i>Anathallis sclerophylla</i> (Lindl.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 1210 (JOI)	FODM
<i>Anathallis ypirangae</i> (Kraenzl.) Pridgeon & M.W.Chase	EP	W.S.Mancinelli 833-B (JOI)	FODSM
<i>Aspasia lunata</i> Lindl.	EP	W.S.Mancinelli 749-B (JOI)	FODTB
<i>Aspidogyne argentea</i> (Vell.) Garay	TE	W.S.Mancinelli 1459-E (JOI)	FODTB/FODSM
<i>Aspidogyne fimbriaris</i> (B.S.Williams) Garay	TE	W.S.Mancinelli 801 (JOI)	FODSM
<i>Baptistonia albinoi</i> (Schltr.) Chiron & V.P.Castro	EP	F.C.Hoehne s.n. (SP)	S.I.
<i>Baptistonia cornigera</i> (Lindl.) Chiron & V.P.Castro	EP	W.S.Mancinelli 1056 (UPCB)	FODSM
<i>Baptistonia aff. venusta</i> (Drapiez) Chiron	EP	W.S.Mancinelli 1548 (JOI)	FODTB
<i>Barbosella gardneri</i> (Lindl.) Schltr.	EP	W.S.Mancinelli 1536 (JOI)	FODM
<i>Barbosella miersii</i> (Lindl.) Schltr.	EP	W.S.Mancinelli 906 (JOI)	FODSM/FODM
<i>Barbosella trilobata</i> Pabst	EP	W.S.Mancinelli 1295 (JOI)	FODAM
<i>Bifrenaria aureofulva</i> Lindl.	EP	W.S.Mancinelli 623 (JOI)	FODSM/FODM
<i>Bifrenaria harrisoniae</i> (Hook.) Rchb.f.	EP/RU	W.S.Mancinelli 714 (JOI)	FODM/FODAM/ C

Nome científico	Forma vida	Voucher	Formação veget.
<i>Bifrenaria inodora</i> Lindl.	EP	W.S.Mancinelli 1539 (JOI)	FODM
<i>Bifrenaria tetragona</i> (Lindl.) Schltr.	EP	W.S.Mancinelli 1091 (JOI)	FODSM
<i>Brasilidium concolor</i> (Hook.) F.Barros & V.T.Rodrigues	EP	F.C.Hoehne s.n. (SP)	S.I.
<i>Brasilidium gardneri</i> (Lindl.) Campacci	EP	W.S.Mancinelli 797 (JOI)	FODM
<i>Brasiliorchis marginata</i> (Lindl.) R.B.Singer, S.Koehler & Carnevali	EP	W.S.Mancinelli 1139 (UPCB)	FODSM/FODM
<i>Brasiliorchis picta</i> (Hook.) R.B.Singer, S.Koehler & Carnevali	EP	W.S.Mancinelli 661 (JOI)	FODM/FODAM
<i>Bulbophyllum glutinosum</i> (Barb.Rodr.) Cogn.	EP	W.S.Mancinelli 867 (UPCB)	FODTB/FODSM/ FODM
<i>Bulbophyllum granulosum</i> Barb.Rodr.	EP	W.S.Mancinelli 659 (JOI)	FODM/FODAM
<i>Bulbophyllum napelli</i> Lindl.	EP/RU	W.S.Mancinelli 1084 (UPCB)	FODSM/FODM
<i>Camaridium carinatum</i> (Barb.Rodr.) Hoehne	EP	W.S.Mancinelli 894 (JOI)	FODM
<i>Camaridium vestitum</i> (Sw.) Lindl.	EP	W.S.Mancinelli 1215 (JOI)	FODSM
<i>Campylocentrum callostachyum</i> (Barb. Rodr.) Cogn.	EP	W.S.Mancinelli 1131 (†)	FODSM
<i>Campylocentrum densiflorum</i> Cogn.	EP	W.S.Mancinelli 1495 (JOI)	FODTB/FODSM/ FODM/FODAM/ FOM
<i>Campylocentrum ornithorrhynchum</i> (Lindl.) Rolfe	EP	W.S.Mancinelli 1289 (UPCB)	FODSM
<i>Campylocentrum aff. pachyrrhizum</i> (Rchb.f.) Rolfe	EP/MI	W.S.Mancinelli 1080 (UPCB)	FODSM
<i>Campylocentrum ulaei</i> Cogn.	EP	W.S.Mancinelli 1486 (JOI)	FODM
<i>Catasetum atratum</i> Lindl.	EP	W.S.Mancinelli 1458-C (JOI)	M/FODTB
<i>Catasetum triodon</i> Rchb.f.	EP	F.C.Hoehne s.n. (SP)	FODTB/FODSM
<i>Cattleya forbesii</i> Lindl.	EP	W.S.Mancinelli 1501 (JOI)	FODTB/FODSM
<i>Cattleya guttata</i> Lindl.	EP	W.S.Mancinelli 1136 (UPCB)	FODSM
<i>Christensonella paranaensis</i> (Barb.Rodr.) S.Koehler	EP	W.S.Mancinelli 1471 (JOI)	FODSM/ FODAM/FOM
<i>Christensonella subulata</i> (Lindl.) Szlach., Mytnik, Górniak & Smiszek	EP	W.S.Mancinelli 1055 (UPCB)	FODSM/FODM
<i>Cirrhaea dependens</i> (Lodd.) Loudon	EP	W.S.Mancinelli 1453-A (JOI)	FODSM/FODM
<i>Cleistes gracilis</i> (Barb.Rodr) Schltr.	TE	W.S.Mancinelli 844-B (JOI)	FODM
<i>Cleistes libonii</i> (Rchb.f.) Schltr.	TE	C.Hering-Rinnert 810 (JOI)	FODTB/FODSM/ FODM
<i>Coppensia doniana</i> (Batem. ex W.Baxter) Campacci	RU/TE	W.S.Mancinelli 1494 (JOI)	C
<i>Coppensia flexuosa</i> (Sims) Campacci	EP	W.S.Mancinelli 1507 (JOI)	FODTB/FODSM
<i>Coppensia hookeri</i> (Rolfe) F.Barros & L.R.S.Guim.	EP	W.S.Mancinelli 1523 (JOI)	FODSM/FODM
<i>Coppensia longicornu</i> (Mutel) F.Barros & V.T.Rodrigues	EP	W.S.Mancinelli 1500 (JOI)	FODAM/FOM
<i>Coppensia paranaensis</i> (Kraenzl.) F.Barros & V.T.Rodrigues	EP	W.S.Mancinelli 1439 (JOI)	FODAM
<i>Corymborkis flava</i> (Sw.) Kuntze	TE	W.S.Mancinelli 1044 (JOI)	FODSM/FODM
<i>Cyclopogon apricus</i> (Lindl.) Schltr.	TE	W.S.Mancinelli 1297 (JOI)	C
<i>Cyclopogon multiflorus</i> Schltr.	EP/TE	M.E.Engels 1655 (MBM)	FODTB/FODSM/ FODM
<i>Cyrtopodium paranaense</i> Schltr.	TE	F.C.S.Vieira 1860 (JOI)	FODTB
<i>Dichaea anchorifera</i> Rchb.f.	EP	W.S.Mancinelli 878 (JOI)	FODSM
<i>Dichaea australis</i> Cogn.	EP	W.S.Mancinelli 814 (JOI)	FODTB/FODSM

Nome científico	Forma vida	Voucher	Formação veget.
<i>Dichaea cogniauxiana</i> Schltr.	EP	W.S.Mancinelli 1082 (UPCB)	FODSM/FODM
<i>Dichaea pendula</i> (Aubl.) Cogn.	EP	W.S.Mancinelli 811 (JOI)	FODSM/FODM
<i>Dryadella aviceps</i> (Rchb.f.) Luer	EP	W.S.Mancinelli 1007 (JOI)	FODSM
<i>Dryadella edwallii</i> (Cogn.) Luer	EP	W.S.Mancinelli 557 (JOI)	FODM/FODAM
<i>Dryadella lilliputiana</i> (Cogn.) Luer	EP	W.S.Mancinelli 1458-F (JOI)	FOM
<i>Elleanthus brasiliensis</i> (Lindl.) Rchb.f.	EP	W.S.Mancinelli 665 (JOI)	FODSM/FODM
<i>Encyclia patens</i> Hook.	EP	W.S.Mancinelli 1236 (UPCB)	FODTB/FODSM
<i>Epidendrum armeniacum</i> Lindl.	EP	W.S.Mancinelli 1369 (UPCB)	FODM
<i>Epidendrum avicula</i> Lindl.	EP	W.S.Mancinelli 1435 (JOI)	FODTB/FODSM
<i>Epidendrum cristatum</i> Ruiz & Pav.	EP	W.S.Mancinelli 746 (JOI)	FODSM
<i>Epidendrum densiflorum</i> Hook.	EP	W.S.Mancinelli 1213 (JOI)	FODM
<i>Epidendrum denticulatum</i> Barb.Rodr.	EP	J.Barbosas Rodrigues s.n. (†)	S.I.
<i>Epidendrum geniculatum</i> Barb.Rodr.	EP	W.S.Mancinelli 1216-B (JOI)	FODSM
<i>Epidendrum latilabre</i> Lindl.	EP	W.S.Mancinelli 610 (JOI)	M/FODTB/ FODSM
<i>Epidendrum nocturnum</i> Jacq.	EP	W.S.Mancinelli 824 (JOI)	FODTB/FODSM
<i>Epidendrum paranaense</i> Barb.Rodr.	EP	W.S.Mancinelli 823 (JOI)	FODM
<i>Epidendrum proligerum</i> Barb.Rodr.	EP	W.S.Mancinelli 600 (JOI)	FODM
<i>Epidendrum pseudodiforme</i> Hoehne & Schltr.	EP	W.S.Mancinelli 502 (JOI)	FODTB/FODSM
<i>Epidendrum ramosum</i> Jacq.	EP	W.S.Mancinelli 985 (JOI)	FODTB/FODSM
<i>Epidendrum rigidum</i> Jacq.	EP	W.S.Mancinelli 1462-B (JOI)	FODTB
<i>Epidendrum secundum</i> Jacq.	EP/RU/ TE	W.S.Mancinelli 666 (JOI)	FODM
<i>Epidendrum strobiliferum</i> Rchb.f.	EP	W.S.Mancinelli 786 (JOI)	FODTB/FODSM/ FODM
<i>Epidendrum tridactylum</i> Lindl.	EP	W.S.Mancinelli 620 (JOI)	FODSM
<i>Epidendrum vesicatum</i> Lindl.	EP	W.S.Mancinelli 1458 (JOI)	FODSM
<i>Eulophia alta</i> (L.) Fawc. & Rendle	TE	W.S.Mancinelli 751 (JOI)	FODTB/FODSM
<i>Eurystyles cotyledon</i> Wawra	EP	W.S.Mancinelli 810-B (JOI)	FODTB/FODSM
<i>Eurystyles lorenzii</i> (Cogn.) Schltr.	EP	W.S.Mancinelli 810 (JOI)	FODM
<i>Gomesa crispa</i> (Lindl.) Klotzsch & Rchb.f.	EP	W.S.Mancinelli 905 (JOI)	FODM
<i>Gomesa glaziovii</i> Cogn.	EP	W.S.Mancinelli 799 (JOI)	FODM/FODAM
<i>Gomesa gomezoides</i> (Barb.Rodr.) Pabst	EP	F.C.S.Vieira 1567 (JOI)	FODM/FODAM
<i>Gomesa recurva</i> R.Br.	EP	W.S.Mancinelli 1083 (JOI)	FODTB/FODSM/ FODM
<i>Gongora bufonia</i> Lindl.	EP	W.S.Mancinelli 1365 (UPCB)	FODSM
<i>Govenia utriculata</i> (Sw.) Lindl.	TE	W.S.Mancinelli 1051 (UPCB)	FODSM/FODM
<i>Grandiphyllum divaricatum</i> (Lindl.) Docha Neto	EP	W.S.Mancinelli 745 (JOI)	FODM
<i>Grobya galeata</i> Lindl.	EP	W.S.Mancinelli 573 (JOI)	FODM/FODAM
<i>Grobya guieselii</i> F.Barros & Lourenço	EP	A.Guiesel s.n. (SP)	S.I.
<i>Habenaria aff. nuda</i> Lindl.	AQ/TE	W.S.Mancinelli 1423-B (JOI)	FODTB
<i>Habenaria parviflora</i> Lindl.	TE	W.S.Mancinelli 172 (JOI)	FODM/C
<i>Habenaria repens</i> Nutt.	TE	W.S.Mancinelli 1454 (JOI)	FODM/C
<i>Habenaria umbraticola</i> Barb. Rodr.	TE	W.S.Mancinelli 1552 (JOI)	FODM
<i>Hadrolaelia coccinea</i> (Lindl.) Chiron & V.P.Castro	EP	W.S.Mancinelli 1294 (JOI)	FODM/FODAM/ C

Nome científico	Forma vida	Voucher	Formação veget.
<i>Hapalorchis lineatus</i> (Lindl.) Schltr.	EP	W.S.Mancinelli 1440 (JOI)	FODM
<i>Heterotaxis brasiliensis</i> (Brieger & Illg) F.Barros	EP	W.S.Mancinelli 646 (JOI)	FODSM/FODM
<i>Homalopetalum joinvillense</i> Mancinelli & E.C.Smidt	EP	W.S.Mancinelli 494-B (JOI)	FODSM
<i>Huntleya meleagris</i> Lindl.	EP	G.Pabst 506 (HB)	FODTB
<i>Ionopsis utricularioides</i> (Sw.) Lindl.	EP	G.Pabst 512 (HB)	FODTB
<i>Isochilus linearis</i> (Jacq.) R.Br.	EP	W.S.Mancinelli 633 (JOI)	FODSM/FODM
<i>Jacquinella globosa</i> (Jacq.) Schltr.	EP	W.S.Mancinelli 877 (JOI)	FODTB/FODSM
<i>Lankesterella caespitosa</i> (Lindl.) Hoehne	EP	W.S.Mancinelli 815 (JOI)	FODM
<i>Lankesterella ceracifolia</i> (Barb.Rodr.) Mansf.	EP	W.S.Mancinelli 896 (JOI)	FODSM/FODM
<i>Lepanthopsis floripecten</i> (Rchb.f.) Ames	EP	W.S.Mancinelli 931-B (JOI)	FODTB/FODSM/ FODM
<i>Leptotes bicolor</i> Lindl.	EP	W.S.Mancinelli 1003 (JOI)	FODTB/FODSM/ FODM
<i>Leptotes unicolor</i> Barb.Rodr.	EP	J.Barbosas Rodrigues s.n. (†)	FOM
<i>Liparis nervosa</i> (Thumb.) Lindl.	TE	W.S.Mancinelli 1503 (JOI)	FODTB
<i>Liparis vexillifera</i> (La Llave & Lex.) Cogn.	TE	W.S.Mancinelli 1504 (JOI)	C
<i>Lockhartia lunifera</i> (Lindl.) Rchb.f.	EP	W.S.Mancinelli 816 (JOI)	FODSM
<i>Lophiaris pumila</i> (Lindl.) Braem	EP	N. Welter 53 (?)	S.I.
<i>Malaxis excavata</i> (Lindl.) Kuntze	EP/TE	W.S.Mancinelli 731 (JOI)	FODM
<i>Maxillaria bradei</i> Schltr. ex Hoehne	EP	W.S.Mancinelli 784 (JOI)	FODTB/FODSM
<i>Maxillaria leucaimata</i> Barb.Rodr.	EP	W.S.Mancinelli 885 (JOI)	FODSM
<i>Maxillaria lindleyana</i> Schltr.	EP	W.S.Mancinelli 1290 (JOI)	FODM
<i>Maxillaria ochroleuca</i> Lodd. ex Lindl.	EP	W.S.Mancinelli 1423 (UPCB)	FODSM/FODM
<i>Microchilus arietinus</i> (Rchb.f. & Warm.) Ormerod	TE	W.S.Mancinelli 1043 (JOI)	FODTB/FODSM
<i>Miltonia regnellii</i> Rchb.f.	EP	W.S.Mancinelli 1169 (JOI)	FODSM/FODM
<i>Mormolyca rufescens</i> (Lindl.) M.A.Blanco	EP	G.Pabst 523 (HB)	FODTB/FODSM
<i>Notylia lyrata</i> S.Moore	EP	W.S.Mancinelli 1132 (JOI)	FODSM
<i>Octomeria anceps</i> Porto & Brade	EP	W.S.Mancinelli 833-A (JOI)	FODSM
<i>Octomeria crassifolia</i> Lindl.	EP	W.S.Mancinelli 558 (JOI)	FODSM/FODM/ FODAM
<i>Octomeria diaphana</i> Lindl.	EP	W.S.Mancinelli 589 (JOI)	FODM
<i>Octomeria flabellifera</i> Pabst	EP	W.S.Mancinelli 586 (JOI)	FODSM
<i>Octomeria gracilis</i> Lodd. ex Lindl.	EP	W.S.Mancinelli 765 (JOI)	FODTB/FODSM
<i>Octomeria grandiflora</i> Lindl.	EP	W.S.Mancinelli 1372 (UPCB)	FODTB/FODSM/ FODM
<i>Octomeria juncifolia</i> Barb.Rodr.	EP	W.S.Mancinelli 764 (JOI)	FODSM/FODM
<i>Octomeria micrantha</i> Barb.Rodr.	EP	W.S.Mancinelli 566 (JOI)	FODM
<i>Oeceoclades maculata</i> (Lindl.) Lindl.	TE	W.S.Mancinelli 1525 (JOI)	FODTB
<i>Ornithidium rigidum</i> (Barb.Rodr.) M.A.Blanco & Ojeda	EP	W.S.Mancinelli 990 (JOI)	FODSM
<i>Ornithocephalus myrticola</i> Lindl.	EP	W.S.Mancinelli 1515 (JOI)	FODSM
<i>Ornithophora radicans</i> (Rchb.f.) Garay & Pabst	EP	W.S.Mancinelli 1425 (UPCB)	FODTB
<i>Pabstia viridis</i> (Lindl.) Garay	EP	W.S.Mancinelli 1363 (UPCB)	FODSM/FODM
<i>Pabstiella bacillaris</i> (Pabst) Luer	EP	W.S.Mancinelli 934 (JOI)	FODSM/FODM
<i>Pabstiella carinifera</i> (Barb.Rodr.) Luer	EP	W.S.Mancinelli 1443 (JOI)	FODM
<i>Pabstiella colorata</i> (Pabst) Luer & Toscano	EP	W.S.Mancinelli 939 (JOI)	FODSM
<i>Pabstiella fusca</i> (Lindl.) Chiron & Xim.Bols.	EP	W.S.Mancinelli 651 (JOI)	FODSM/FODM

Nome científico	Forma vida	Voucher	Formação veget.
<i>Pabstiella martinensis</i> (Hoehne) Luer	EP	W.S.Mancinelli 1209 (JOI)	FODM/FOM
<i>Pabstiella miragliae</i> (J.E.Leite) Luer	EP	W.S.Mancinelli 858 (JOI)	FODSM
<i>Pabstiella parvifolia</i> (Lindl.) Luer	EP	W.S.Mancinelli 1186 (UPCB)	FODM
<i>Pabstiella pleurothalloides</i> (Cogn.) Luer	EP	W.S.Mancinelli 652 (JOI)	FODM/FODAM
<i>Pabstiella podoglossa</i> (Hoehne) Luer	EP	W.S.Mancinelli 1456 (JOI)	FODM/FODAM
<i>Pabstiella punctatifolia</i> (Barb.Rodr.) Luer	EP	W.S.Mancinelli 1238 (UPCB)	FODSM
<i>Pabstiella quadridentata</i> (Barb. Rodr.) Luer	EP	W.S.Mancinelli 1461-B (JOI)	FODM
<i>Pabstiella seriata</i> (Lindl.) Luer & Toscano	EP	W.S.Mancinelli 1366 (JOI)	FODM
<i>Pabstiella trifida</i> (Lindl.) Luer	EP	W.S.Mancinelli 350 (JOI)	FODM/FODAM
<i>Pabstiella versicolor</i> (Porsch) Luer	EP	W.S.Mancinelli 1187 (JOI)	FODM
<i>Pabstiella wacketii</i> (Handro & Pabst) Luer	EP	W.S.Mancinelli 1551 (JOI)	FODM
<i>Pelexia novofriburgensis</i> (Rchb.f.) Garay	TE	W.S.Mancinelli 1358 (UPCB)	FODSM/FODM
<i>Pelexia sancta</i> (Rchb.f. & Warm.) Garay	EP/TE	W.S.Mancinelli 817 (JOI)	FODSM/FODM
<i>Phymatidium aquinoi</i> Schltr.	EP	T.J.Cadorin 814 (FURB)	FODM
<i>Phymatidium delicatulum</i> Lindl.	EP	W.S.Mancinelli 602 (JOI)	FODTB/FODSM/ FODM
<i>Phymatidium falcifolium</i> Lindl.	EP	W.S.Mancinelli 1371 (UPCB)	FODSM/FODM
<i>Platyrrhiza quadricolor</i> Barb.Rodr.	EP	W.S.Mancinelli 798 (JOI)	FODSM/FODM
<i>Platystele oxyglossa</i> (Schltr.) Garay	EP	W.S.Mancinelli 859 (JOI)	FODM
<i>Platythelys schlechteriana</i> (Hoehne) Garay	AQ/TE	W.S.Mancinelli 1035 (JOI)	FODM
<i>Polystachya concreta</i> (Jacq.) Garay & Sweet	EP	W.S.Mancinelli 492 (JOI)	M/FODTB/ FODSM/FODM
<i>Prescottia densiflora</i> (Brongn.) Cogn.	TE	W.S.Mancinelli 1461 (JOI)	FODTB
<i>Prescottia lancifolia</i> Lindl.	EP	W.S.Mancinelli 593 (JOI)	FODM/FODAM
<i>Prescottia stachyodes</i> (Sw.) Lindl.	TE	W.S.Mancinelli 994 (JOI)	FODSM/FODM
<i>Promenaea xanthina</i> (Lindl.) Lindl.	EP	W.S.Mancinelli 1093 (JOI)	FODM/FODAM
<i>Prosthechea bulbosa</i> (Vell.) W.E.Higgins	EP	W.S.Mancinelli 489 (JOI)	FODTB/FODSM/ FODM/FODAM
<i>Prosthechea fragrans</i> (Sw.) W.E.Higgins	EP	W.S.Mancinelli 1468 (JOI)	FODTB/FODSM
<i>Prosthechea pygmaea</i> (Hook.) W.E.Higgins	EP	W.S.Mancinelli 883 (JOI)	FODTB/FODSM
<i>Prosthechea vespa</i> (Vell.) W.E.Higgins	EP	W.S.Mancinelli 833 (JOI)	FODM
<i>Psilochilus dusenianus</i> Kraenzl. ex Dunsterv. & Garay	TE	W.S.Mancinelli 813 (JOI)	FODM
<i>Psilochilus modestus</i> Barb.Rodr.	TE	W.S.Mancinelli 749 (JOI)	FODM/FODAM
<i>Rhettinantha notylioglossa</i> (Rchb.f.) M.A.Blanco	EP/RU	F.C.S.Vieira 72 (FUEL)	FODM/FODAM
<i>Rodriguezia bracteata</i> (Vell.) Hoehne	EP	W.S.Mancinelli 1064 (UPCB)	FODTB/FODSM
<i>Rodriguezopsis eleutherosepala</i> (Barb.Rodr) Schltr.	EP	W.S.Mancinelli 898 (JOI)	FODM/FODAM
<i>Sacoila lanceolata</i> (Aubl.) Garay	TE	W.S.Mancinelli 1537 (JOI)	FODTB/FODM
<i>Sauroglossum elatum</i> Lindl.	TE	W.S.Mancinelli 1459-B (JOI)	FODTB/FODSM/ FODM
<i>Scaphyglottis modesta</i> (Rchb.f.) Schltr.	EP	W.S.Mancinelli 500 (JOI)	FODTB/FODSM/ FODM
<i>Scaphyglottis reflexa</i> Lindl.	EP	W.S.Mancinelli 1368 (UPCB)	FODTB/FODSM
<i>Specklinia grobyi</i> (Batem. ex Lindl.) F.Barros	EP	F.C.S.Vieira 690 (JOI)	FODM/FODAM
<i>Stanhopea lietzei</i> (Regel) Schltr.	EP	W.S.Mancinelli 1089 (JOI)	FODSM
<i>Stelis deregularis</i> Barb.Rodr.	EP	W.S.Mancinelli 627 (JOI)	FODTB/FODSM
<i>Stelis intermedia</i> Poepp. & Endl.	EP	W.S.Mancinelli 697 (JOI)	FODM/FODAM

Nome científico	Forma vida	voucher	Formação veget.
<i>Stelis megantha</i> Barb.Rodr.	EP	W.S.Mancinelli 1015 (UPCB)	FODSM
<i>Stelis papaquerensis</i> Rchb.f.	EP	W.S.Mancinelli 729 (JOI)	FODSM/FODM/ FODAM
<i>Stelis pauloensis</i> Hoehne & Schltr.	EP	W.S.Mancinelli 987 (JOI)	FODSM/FODAM
<i>Trigonidium latifolium</i> Lindl.	EP	W.S.Mancinelli 1011 (UPCB)	FODTB/FODSM
<i>Trizeuxis falcata</i> Lindl.	EP	W.S.Mancinelli 1550 (JOI)	FODTB
<i>Uleiorchis ulei</i> (Cogn.) Handro	MI/TE	W.S.Mancinelli 1444 (JOI)	FODTB
<i>Vanilla chamissonis</i> Klotzsch	HE	W.S.Mancinelli 1458-B (JOI)	FODTB
<i>Vanilla aff. edwallii</i> Hoehne	HE	W.S.Mancinelli 1269-B (JOI)	FODM
<i>Warmingia eugenii</i> Rchb.f.	EP	G.Hatschbach 2968 (MBM)	S.l.
<i>Xylobium variegatum</i> (Ruiz & Pav.) Garay & Dunst.	EP	W.S.Mancinelli 932 (JOI)	FODSM/FODM
<i>Zootrophion atropurpureum</i> (Lindl.) Luer	EP	W.S.Mancinelli 884 (JOI)	FODSM/FODM
<i>Zygotepalum crinitum</i> Lodd.	EP	W.S.Mancinelli 789 (JOI)	FODM/FODAM
<i>Zygotepalum maculatum</i> (Kunth) Garay	RU/TE	W.S.Mancinelli 1493 (JOI)	C
<i>Zygotepalum maxillare</i> Lodd.	EP	W.S.Mancinelli 1429 (JOI)	FODTB
<i>Zygostates lunata</i> Lindl.	EP	W.S.Mancinelli 827 (JOI)	FODTB
<i>Zygostates pellucida</i> Rchb.f.	EP	W.S.Mancinelli 1092 (JOI)	FODSM/FODM
<i>Zygostates pustulata</i> (Kraenzl.) Schltr.	EP	W.S.Mancinelli 584 (JOI)	FODM/FODAM

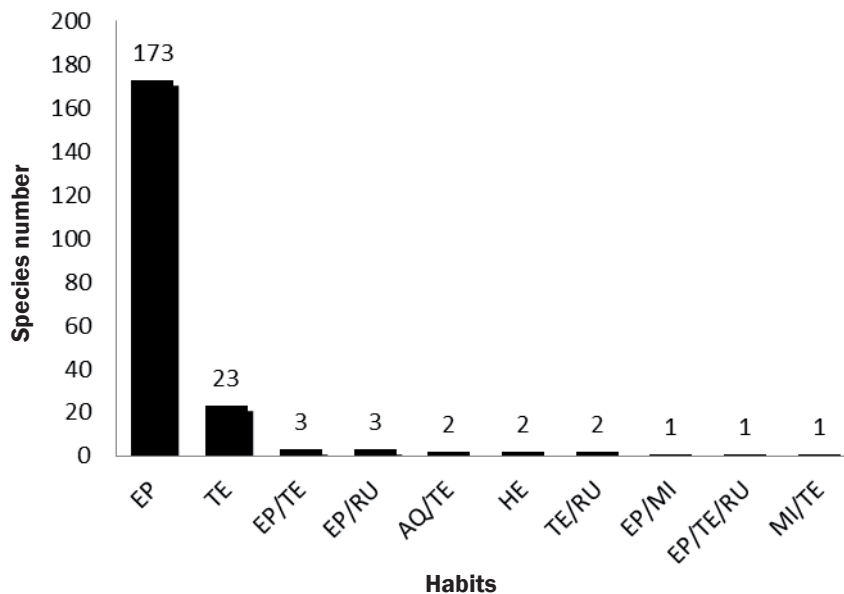


Figure 3 – Habit versus species number. AQ – aquatic; EP – epiphytic; HE – hemi-epiphytic; MI – myco-heterotrophic; RU – rupicolous; TE – terrestrial. Legend – horizontal: habits; vertical: species number.

In relation to occurrence in vegetation formations (Figure 4), most species were observed exclusively in montane dense ombrophilous forest (19.12%), followed by species exclusive to submontane dense ombrophilous forest (16.18%), species found in both submontane dense ombrophilous forest and montane dense ombrophilous forest (15.20%), species found between lowland dense ombrophilous forest and submontane dense ombrophilous forest (12.25%), and species found between montane dense ombrophilous forest and high montane dense ombrophilous forest (9.31%). The remaining species (27.94%) are less representative and occur at the intersections of formations, including mangroves, high montane grasslands and mixed ombrophilous forest. In total, seven species did not have localities

recorded on specimen labels. It is thought that 49.02% of these species occur exclusively in a specific vegetation formation and elevation range. This fact is justified, in some cases, because the species are infrequent and were observed only in a specific location, while in other cases many species were exclusive to a vegetation formation and elevation. In addition, many species occur at the intersections of formations, especially at the tops of hills under 1000 m elevation where the montane vegetation contains diverse elements of high montane formations. Few species are generalists (10.29%), which occur in three or more vegetation formations. It is noteworthy that five species occur in mangroves, which is unusual for these plants.

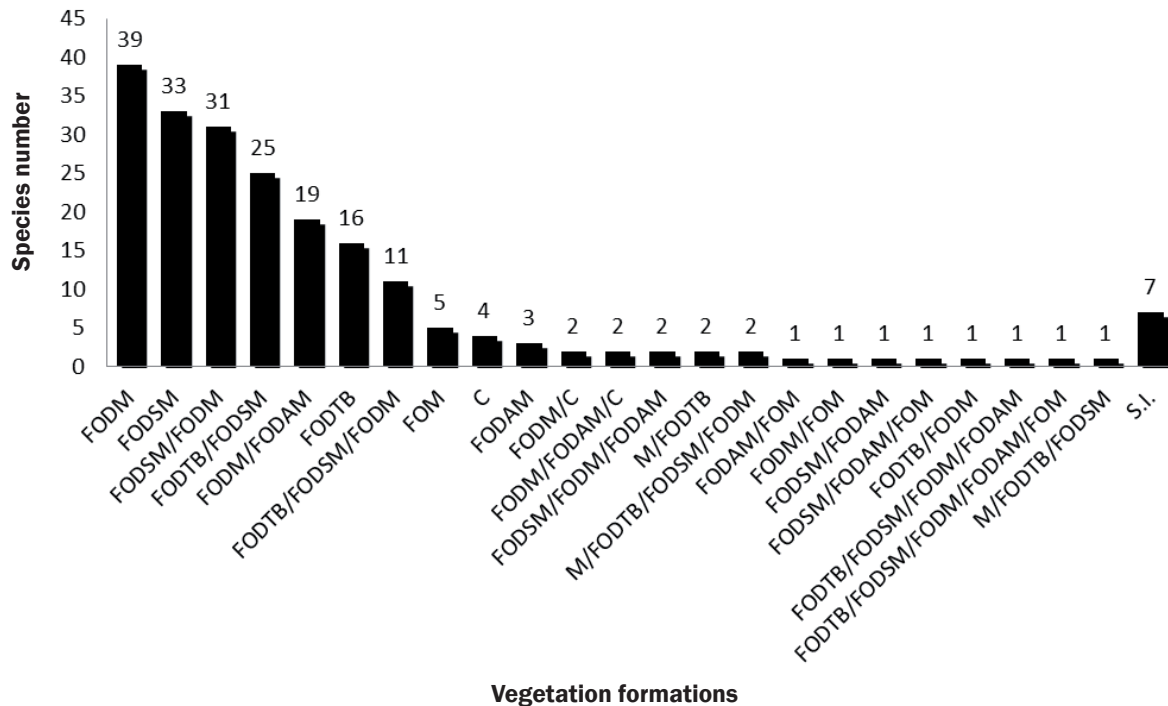


Figure 4 – Vegetation formations versus species number. M – mangroves; FODTB – lowland dense ombrophilous forest; FODSM – submontane dense ombrophilous forest; FODM – montane dense ombrophilous forest; FODAM – high montane dense ombrophilous forest; C – high montane grasslands; FOM – mixed ombrophilous forest; S.I. = without informations. Legend – horizontal: vegetation formations; vertical: species number.

Some species were characterized by occurring in *capoeiras* (secondary vegetation) and on banks in the middle of forests, such as *Cleistes libonii* (Rchb.f.) Schltr., *Epidendrum secundum* Jacq. and *Eulophia alta* (L.) Fawc. Rendle. Other species occur in mountainous regions where the vegetation is lush and protected by slopes, which are difficult to explore and develop.

A comparison was conducted, using Sorensen's Similarity Index, between the main floristic studies of Orchidaceae in Santa Catarina and an adjacent study in Paraná (Table 2).

Table 2 – Sorensen Similarity Index.

Reference	N. of species	Sorensen index
Blum (2010)	111	54,3
Klein <i>et al.</i> (1978)	295	52,7
Klein (1979)	274	50,5
Caetano and Guimarães (2013)	65	32,8
Geuster and Favretto (2014)	95	21,0

The orchids of Florianópolis and surrounding areas were first listed by Rohr (1951) who recorded 169 species, and subsequently by Klein *et al.* (1978) who listed 295 species; for the Vale do Itajaí region, Klein (1979) listed 274 species. In a more specific study about the municipality of Benedito Novo, Caetano and Guimarães (2013) reported 65 species, and for western Santa Catarina Geuster and Favretto (2014) cited 95 species of orchids. In addition, it is worth noting that Blum (2010) reported 111 species of orchids for Parque Nacional Saint-Hilaire in Morretes, Paraná. The data from Blum (2010) is for an area of the Serra do Mar in the state of Paraná and is the most similar to the results obtained for Joinville, followed by Klein *et al.* (1978), which covered a portion of coastal Santa Catarina. Even so, the high number of species not common among the different studies demonstrates the contribution of the present study, about the diversity of orchids in Joinville, to what is known about Orchidaceae in Santa Catarina. The representative number of species in the region highlights the existing diversity and the influence of different vegetation formations and elevations that occur in the Joinville municipality.

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