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Authors: Chautems, Alain, and Perret, Mathieu

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Description and phylogenetic position of a new species of Nematanthus (Gesneriaceae) from Bahia, Brazil

Alain Chautems & Mathieu Perret

Abstract

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Nematanthus exsertus Chautems, a new species of *Gesneriaceae* from the state of Bahia in Brazil, is described. It is easily distinguished from other *Nematanthus* Schrad. species by its pendent resupinate flowers with funnel-shaped and laterally compressed corolla combined with striking exserted stamens and style. According to the phylogenetic analyses based on nuclear and plastid DNA sequences, this species belongs to a clade including the morphologically distinct *Nematanthus monanthos* (Vell.) Chautems and four other species with a similar flower morphology but lacking exserted stamen and style. Field photographs accompany the description. The new species is known from one locality in the municipality of Wenceslau Guimarães in the southern part of Bahia state within the "região cacaueira" [cocoa producing area]. The new species is assigned a preliminary assessment of "Vulnerable" using the IUCN Red List Categories and Criteria.

Keywords

GESNERIACEAE – *Nematanthus* – Brazil – Atlantic Forest – Endemism – Taxonomy – Phylogeny

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Addresses of the authors :

AC, MP : Conservatoire et Jardin botaniques de la Ville de Genève, C.P. 60, 1292 Chambésy, Switzerland. E-mail : **alain.chautems@ville-ge.ch**

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Introduction

The genus *Nematanthus* Schrader includes 31 species, all endemic to the Brazilian Atlantic Forest (Chautems et al., 2005; Ferreira et al., 2016). *Nematanthus* species are epiphytic perennial herbs or subshrubs, less frequently growing on rocky substrates in humus pockets. Blossoms display a large range of morphologies among species, including short or long pedicelate, brightly colored flowers, with resupinate, or non-resupinate flowers. Flowers that are non-resupinate are pouched. Flowers that are resupinate are funnel-shaped and laterally compressed, but in some taxa, flowers are white and bell-shaped. Hummingbird pollination has been documented in the field for several species and is likely the dominant pollination mode in the genus, according to flower morphology (Serrano-Serrano et al., 2017). However, flowers matching the bee-pollination have also evolved in a clade of three *Nematanthus* species (Serrano-Serrano et al., 2015). Despite this large morphological variation, the monophyly of *Nematanthus* has been confirmed by phylogenetic data and traits such as flower resupination and bee syndrome have been identified as synapomorphies of specific clades (Ferreira et al., 2016; Serrano-Serrano et al., 2015).

The Brazilian Atlantic Forest is recognized as a global biodiversity hotspot and studies focused on forest remnants in the State of Bahia in eastern Brazil have revealed a higher species richness in trees, herbs, vines and epiphytes than in other areas from southeastern Brazil (Amorim et al., 2005, 2009; Thomas, 2008). During fieldwork in the county of Wenceslau Guimarães in southern Bahia state, plants with resupinate red flowers and exserted anthers and style were fortuitously discovered by the first author while walking in a fragment of well-preserved rain forest. Here we recognize and describe this new species and used two nuclear loci and seven plastid DNA regions to investigate its phylogenetic placement within the genus. Morphology of the new species is discussed and compared with other closely related and sympatric species. Field photographs and distribution map are provided as well as a preliminary risk of extinction assessment using the IUCN Red List Categories and Criteria (IUCN, 2012).

Material and methods

Specimens of the newly identified species were collected during fieldwork carried out in May 2007 in the county of Wenceslau Guimarães, southern Bahia state, Brazil. All pressed material is deposited in the CEPEC and NY herbaria (acronyms according to Index Herbariorum, 2017). New collections were later registered from the same area in 2012 and material was deposited in the RB herbarium. The description and analysis of the new species were based on fresh and dried specimens. Data for comparisons with other species were taken from previous studies (Chautems, 1988, Chautems & Matsuoka, 2003); directly from herbarium specimens mostly at G, NY, RB; from fresh specimens kept in cultivation at the *Conservatoire et Jardin botaniques de la Ville de Genève*; or at Mauro Peixoto's private collection in sitio Primavera, Mogi das Cruzes, São Paulo, Brazil. The map was created using ArcGIS 10 (ESRI Inc.).

To assess the phylogenetic position of the new taxon, we performed a phylogenetic analysis based on DNA nucleotide sequence data. A DNA sample of the type collection was analyzed with sequences data obtained from other representative species of the genera *Nematanthus* Schrad. (26 of 31 species), *Codonanthe* (Mart.) Hanst. (8 of 8 species), *Codonanthopsis* Mansf. (7 of 13 species), *Lesia* J.L. Clark & J.F. Sm. (1 of 2 species). Two outgroups, *Drymonia serrulata* (Jacq.) Mart. and *Chrysothemis pulchella* (Donn ex Sims) Decne., were selected according to previous phylogenetic analyses (Perret et al., 2013). Phylogenetic relationsips among these taxa were reconstructed using seven plastid DNA regions (*atpB-rbcL, matK, rps16, rpl16, trnT-trnL, trnL-trnF* and *trnS-trnG*) and two nuclear regions, the ribosomal internal transcribed spacer (*ITS*) and a portion of the plastid-expressed glutamine synthetase gene *(ncpGS).* New DNA sequences were generated for *trnT-trnL*, *trnS-trnG* and for the new species, *N. exsertus*, following the procedure described in Perret et al. (2003) and Ferreira et al. (2016). All other sequences were obtained from previous works by Serrano-Serrano et al. (2015) and Ferreira et al. (2016). Newly acquired sequences have been deposited in GenBank. Voucher information and GenBank numbers for each sequence used in this study are provided in Appendix 1.

Newly acquired sequences were manually added to available alignments in Mesquite 3.03 (Maddison & Maddison, 2015). Phylogenetic analyses were performed on the CIPRES portal in San-Diego, USA [http://www.phylo.org] using maximum likelihood (ML) and Bayesian Inference (BI). Maximum likelihood analyses were conducted using the software RAxML v.8.2.10 (Stamatakis, 2014) with a rapid bootstrap analysis followed by the search of the best-scoring ML tree in one single run. Bootstrap analysis stopped after 456 replicates, which were sufficient for getting stable support values according to the bootstrap convergence test using the extended majority-rule consensus tree criterion (autoMRE). The default model, GTRCAT, was used to perform the ML analyses. Bayesian inference analyses were performed using MrBayes 3.2.3 (Ronquist et al., 2012) following the procedure described in Serrano-Serrano et al. (2015). For each DNA region, the optimal substitution models were assessed using jModelTest2 (Darriba et al., 2012) according to the Akaike information criterion (AIC). The best-fit model was HKY + G for ncpGS, and GTR + G for all other genes. All the parameters values were unlinked across gene partitions and estimated during the Markov chain Monte Carlo (MCMC) runs. Two independent analyses were run from different random trees. The chains were run for 20,000,000 generations, with trees sampled every 1000th generation. We determined chain convergence and burn-in length (20% of the sampled generations) by examining trace plots of each parameter in Tracer v.1.6 (Rambaut et al. 2014). A consensus tree was calculated by removing the burn-in period and combining the two runs.

Results and discussion

The topology of the phylogenetic trees resulting from the ML and BI analyses are identical and are summarized in Fig. 1. The result is also congruent with the maximum clade credibility tree described in Serrano-Serrano et al. (2015) showing that *Nematanthus* species are clustered in five main clades exhibiting contrasting flower morphologies. Species with resupinate flowers and hummingbird syndrome belong to clades I and III, whereas the three species with white non-resupinate flowers and bee pollination syndrome belong to clade II (Fig. 1). The *Nematanthus* species with non-resupinate flowers

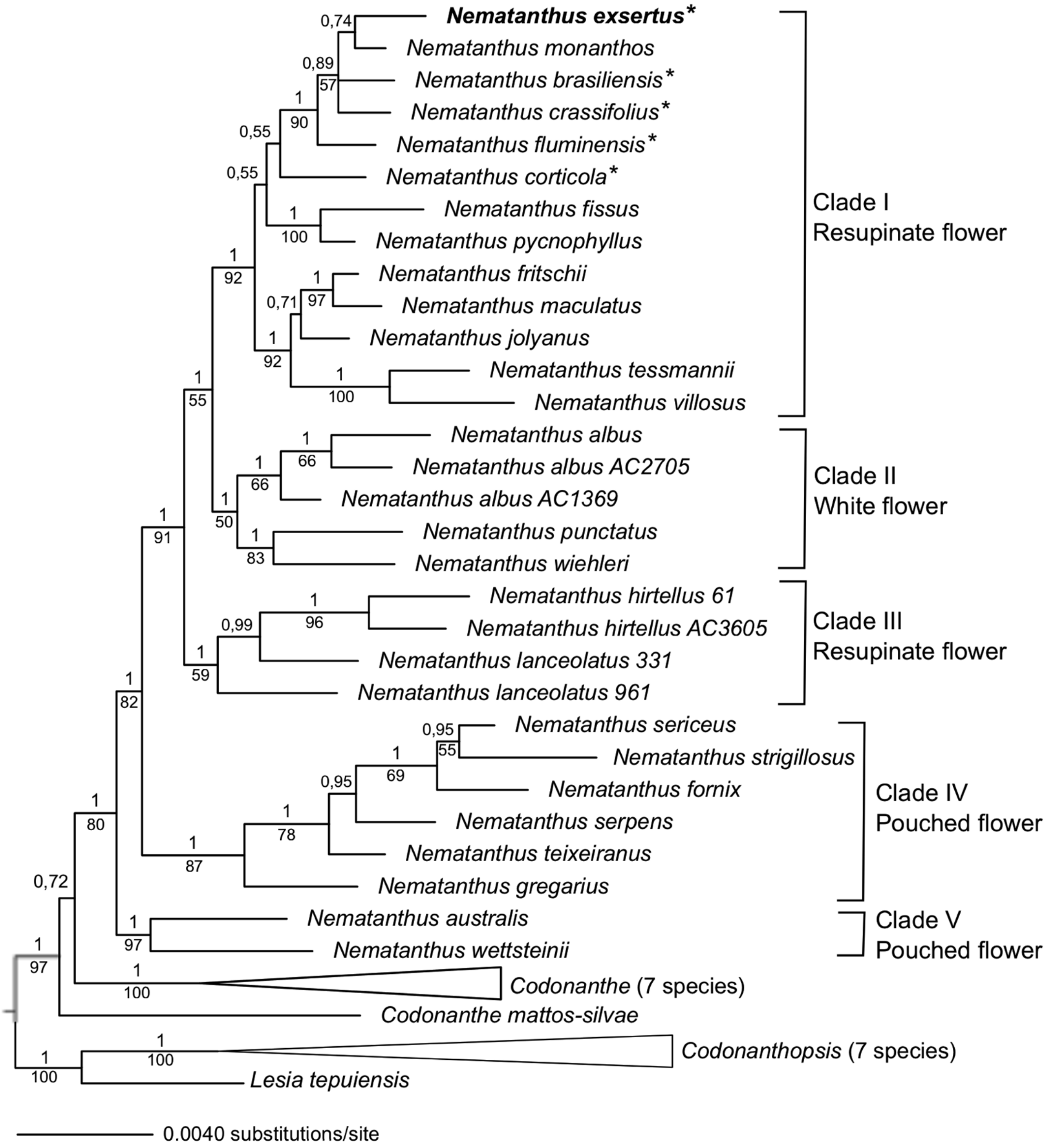

Fig. 1. – Bayesian 50% majority rule consensus tree of *Nematanthus* resulting from the combined analysis of plastid loci *atpB-rbcL*, *matK*, *rps16*, *rpl16*, *trnT-trnL*, *trnL-trnF*, *trnS-trnG*, and the nuclear regions *ncpGS* and *ITS*. Numbers above branches are Bayesian posterior probabilities. Numbers below branches are maximum likelihood bootstrap when ≥50%. Asterisks indicate species with funnel-shaped and laterally compressed corollas.

Fig. 2. – *Nematanthus exsertus* Chautems. **A.** Habit with pendent pedicels in native habitat; **B.** Flowering shoots; **C.** Close-up of shoot showing stem and petiole indumentum; **D.** Close-up of corolla showing exserted stamens and style.
[*Jardim et al. 5000*]

and hypocyrtoid (or pouched) corolla are found in clades IV and V (Fig. 1). Our analysis support that the new species, *N. exsertus*, nests in a well-supported clade (bootstrap support, BS = 90%, Bayesian posterior probability, PP = 1) with four other resupinate species (*N. brasiliensis*, *N. crassifolia*, *N. fluminensis* and *N. monanthos*, Fig. 1). *Nematanthus exsertus* is sister to *N. monanthos*, but interspecific relationships within this clade are not supported (BS < 50%). Although the new species can be readily distinguished from *N. monanthos*, it presents morphological affinities with *N. brasiliensis*, *N. corticola, N. crassifolia* and *N. fluminensis*. All five species in this group are characterized by the presence of pendent flowers with elongate pedicels with funnel-shaped corolla tubes that appear laterally compressed in the throat. However, all of the other species have inserted stamens and pistil. In contrast, *N. exsertus* (Fig. 2) is unique by the presence of exserted stamens and pistil. Scarlet-red corollas are found in *N. exsertus*, *N. corticola* and *N. crassifolius*, whereas *N. brasiliensis* displays a yellow corolla with red stripes and *N. fluminensis* a plain yellow corolla. However, none of these species have stamens and pistil as exserted as in *N. exsertus* (Fig. 2). Scarlet-red corolla is found in *N. exsertus*, *N. corticola* and *N. crassifolius*, whereas *N. brasiliensis* displays a yellow corolla with red stripes and *N. fluminensis* a plain yellow corolla.

The only closely related species that is sympatric with *N. exsertus* is *N. corticola* (Fig. 3). These two species are easily differentiated when fertile or sterile. When sterile, they can be differentiated by the presence of villous indumentum on the stem in *N. exsertus* in contrast to the glabrous stems in *N. corticola*. In flower, *N. exsertus* is differentiated by the presence of exserted stamens and style and shorter corolla tube with narrower gibbosity (Table 1).

Taxonomic treatment

Nematanthus exsertus Chautems, **spec. nova** (Fig. 2).

Typus: Brazil. Bahia: Município de Wenceslau Guimarães, Estação Ecológica Estadual Nova Esperança, trilha para o Rio Agua Vermelha, 415-450 m, 13°35’43”S 39°43’10”W, 3.V.2007, *Jardim et al. 5000* (holo-: CEPEC-117040!; iso-: NY!).

Nematanthus exsertus Chautems resembles N. corticola Schrad. with similar elongate pedicels, short and narrow calyx lobes and funnel-shaped, laterally compressed red corollas, but differs by a villous indumentum on stem and petioles, as well as shorter and more ventricose corollas and presence of exserted stamens and style.

Subshrub 0.5-1.2 m, epiphytic; stem ascending, sparingly branched, 3-6 mm diam., villose, especially in young parts; internodes 1.5-5 cm. *Leaves* strongly anisophyllous; petioles 0.5-4 cm, dark vinaceous, pubescent-hirsute; blades 2.5-5 × 0.8-2 cm (smaller ones) to 6–14 × 1.8-3 cm (larger ones), elliptic, adaxially green, pubescent, abaxially paler green, glabrescent, apex acute to acuminate, base cuneate, margin entire, 3-6 lateral veins each side of the midrib, vinaceous, pubescent. *Flowers* solitary, 1-3 per stem, pendent-resupinate, in leaf axils, bracts minute or early caducous; pedicels 10-18 cm long, vinaceous, pubescent. *Calyx* fused for 3-4 mm at base, sepals 7-8 × 2-3 mm, linear lanceolate, pubescent, vinaceous, apex acute, greenish, margin entire or remotely toothed. *Corolla* 3-3.5 cm long, scarlet-red, obliquely inserted in calyx, funnel-shaped, laterally compressed on ventral side before mouth, pubescent, base shortly cylindric, 4-5 mm diam., gradually enlarged to 2-2.2 cm at the opening, lobes revolute at anthesis; stamens and style exserted for about 2.5-2.8 cm beyond the corolla opening, filaments 4.5-5 cm, not coiling at the end of anthesis,

Table 1. – Key morphological differences between *Nematanthus exsertus* Chautems, *N. corticola* Schrad. and *N. crassifolius* (Schott) Wiehler; abbreviations in capital letters stands for the Brazilian states of Bahia (BA), Espírito Santo (ES), Minas Gerais (MG), Rio de Janeiro (RJ), and São Paulo (SP).

	N. corticola	***N. crassifolius***	***N. exsertus***
Stem indument	glabrous	glabrous	villose
Petiole indument	Sparsely pubescent	glabrous	villose
Pedicel length [cm]	10-20	3-10(-16)	10-18
Calyx lobes length [mm]	7-12	15-30	8-10
Calyx lobes width [mm]	2-4	4-8	2-3
Corolla length [cm]	3.8-5	4-5	3-3.5
Corolla width at max. gibbosity [cm]	1.4-2	1.8-2.4	2-2.2
Stamens position	included	included	strongly exserted
Distribution	BA in most of the southern hylea rain forest	Montane rain forest in ES, RJ, southeastern MG and marginally in SP	Restricted to one locality in southern BA

white, glabrous, pollen cream; nectary gland bilobed, 3-4 × 2-3 mm, cream, ovary 4-6 mm long, vinaceous, pubescent, style 4.8-5.2 mm, white, glabrous. *Fruit* unknown.

Etymology. – The epithet "exsertus" refers to the exserted stamens and style that extend beyond the corolla opening for at least 2.5 cm.

Distribution, ecology and phenology. – *Nematanthus exsertus* is currently known by two collections made in the "Estação Ecológica Estadual Nova Esperança" in the municipality of Wenceslau Guimarães in the state of Bahia (Fig. 3). The individuals were observed growing epiphytically on small trees at 1-2 m above the ground in the understory of a fragment of wet and dense forest on flat grounds. Specimens were collected with flowers in January and May. According to flower morphology, the species is likely pollinated by hummingbirds. Pollination by hermit hummingbirds has been documented for the related species *N. crassifolia* and *N. brasiliensis* presenting similar pendent and resupinate flowers with laterally compressed corolla (SanMartin-Gajardo & Vianna, 2010; Wolowski et al., 2013).

Conservation status. – *Nematanthus exsertus* is known only from a single location of a dozen individuals in an area of preservation created in 1997 and extended in 2,000, covering 2,418 ha. of Atlantic Rain Forest ("Estação Ecológica Estadual Nova Esperança"). This area is nevertheless subject to local preservation conflicts, like deforestation, illegal hunting and illegal occupation [http://www.inema.ba.gov.br/gestao-2/unidades-de-conservacao/estacao-ecologica/estacao-ecologica-de-wenceslau-guimaraes]. Therefore, with a restricted AOO, plausible threats that could rapidly push the species to "Critically Endangered", *N. exsertus* is assigned a preliminary assessment of "Vulnerable" [VU D2] using the IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – Our first thought, at the time of discovering this species, was that we had found an individual of *Nematanthus corticola* with ill-formed stamens and style, because this taxon occurs frequently in the southern Bahian rain forest (Fig. 3). After having observed few individuals, each bearing several flowers, it was readily apparent that we had discovered a new species.

The striking exserted position of stamens and style are a unique feature in the genus *Nematanthus*. *Nematanthus exsertus* resembles *N. corticola* with similar pedicel, calyx lobes, corollas, but differs by a villous indumentum on stem and petioles, as well as shorter and more ventricose corollas with strikingly exserted stamens and style (see Table 1).

The total number of known species for the genus *Nematanthus* is now 32. The new species should be added to the recent checklist that established a high endemism rate of epiphytic plants within the eastern Brazilian Atlantic rain forest (Freitas et al., 2016). It is also an addition to the number of *Gesneriaceae* species that have been registered so far for the state of Bahia, the total number of registered species reaches now 29 (Chautems, 1991; Araujo et al., 2017).

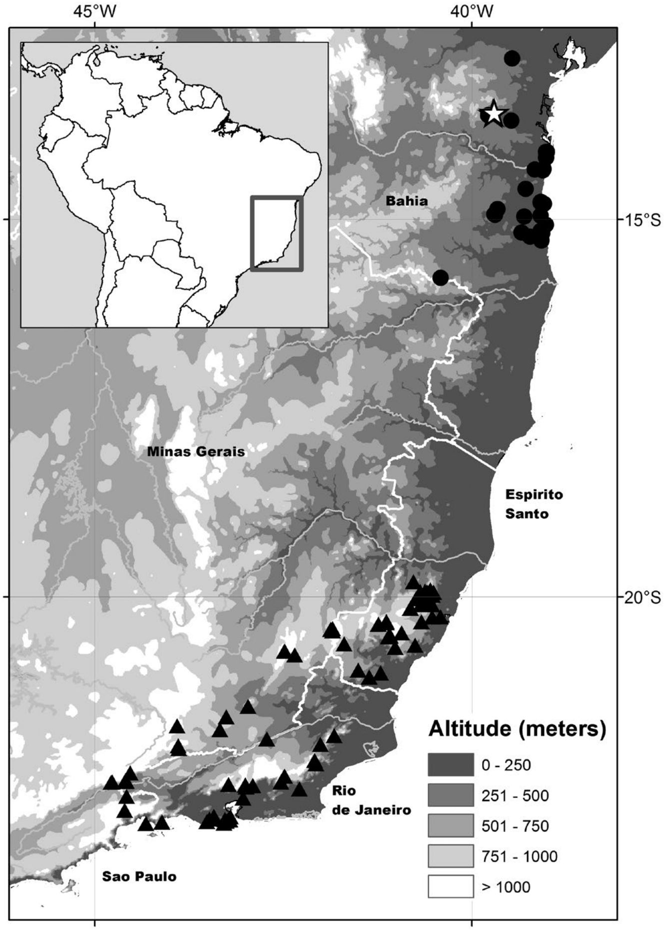

Fig. 3. – Distribution map of *Nematanthus exsertus* Chautems (star) showing also the occurrences of morphologically related species *N. corticola* Schrad. (circles) and *N. crassifolius* (Schott) Wiehler (triangles).

Paratypus. – **Brazil. Bahia:** Município de Wenceslau Guimarães, Reserva Estadual de Wenceslau Guimarães, Trilha da Petioba, 13°34'49"S 39°42'17"W, 411 m, 19.01.2012, *Monteiro et al. 545* (RB-536512).

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Appendix 1. – List of sequences used in the phylogenetic analyses. Taxa, voucher information, origin and Genbank accession numbers for the nine DNA regions (new sequences in bold).

Taxon	Voucher	*ITS*	*ncpGS*	*matK*
Chrysothemis pulchella	*Araujo et al. 602* (G)	KT958331	KT958276	JX195977
Codonanthe carnosa	*Chautems & Perret 08-001* (G)	KT958316	KT958261	JX195956
Codonanthe cordifolia	*Chautems & Perret 10-103* (G)	KT958317	KT958262	JX195958
Codonanthe devosiana	*Chautems & Perret 99-010* (G)	KT958320	KT958265	JX195962
Codonanthe gibbosa	*Kollmann et al. 4784* (MBML)	KT958323	KT958268	JX195965
Codonanthe gracilis	*Chautems & Perret 99-003* (G)	KT958324	KT958269	JX195968
Codonanthe mattos-silvae	*Chautems & Perret 99-033* (G)	KT958327	KT958272	JX195971
Codonanthe serrulata	*Chautems & Perret 99-045* (G)	KT958328	KT958273	JX195972
Codonanthe venosa	*Chautems & Perret 99-006* (G)	KT958330	KT958275	JX195974
Codonanthopsis calcarata	Cultivated at CJBG AC-3305	KT958314	KT958259	JX195954
Codonanthopsis corniculata	*Chautems & Perret 99-043* (G)	KT958318	KT958263	JX195959
Codonanthopsis crassifolia	*Chautems & Perret 06-102* (G)	KT958319	KT958264	JX195960
Codonanthopsis dissimulata	*Perret & Chautems 79* (G)	KT958335	KT958280	JX195984
Codonanthopsis macradenia	*Chautems & Perret 10-107* (G)	KT958326	KT958271	JX195970
Codonanthopsis uleana	*Chautems & Perret 02-105* (G)	KT958329	KT958274	JX195973
Codonanthopsis ulei	*Chautems & Perret 07-002* (G)	KT958336	KT958281	JX195985
Drymonia serrulata	*Araujo et al. 601* (G)	KT958337	KT958282	JX195992
Lesia tepuiensis	*Ferreira 262* (INPA)	KX011577	KX011561	KX011545
Nematanthus albus	*Chautems & Perret 99-012* (G)	KT958341	KT958286	JX196015
Nematanthus albus	*Carnauba et al. 20.11.2013*	**MF787816**	–	**MF787931**
Nematanthus albus	Cultivated at CJBG AC-2705	**MF787817**	**MF787810**	**MF787932**
Nematanthus australis	*Chautems & Perret 99-011* (G)	KT958342	KT958287	JX196016
Nematanthus brasiliensis	*Chautems & Perret 07-303* (G)	KT958344	KT958288	JX196017
Nematanthus corticola	*Chautems & Perret 99-013* (G)	KT958345	KT958289	JX196018
Nematanthus crassifolius	*Chautems & Perret 07-403* (G)	KT958346	KT958290	JX196019
Nematanthus exsertus	*Jardim et al. 5000* (CEPEC)	**MF787818**	**MF787809**	**MF787936**
Nematanthus fissus	*Ferreira 269* (INPA)	**MF787819**	**MF787811**	–
Nematanthus fluminensis	*Chautems & Perret 99-020* (G)	KT958348	–	JX196020
Nematanthus fornix	*Chautems & Perret 10-101* (G)	KT958349	KT958292	JX196021
Nematanthus fritschii	*Chautems & Perret 07-404* (G)	KT958350	KT958293	JX196022
Nematanthus gregarius	*Chautems & Perret 99-019* (G)	KT958351	KT958294	JX196023
Nematanthus hirtellus	*Perret, Chautems et al. 61* (G)	**MF787820**	**MF787812**	**MF787933**
Nematanthus hirtellus	Cultivated at CJBG AC-3605	**MF787821**	**MF787813**	–
Nematanthus jolyanus	*Chautems & Perret 99-028* (G)	KT958353	KT958296	JX196025
Nematanthus lanceolatus	*Chautems & Perret 12-102* (G)	KY858387	**MF787815**	**MF787935**
Nematanthus lanceolatus	*Chautems & Perret 99-023* (G)	**MF787822**	**MF787814**	**MF787934**
Nematanthus maculatus	*Chautems & Perret 07-405* (G)	KT958356	–	JX196027
Nematanthus monanthos	*Chautems & Perret 08-601* (G)	KT958357	KT958299	JX196028
Nematanthus punctatus	*Chautems & Perret 99-046* (G)	KT958358	KT958300	JX196029
Nematanthus pycnophyllus	*Chautems & Perret 02-010* (G)	KT958359	KT958301	JX196030
Nematanthus sericeus	*Chautems & Perret 99-018* (G)	KT958360	KT958302	JX196031
Nematanthus strigillosus	*Chautems & Perret 11-101* (G)	KT958362	KT958304	JX196033
Nematanthus teixeiranus	*Chautems & Perret 07-407* (G)	KT958363	KT958305	JX196035
Nematanthus tessmannii	*Chautems & Perret 07-408* (G)	KT958364	KT958306	JX196036
Nematanthus villosus	*Chautems & Perret 99-041* (G)	KT958365	KT958307	JX196037
Nematanthus wettsteinii	*Chautems & Perret 10-102* (G)	KT958366	KT958308	JX196038
Nematanthus wiehleri	*Chautems & Perret 12-101* (G)	KT958367	KT958309	JX196039

trnL-F	***rps16***	***atpB-rbcL***	***rpl16***	***trnT-L***	***trnS-G***
GQ383544	GQ383582	KT958447	KT958388	**MF787865**	**MF787823**
JX195728	JX195812	KT958433	KT958373	**MF787867**	**MF787825**
JX195730	JX195814	KT958434	KT958374	**MF787868**	**MF787826**
JX195734	JX195817	KT958437	KT958377	**MF787871**	**MF787829**
JX195737	JX195820	KT958439	KT958380	**MF787872**	–
JX195740	JX195823	KT958440	KT958381	**MF787873**	**MF787830**
JX195743	JX195826	KT958443	KT958384	**MF787875**	**MF787832**
AJ439826	GQ383583	KT958444	KT958385	**MF787876**	**MF787833**
JX195745	JX195827	KT958446	KT958387	**MF787878**	**MF787835**
JX195726	JX195810	KT958432	KT958371	**MF787866**	**MF787824**
JX195731	JX195815	KT958435	KT958375	**MF787869**	**MF787827**
JX195732	–	KT958436	KT958376	**MF787870**	**MF787828**
JX195753	JX195835	KT958451	–	**MF787879**	**MF787836**
JX195742	JX195825	KT958442	KT958383	**MF787874**	**MF787831**
JX195744	–	KT958445	KT958386	**MF787877**	**MF787834**
JX195754	JX195836	KT958452	KT958392	**MF787880**	**MF787837**
GQ383548	GQ383587	KT958453	KT958393	**MF787881**	**MF787838**
KX011539	KX011542	KX011551	KX011569	**MF787882**	–
JX195765	JX195848	KT958457	KT958397	**MF787883**	**MF787839**
MF787802	**MF787909**	**MF787924**	**MF787917**	**MF787884**	**MF787840**
MF787803	**MF787910**	**MF787925**	**MF787918**	**MF787885**	**MF787841**
JX195766	JX195849	KT958458	KT958398	**MF787886**	**MF787842**
JX195767	JX195850	KT958459	KT958399	**MF787887**	**MF787843**
JX195768	JX195851	KT958460	KT958400	**MF787888**	**MF787844**
JX195769	JX195852	KT958461	KT958401	**MF787889**	**MF787845**
MF787808	**MF787916**	**MF787926**	**MF787919**	**MF787890**	**MF787846**
MF787804	**MF787911**	–	–	**MF787891**	–
JX195770	JX195853	KT958462	KT958402	**MF787892**	**MF787847**
JX195771	JX195854	KT958463	KT958403	**MF787893**	**MF787848**
JX195772	JX195855	KT958464	KT958404	**MF787894**	**MF787849**
JX195773	JX195856	KT958465	KT958405	**MF787895**	**MF787850**
MF787805	**MF787912**	**MF787927**	**MF787920**	–	**MF787851**
MF787806	**MF787913**	**MF787928**	**MF787921**	**MF787896**	–
JX195775	JX195858	KT958467	KT958407	**MF787897**	**MF787852**
KY858634	**MF787915**	**MF787930**	**MF787923**	–	**MF787854**
MF787807	**MF787914**	**MF787929**	**MF787922**	**MF787898**	**MF787853**
JX195777	JX195860	KT958469	KT958409	**MF787899**	**MF787855**
JX195778	JX195861	KT958470	KT958410	**MF787900**	**MF787856**
JX195779	JX195862	KT958471	KT958411	**MF787901**	**MF787857**
JX195780	JX195863	KT958472	KT958412	**MF787902**	**MF787858**
JX195781	JX195864	KT958473	KT958413	–	–
JX195783	JX195866	KT958475	KT958415	**MF787903**	**MF787859**
JX195785	JX195868	KT958476	KT958416	**MF787904**	**MF787860**
JX195786	JX195869	KT958477	KT958417	**MF787905**	**MF787861**
AJ439825	GQ383608	KT958478	KT958418	**MF787906**	**MF787862**
JX195787	JX195870	KT958479	KT958419	**MF787907**	**MF787863**
JX195788	JX195871	KT958480	KT958420	**MF787908**	**MF787864**