

Insect galls from Atlantic Forest areas of Santa Teresa, Espírito Santo, Brazil: characterization and occurrence

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RESUMO: Galhas de insetos de áreas de Mata Atlântica de Santa Teresa, Espírito Santo, Brasil: caracterização e ocorrência. Três áreas protegidas de Mata atlântica foram investigadas em Santa Teresa, Espírito Santo, de junho de 2007 a agosto de 2009: Estação Biológica de Santa Lúcia, Reserva Biológica Augusto Ruschi e Parque Natural Municipal São Lourenço. A vegetação local foi examinada à procura de galhas de insetos. Foram encontrados 265 morfotipos de galhas em 141 espécies de plantas (104 gêneros e 49 famílias). Asteraceae, Fabaceae, Myrtaceae, Melastomataceae e Rubiaceae foram as famílias de planta com maior riqueza de galhas. Os gêneros super-hospedeiros foram *Mikania* Willd. (Asteraceae), *Myrcia* DC. ex. Guill. (Myrtaceae) e *Inga* Mill. (Fabaceae). A espécie super-hospedeira foi *Guapira opposita* (Vell.) Reitz. (Nyctaginaceae). As galhas foram encontradas em folhas, caules, botões, raízes e gavinhas. As folhas foram o órgão vegetal mais galhado, seguidas pelos caules e botões. Os indutores pertencem a quatro ordens de insetos: Diptera, Lepidoptera, Hemiptera e Thysanoptera, sendo Cecidomyiidae (Diptera) os mais frequentes e diversificados galhadores. Inquilinos foram obtidos de cinco morfotipos de galhas, estando representados por Cecidomyiidae and Muscomorpha. Nove espécies galhadoras são registradas pela primeira vez no Estado do Espírito Santo, e *Cordiamyia globosa* Maia, 1996 é assinalada pela primeira vez para o município de Santa Teresa. O presente estudo indica que dentre as áreas da Mata Atlântica já estudadas, Santa Teresa (ES) é a que apresenta maior riqueza de galhas de insetos.

Palavras-chave. Riqueza de galhas, plantas hospedeiras, interação inseto-planta

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ABSTRACT: Three protected areas of Atlantic Forest were investigated in Santa Teresa, Espírito Santo from June, 2007 to August, 2009: Estação Biológica de Santa Lúcia, Reserva Biológica Augusto Ruschi, and Parque Natural Municipal São Lourenço. The local vegetation was examined in search for insect galls. A total of 265 morphotypes of insect gall were found on 141 plant species (104 genera and 49 families). Asteraceae, Fabaceae, Myrtaceae, Melastomataceae, and Rubiaceae were the plant families with the greatest richness of galls. The super host genera were *Mikania* Willd. (Asteraceae), *Myrcia* DC. ex. Guill. (Myrtaceae), and *Inga* Mill. (Fabaceae). The super host species was *Guapira opposita* (Vell.) Reitz. (Nyctaginaceae). Galls were found on leaves, stems, buds, roots, and tendrils. Leaves were the most galled plant organ, followed by stems, and buds. The inducers belong to four insect orders: Diptera, Lepidoptera, Hemiptera, and Thysanoptera, being Cecidomyiidae (Diptera) the most frequent and diversified gallers. Inquilines were obtained from five gall morphotypes, being represented by Cecidomyiidae and Muscomorpha. Nine gall midge species are recorded for the first time in State of Espírito Santo, and *Cordiomyia globosa* Maia, 1996 is recorded for the first time in the municipality of Santa Teresa. The present study indicates that among the studied areas of Atlantic Forest, Santa Teresa (ES) is the one which presents the greatest richness of insect galls. **Key words:** Gall richness, host plants, insect-plant interaction

Introduction

Galls are abnormal growths of plant cells, tissues or organs due to an increase in cell volume (hypertrophy) and/or cell number (hyperplasia) in response to feeding or other stimuli by foreign organisms (Rohfritsch & Shorthouse, 1982; Dreger- Jauffret & Shorthouse, 1992). They can be induced by viruses, bacteria, fungi, mites, insects and other organisms (Felt, 1940).

Galling insects are among the most specialized herbivores due to their ability to modify plant metabolism to produce a tumor-like growth that provides their larva with nutrition and shelter from adverse environmental conditions and natural enemies (Price *et al.*, 1987).

The majority of galling insects are host-plant and plant-organ specific. Gall morphology is also specific to each inducer making them excellent model systems for estimation of the patterns of abundance and richness (Fernandes & Price, 1988; Fernandes *et al.*, 1994).

The diversity of insect galls from Atlantic Forest is poorly known. Some surveys have been developed in coastal areas of the states of Rio de Janeiro (Maia, 2001; Oliveira & Maia, 2005; Maia & Oliveira, 2010), São

Paulo (Maia *et al.*, 2008), and Espírito Santo (Bregonci *et al.*, 2010), but the higher elevation region remains little studied. Except for the publications of J. S. Tavares (dated from the beginning of the XIX century), no other studies have been done. This Portuguese priest investigated higher elevation areas of the state of Rio de Janeiro, such as Nova Friburgo, Teresópolis and Serra de Macaé (Tavares, 1915, 1916, 1917a, 1917b, 1918, 1920a, 1920b, 1920c and 1922), but the galling fauna of higher elevation areas of Espírito Santo is still unknown.

The Atlantic Forest presents high species diversity and richness, as well as a high number of flora and fauna endemisms. It originally extended for approximately 330 million acres, but has been greatly reduced and fragmented, with only about 7% remaining. It has been considered a world biosphere reserve and a high priority area for biological conservation (Myers *et al.*, 2000).

The municipality of Santa Teresa, where the present study was developed, comprises an area about 71,100 hectares, in the micro-region called Colonial Serrana Espírito-Santense (Tabacow, 1992) in the central region of the state of Espírito Santo, Southeastern Brazil. The weather is predominantly Cfa in Koppen's classification, being characterized by a hot and wet season (October-March) and a dry and cold season (April-September); average precipitation is 1,868 mm and average annual temperature is 19.9 °C (Mendes & Padovan, 2000). Altitudes vary from 550 to 950m (Mendes & Padovan, 2000) and the predominant vegetation is dense ombrophilous forest (Atlantic Forest) (IBGE, 1993). Due to high levels of species richness and endemism, this region is considered extremely important for the conservation of the Atlantic Forest (Conservation International, 2000). About 33% of the the Santa Teresa municipality area is protected and in a good state of conservation (SOS Mata Atlântica & INPE, 2006).

The main objective of this study is to contribute to the knowledge of galling insect fauna from areas of Atlantic Forest in Espírito Santo.

Material and Methods

Three protected areas of Atlantic Forest were investigated in Santa Teresa, Espírito Santo from June, 2007 to August, 2009, namely Estação Biológica de Santa Lúcia (approximately 440 ha; 19°58'11" S, 40°32'11" W), Reserva Biológica Augusto Ruschi (3,600 ha; 19°54'20" S, 40°33'44" W), and Parque Natural Municipal São Lourenço (265 ha; 19°09' S, 40°36'00" W).

The samples were collected along five pathways: three in the Estação Biológica de Santa Lúcia (EBSL): Indaiáçu, Tapinoã, and Túmulo, with about 1,250m, 950m, and 1,950m of extension, respectively; the fourth in the Reserva

Biológica Augusto Ruschi (RBAR) with about 2,000 m; and the fifth in the Parque Natural Municipal São Lourenço (PNMSL) with about 940m.

The local vegetation was examined in search for insect galls. All plant organs were investigated, except for subterranean roots. Galled plants were pressed for identification and preservation. Dried plants were deposited in the herbarium of Museu Nacional/Universidade Federal do Rio de Janeiro (R) and in the herbarium of the Universidade Federal Rural da Amazônia. Botanical identification was done by Dr. Andrea Costa (MNRJ) (Bromeliaceae), Dr. Debora Medeiros and Luis J.S. Pinto (MNRJ and JBRJ) (Euphorbiaceae), Dr. Mara Magenta (Universidade de Santa Cecília, SP) (Asteraceae), Dr. Marcelo Souza (MNRJ) (Myrtaceae), R.F.P. Machado (MNRJ) (Nyctaginaceae), E. F. Guimarães (JBRJ) (Piperaceae, in part), M. F. Oliveira (JBRJ) (Melastomataceae, in part), Dr. Gracialda Costa Ferreira (Universidade Federal Rural da Amazônia) and the coauthors. All plant names and authors were checked using www.tropicos.org. All gall morphotypes were photographed in the field and described based on shape, color, presence of trichomes, and plant organ. They were transported in plastic bags to the laboratory of Diptera, where some samples of each gall morphotype were dried for preservation and incorporated in the gall collection at the MNRJ. Other samples were dissected under a stereoscopic microscope to obtain the immature forms of the insects associated with these galls, as well as to observe the number of internal chambers.

Pupal exuviae and adults were obtained from rearing, by keeping samples of each kind of gall individually in covered plastic vials with damp cotton at the bottom. These vials were examined daily for adults' emergence. The galls were kept in these rearing pots until their deterioration. All insects were preserved in 70% ethanol. The gall midges (larvae, pupae, pupal exuviae and adults) were later mounted on microscope slides following the methodology described by Gagné (1989). The Cecidomyiidae genera were identified based on the keys by Gagné (1994). The insects were incorporated in the entomological collection of MNRJ.

Results

We obtained 265 morphotypes of insect gall in Santa Teresa (ES) from 141 plant species in 104 genera and 49 families (Table 1). The average number of gall morphotypes per host plant species was 1.88.

Asteraceae, Fabaceae, Myrtaceae, Melastomataceae, and Rubiaceae were the plant families with the greatest richness of galls, with 36, 32, 27,

Table 1. Distribution of gall richness by host plant (family and species) in Santa Teresa (ES).

Plant family (N=49)	Plant species (N=141)	Number of gall morphotypes (N=265)
Acanthaceae	Not determined	01
Apiaceae	Not determined	01
Apocynaceae	<i>Odontadenia</i> sp.	01
	<i>Tabernaemontana</i> sp.	01
Aquifoliaceae	<i>Ilex</i> sp.	01
Araceae	<i>Heteropsis linearis</i> A.C. Sm.	01
	<i>Heteropsis salicifolia</i> Kunth	01
	<i>Philodendron</i> sp.1	02
	<i>Philodendron</i> sp.2	01
Asteraceae	<i>Ageratum</i> sp.	03
	<i>Baccharis serrulata</i> (Lam.)	04
	<i>Baccharis serrulata</i> cf.	01
	<i>Eupatorium</i> sp.	01
	<i>Mikania</i> cf. <i>laevigata</i>	07
	<i>Mikania</i> cf. <i>lindbergii</i>	01
	<i>Mikania</i> sp.1	05
	<i>Mikania</i> sp.2	02
	<i>Mikania</i> sp.3	01
	<i>Mikania</i> sp.4	02
	<i>Mikania</i> sp.5	01
	<i>Mikania</i> sp.6	04
	<i>Mikania</i> sp.7	01
	<i>Vernonantha montevidensis</i> (Spreng) H. Rob.	01
	<i>Vernonia lanuginosa</i> Gardn.	01
	<i>Vernonia</i> sp.	01
Bignoniaceae	<i>Adenocalymma</i> sp.	01
	<i>Tabebuia</i> sp.	01
	<i>Stizophyllum</i> sp.	01
Bombacaceae	Not determined	02
Boraginaceae	<i>Cordia curassavica</i> (Jacq.) Roem & Schult.	01
Bromeliaceae	<i>Neoregelia ampullacea</i> (E. Morren) L B. Sm	01
Clusiaceae	<i>Clusia</i> sp.	04
Dennstaedtiaceae	<i>Pteridium</i> sp.	01
Dilleniaceae	<i>Davilla</i> sp.	07
Elaeocarpaceae	<i>Sloanea</i> sp.	01
Erythroxylaceae	<i>Erythroxylum ovalifolium</i> Peyr	03
	<i>Erythroxylum</i> sp.	01
Euphorbiaceae	<i>Croton floribundus</i> Spreng.	05
	<i>Croton</i> sp.	01
	<i>Tetraplandra</i> sp.	01
Fabaceae	<i>Abarema laeta</i> (Benth) Barneby & J W Grimes	01
	<i>Andira fraxinifolia</i> Benth.	02
	<i>Andira</i> sp.	02
	<i>Bauhinia</i> sp.	02
	<i>Copaifera</i> sp.	01
	<i>Dalbergia</i> sp.	01

Table 1 (cont.)

Plant family (N=49)	Plant species (N=141)	Number of gall morphotypes (N=265)
	<i>Inga</i> sp.1	10
	<i>Inga</i> sp.2	01
	<i>Inga</i> sp.3	01
	<i>Machaerium</i> sp	01
	<i>Swartzia langsdorffii</i> Raddi	02
	Not determined sp.1	04
	Not determined sp.2	02
	Not determined sp.3	01
	Not determined sp.4	01
Flacourtiaceae	<i>Casearia arborea</i> (Rich.) Urb.	01
	<i>Casearia</i> sp.	02
Hypericaceae	<i>Vismia</i> cf. <i>reichardtiana</i> (Küntze) Ewan	01
Lauraceae	<i>Nectandra</i> sp.	01
	<i>Ocotea</i> sp.	01
	Not determined	01
Loranthaceae	<i>Phoradendron</i> sp.	01
	Not determined	04
Malpighiaceae	<i>Byrsonima</i> sp.1	01
	<i>Byrsonima</i> sp.2	02
	<i>Heteropteris</i> sp.	02
	<i>Mascagnia</i> sp.	01
Malvaceae	<i>Abutilon</i> sp.	01
	<i>Pavonia makoyana</i> F. Monen	01
Melastomataceae	<i>Clidemia</i> cf. <i>amygdaloides</i>	06
	<i>Clidemia capilliflora</i> (Naudin) Cogn.	01
	<i>Clidemia</i> sp.	01
	<i>Leandra melastomoides</i> Raddi.	01
	<i>Miconia pyrifolia</i> Naudin	02
	<i>Miconia</i> sp.1	03
	<i>Miconia</i> sp.2	01
	<i>Miconia</i> sp.3	01
	<i>Tibouchina</i> sp.	01
	Not determined sp.1	01
	Not determined sp.2	03
	Not determined sp.3	01
	Not determined sp.4	01
	Not determined sp.5	01
	Not determined sp.6	01
Meliaceae	<i>Guarea guidonia</i> (L.) Sleumer	01
	<i>Guarea</i> sp.	01
Moraceae	<i>Pourouma guianensis</i> Aubl.	01
Myrsinaceae	<i>Myrsine</i> sp.	03
Myrtaceae	<i>Campomanesia</i> cf. <i>laurifolia</i> Gardner	02
	<i>Calyptanthes</i> cf. <i>grandiflora</i>	01
	<i>Eugenia</i> cf. <i>melanogyna</i> (D.Legrand) Sobral	03
	<i>Eugenia</i> sp.	02
	<i>Marlierea</i> cf.	01
	<i>Myrcia ovata</i> Camb.	01

Table 1 (cont.)

Plant family (N=49)	Plant species (N=141)	Number of gall morphotypes (N=265)
	<i>Myrcia</i> sp.1	08
	<i>Myrcia</i> sp.2	01
	<i>Myrcia</i> sp.3	04
	<i>Myrciaria floribunda</i> (H.West ex Willd) O. Berg	03
	Not determined	01
Nyctaginaceae	<i>Guapira opposita</i> (Vell.) Reitz.	08
Orchidaceae	Not determined	01
Phyllanthaceae	<i>Phyllanthus</i> sp.	01
Picramniaceae	<i>Picramnia</i> sp.	02
Piperaceae	<i>Piper arboreum</i> Aubl.	02
	<i>Piper mollicomum</i> Kunth.	04
	<i>Piper pseudopothifolium</i> C. DC.	01
	Not determined sp.1	01
Plumbaginaceae	<i>Plumbago zeylanica</i> L.	01
Poaceae	Not determined	02
Polygonaceae	<i>Symmeria</i> sp.	01
Rubiaceae	<i>Chiococca alba</i> (L.) Hitchc	01
	<i>Malanea macrophylla</i> f. <i>bahiensis</i> (Müll. Arg.) Steyern	03
	<i>Palicourea guianensis</i> Aubl.	01
	<i>Posoqueria</i> sp.	01
	<i>Psychotria carthagenensis</i> Jacq.	01
	<i>Psychotria vellosiana</i> Benth.	07
	<i>Psychotria</i> sp.	01
	<i>Psychotria</i> cf.	01
	<i>Rolandra</i> sp.	02
	<i>Rubus</i> sp.	01
	<i>Sipanea</i> sp.	01
Rutaceae	<i>Dictyoloma vandellianum</i> A.H.Juss	01
Salicaceae	<i>Homalium</i> sp.	01
Sapindaceae	<i>Matayba</i> cf. sp.	04
	<i>Serjania</i> sp.	02
	Not determined sp.1	04
	Not determined sp.2	02
	Not determined sp.3	03
Sapotaceae	<i>Pouteria</i> sp.	02
	Not determined sp.1	02
	Not determined sp.2	01
Simaroubaceae	<i>Picrolemma sprucei</i> Hook. f.	01
Siparunaceae	<i>Siparuna</i> sp.	01
Smilacaceae	<i>Smilax</i> sp.	01
Solanaceae	<i>Cestrum</i> sp.	01
	<i>Solanum swartzianum</i> Roem.	02
	<i>Solanum</i> sp.	01
Symplocaceae	<i>Symplocos</i> sp.	01
Urticaceae	<i>Pourouma velutina</i> Mart ex Miq	01
Verbenaceae	<i>Lantana</i> cfr. <i>lilacina</i>	02
	<i>Lantana</i> sp.	01

25 and 20 morphotypes, respectively (Table 1). The super host genera were *Mikania* Willd. (Asteraceae), *Myrcia* DC. ex. Guill. (Myrtaceae), and *Inga* Mill. (Fabaceae) with 24, 14, and 12 gall morphotypes, respectively. The super host species was *Guapira opposita* (Vell.) Reitz. (Nyctaginaceae) with eight gall morphotypes.

The following gall shapes were found: globose, fusiform, conical, cylindrical, ovoid, circular, discoid, linear, claviform, imbricated, rosette, leaf fold, marginal leaf roll, leaf roll, leaf coalescence, and stellate. Globose and fusiform galls were the most common, with 41.5% and 27.1% respectively (Table 2). Only two galls presented polymorphisms: vein swelling on *Mikania* sp.4 (globose or fusiform), and pedunculate leaf gall on *Inga* sp. (claviform, fusiform or ovoid).

Green/greenish, red/reddish, brown/brownish, yellow/yellowish, purple, and whitish galls were found, being the majority green/greenish (42.6%) or brown/brownish (27.9%). Fourteen galls presented color variation (Table 3). This variation can be caused by differences on the gall maturation, age of the galled plant organ, sun exposition, oxidation and others.

Concerning the presence of trichomes, only 31 morphotypes were hairy (11.69%), the remainders were glabrous (88.31%). The color of the trichomes differed from the gall color in five morphotypes. Only five

Table 2. Distribution of gall morphotypes per shape in Santa Teresa (ES).

Gall shape	Number of morphotypes
Globose	110 (41.51%)
Fusiform	72 (27.16%)
Conical	17 (6.41%)
Ovoid	13 (4.96%)
Circular	12 (4.53%)
Cylindrical	11 (4.15%)
Marginal leaf roll	09 (3.39%)
Linear	04 (1.51%)
Discoid	03 (1.13%)
Rosette	03 (1.13%)
Claviform	02 (0.75%)
Leaf roll	02 (0.75%)
Fold leaf	02 (0.75%)
Leaf coalescence	01 (0.37%)
Stellate	01 (0.37%)
Imbricated	01 (0.37%)
Globose or fusiform	01 (0.37%)
Claviform, fusiform or globoid	01 (0.37%)

morphotypes were multi-chambered (1.88%). The great majority was one-chambered (98.12%).

Galls were found on leaves, stems, buds, roots, and tendrils. Leaves were the most galled plant organ (about 68%), followed by stems (about 22%) and buds (about 14%). Few galls were recorded on roots and tendrils (about 1.5% and 0.4%). Galls on flowers and fruits were not found. The majority (95.09%) occurred on a single plant organ, but 13 morphotypes occurred in two or more plant organs (Table 4).

Gallers of 139 morphotypes were identified at least to order; the others remain unknown as gall samples were collected already unoccupied,

Table 3. Distribution of gall morphotypes per color in Santa Teresa (ES).

Gall color	Number of morphotypes
Green/greenish	113 (42.61%)
Brown/brownish	74 (27.92%)
Yellow/yellowish	51 (19.24%)
Red/reddish	07 (2.64%)
Purple	01 (0.37%)
Whitish	01 (0.37%)
Yellow/yellowish or red/reddish	05 (1.88%)
Green/greenish or brown/brownish	03 (1.13%)
Green/greenish or red/reddish	02 (0.75%)
Green/greenish or yellow/yellowish	01 (0.37%)
Green/greenish, yellow/yellowish or red/reddish	05 (1.88%)

Table 4. Distribution of gall morphotypes per plant organ in Santa Teresa (ES).

Plant organ	Number of gall morphotypes
Leaf	180 (67.92%)
Stem	58 (21.88%)
Bud	37 (13.96%)
Root	04 (1.51%)
Tendrill	01 (0.37%)
Flower	0 (0%)
Fruit	0 (0%)
Leaf and stem	07 (2.59%)
Leaf and bud	04 (1.51%)
Leaf, stem and bud	02 (0.75%)
Total	292

*The total is over 100% because some morphotypes occurred in more than on plant organ.

or occupied by other organisms. The obtained inducers belong to four insect orders: Diptera, Lepidoptera, Hemiptera, and Thysanoptera. No Coleoptera and Hymenoptera could be determined as gall inducers in these samples. Considering the total of identified gallers, the majority consisted of Diptera (93.52%). Lepidoptera are the second most common inducers (4.31%), Hemiptera the third (1.43%), followed by Thysanoptera with less than 1%. Diptera are represented by two families: Cecidomyiidae and Tephritidae, being the former the most frequent and diverse gallers (with 92.80%) (Table 5).

Ten inducers were identified to species level and 20 to genus level; the others were under suprageneric categories (100 to family and 9 to order) as they were represented by few specimens or immature stages only.

The galling species are represented at least by 10 genera of Cecidomyiidae: *Clinodiplosis* Kieffer, 1895 (07 spp.); *Neolasioptera* Felt, 1908 (06 spp.); *Bruggmannia* Tavares, 1906 (05 spp.); *Lopesia* Rübсаamen, 1908 (04 spp.); *Dasineura* Rondani, 1840 (03 spp.); *Cordiamyia* Maia, 1996 (01 sp.); *Burseramyia* Möhn, 1960 (01 sp.); *Proasphondylia* Felt, 1915 (01 sp.); *Pisphondylia* Möhn, 1960 (01 sp.), and *Alexomyia* Felt, 1921 (01 sp.).

Inquilines were obtained from five gall morphotypes, being represented by Cecidomyiidae (*Clinodiplosis* - 01 sp.; *Resseliella* Seitner, 1906 - 01 sp.; *Trotteria* Kieffer, 1901 - 02 spp.), and Muscomorpha (01 sp. obtained as larva). Parasitoids were not investigated.

Nine gall midge species were recorded for the first time in State of Espírito Santo: *Bruggmannia acaudata* Maia, 2004; *Bruggmannia elongata* Maia & Couri, 1993; *Bruggmannia robusta* Maia & Couri, 1993; *Burseramyia braziliensis* Maia & Fonseca, 2011; *Dasineura myrciariae* Maia, 1993; *Dasineura ovalifoliae* Maia & Fernandes, 2011; *Lopesia erythroxyli*

Table 5. Distribution of gall morphotypes per insect order of the inducer in Santa Teresa (ES).

Galling Insect	Number of gall morphotypes (n=139)
Diptera	130 (93.52%)
Cecidomyiidae	129 (92.80%)
Tephritidae	01 (0.72%)
Lepidoptera	06 (4.31%)
Hemiptera	02 (1.43%)
Thysanoptera	01 (0.72%)
Coleoptera	0 (0%)
Hymenoptera	0 (0%)

Rodrigues & Maia, 2010; *Pisphondylia braziliensis* Couri & Maia, 1992 and *Proasphondylia guapirae* Maia, 1993.

Cordiamyia globosa Maia, 1996 was recorded for the first time in the municipality of Santa Teresa. This species was previously recorded in Guarapari (Parque Estadual Paulo César Vinha, E.S.) (Bregonci *et al.*, 2010) and in restinga areas of the State of Rio de Janeiro (Maia, 2001) and São Paulo (Maia *et al.*, 2008).

Data on insect galls are presented here under host plant family, genus and species in alphabetical order. They include morphological characterization (plant organ, shape, color, presence/absence of trichomes, number of internal chamber and galler), as well as information about the associated insects, and previous records of the same gall morphotype or other morphotypes on the same host plant species, genus or family in Brazil. Locality data are not standardized (they are presented as in the original publication).

Acanthaceae

Acanthaceae not determined

Bud gall, globose, green, glabrous, one-chambered. Galler: *Neolasioptera* sp. (Diptera, Cecidomyiidae). Locality: RBAR.

Previous records on Acanthaceae: Tavares, 1909 (one stem gall on *Justicia* sp. from São Leopoldo, RS); Julião *et al.*, 2002 (one leaf gall on *Lophostachys* sp. from Pantanal sul-matogrossense, MS); and Maia *et al.*, 2008 (one leaf gall on *Avicennia schaueriana* Stapf & Leechm. ex Moldenke from Bertioiga, SP).

Apiaceae

Apiaceae not determined

Bud gall, globose, brown, glabrous, one-chambered (Fig. 1). Galler: not determined. Locality: PNMSL.

No previous records on Apiaceae.

Apocynaceae

Odontadenia sp.

Leaf gall, globose, green, glabrous, one-chambered (Fig. 2). Galler: Hemiptera. Localities: EBSL Indaiáçu and PNMSL.

No previous records on *Odontadenia* Benth.

Tabernaemontana sp.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 3). Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã.

Previous records on *Tabernaemontana*: Fernandes *et al.*, 2001 (one leaf and one stem gall on *Tabernaemontana* sp. from Vale do Rio Doce, MG).

Aquifoliaceae

Ilex sp.

Fold gall on leaf, green, glabrous, one-chambered (Fig. 4). Galler: Hemiptera (probably Psyllidae). Locality: EBSL Túmulo.

Previous records on *Ilex*: Fernandes *et al.*, 2001 (one leaf gall on *I. ceracifolia* Reiss. from Vale do Rio Doce, MG); Maia *et al.*, 2008 (one stem and two bud galls on *I. pseudobuxus* Reissek; one stem and two leaf galls on *I. theezans* Mart. from Bertiooga, SP); Carneiro *et al.*, 2009a (one stem gall on *I. amara* (Vell.) Loes.; one leaf gall on *I. brasiliensis* Loes. from Serra do Espinhaço, MG); Bregonci *et al.*, 2010 (one leaf gall on *Ilex* sp. from Guarapari, ES); Maia & Oliveira, 2010 (one leaf gall on *Ilex* sp. from Ilha Grande, RJ); and Almada & Fernandes, 2011 (one leaf gall on *I. inundata* Poepp. ex Reissek from Porto de Trombetas, PA).

Araceae

Heteropsis linearis A.C. Sm.

Leaf gall, conical, grainy, yellowish, glabrous, one-chambered (Fig. 5). Galler: Cecidomyiidae (Diptera). Localities: EBSL Tapinoã and Indaiaçu. No previous records on *H. linearis*.

Heteropsis salicifolia Kunth

Midvein swelling, fusiform, greenish, one-chambered (Fig. 6). Galler: Cecidomyiidae (Diptera). Locality: ESBL Tapinoã.

Previous records on *H. salicifolia*: Rübssaamen, 1907 (one leaf gall from Fábrica, RJ).

Philodendron sp.1

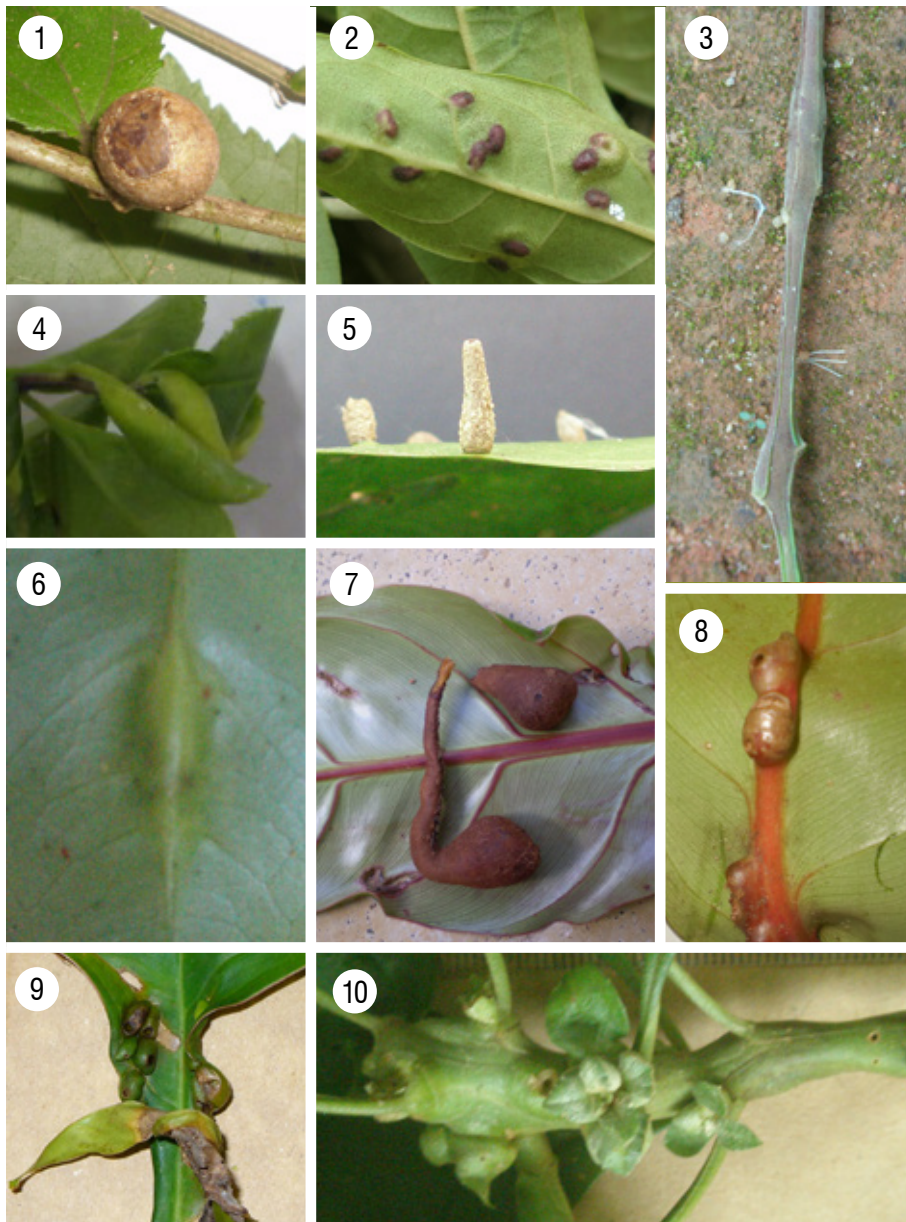
Aerial root swelling, globose, reddish, glabrous, one-chambered (Fig. 7). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and RBAR.

Midvein swelling, globose, reddish, glabrous, one-chambered (Fig. 8). Galler: not determined. Locality: RBAR.

Philodendron sp.2

Leaf gall, globose, green, glabrous, one-chambered (Fig. 9). Galler: not determined. Localities: ESBL Indaiaçu, Tapinoã and Túmulo.

Previous records on *Philodendron*: Maia *et al.*, 2008 (one leaf and one root gall on *P. appendiculatum* Nadruz & Mayo from Bertiooga, SP).



Figs. 1-10. Insect galls of Santa Teresa (ES, Brazil): 1. Apiaceae not determined, bud gall; 2. *Odontadenia* sp., leaf gall; 3. *Tabernaemontana* sp., stem swelling; 4. *Ilex* sp., leaf gall; 5. *Heteropsis linearis*, leaf gall; 6. *Heteropsis salicifolia*, midvein swelling; 7. *Philodendron* sp.1 aerial root swelling; 8. *Philodendron* sp.1, midvein swelling; 9. *Philodendron* sp.2, leaf gall; 10. *Baccharis serrulata*, stem swelling.

Asteraceae

Ageratum sp.

Bud gall, globose, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu, Túmulo, Tapinoã, PNMSL and RBAR.

Stem swelling, fusiform, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu, Túmulo, PNMSL and RBAR.

Midvein swelling, fusiform, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu, Túmulo and RBAR. Previous records on *Ageratum*: Gagné, 1994 (one flower gall on *A. conyzoides* L. from Paraná).

Baccharis serrulata (Lam.) Pers.

Leaf gall, globose, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo and PNMSL.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 10). Galler: Cecidomyiidae (Diptera). Localities: EBSL Tapinoã and PNMSL.

Midvein swelling, fusiform, green, glabrous, one-chambered (Fig. 11). Galler: not determined. Locality: EBSL Túmulo.

Leaf, bud and stem gall, globose, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu and Tapinoã.

Baccharis serrulata cfr.

Stem and midvein swelling, fusiform, brown, glabrous, one-chambered (Fig. 12). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu, Túmulo, Tapinoã and PNMSL.

Previous records of the same gall morphotype: Carneiro *et al.*, 2009a (from Serra do Espinhaço, MG).

Other records on *B. serrulata*: Fernandes *et al.*, 2001 (one stem and three leaf galls from Vale do Rio Doce, MG); Maia & Fernandes, 2004 (one leaf gall from Serra de São José, MG).

Eupatorium sp.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 13). Galler: not determined. Localities: PNMSL and RBAR.

Previous record on *Eupatorium*: Tavares, 1917a (one stem gall on *Eupatorium* sp. from Salvador, Bahia, one petiole gall on *E. laevigatum* Lam. and one leaf gall on *Eupatorium* sp., both from Nova Friburgo, RJ) and Fernandes *et al.*, 1997 (three galls on *E. squalidum* DC from Vale do Jequitinhonha, MG).

Mikania cf. *laevigata* Sch. Bip. ex Baker

Stem swelling, fusiform, brown, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and PNMSL.

Leaf gall, cylindrical, green, glabrous, one-chambered (Fig. 14). Galler: Cecidomyiidae (Diptera). Localities: EBSL Tapinoã and PNMSL.

Leaf gall, cylindrical, green, glabrous, one-chambered (Fig. 15). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and PNMSL.

Leaf gall, globose, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Midvein swelling, linear, brown, one-chambered. Galler: not determined. Locality: PNMSL.

Marginal leaf roll, green, glabrous, one-chambered (Fig. 16). Galler: not determined. Locality: PNMSL.

Bud gall, conical, green, glabrous, one-chambered (Fig. 17). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

No previous records on *M. laevigata*.

Mikania cf. *lindbergii* Baker

Rosette bud gall, green, glabrous (Fig. 18). Galler: not determined. Locality: RBAR.

Previous records on *M. lindbergii*: Maia & Fernandes, 2004 (one stem gall from Serra de São José, MG).

Mikania sp.1

Leaf gall, globose, yellowish, glabrous, one-chambered (Fig. 19). Galler: not determined. Locality: EBSL Indaiaçu.

Stem swelling, fusiform, green with brown trichomes (Fig. 20). Galler: not determined. Locality: EBSL Tapinoã.

Stem swelling, globose, brown, with micro trichomes, one-chambered (Fig. 21). Galler: not determined. Locality: EBSL Indaiaçu.

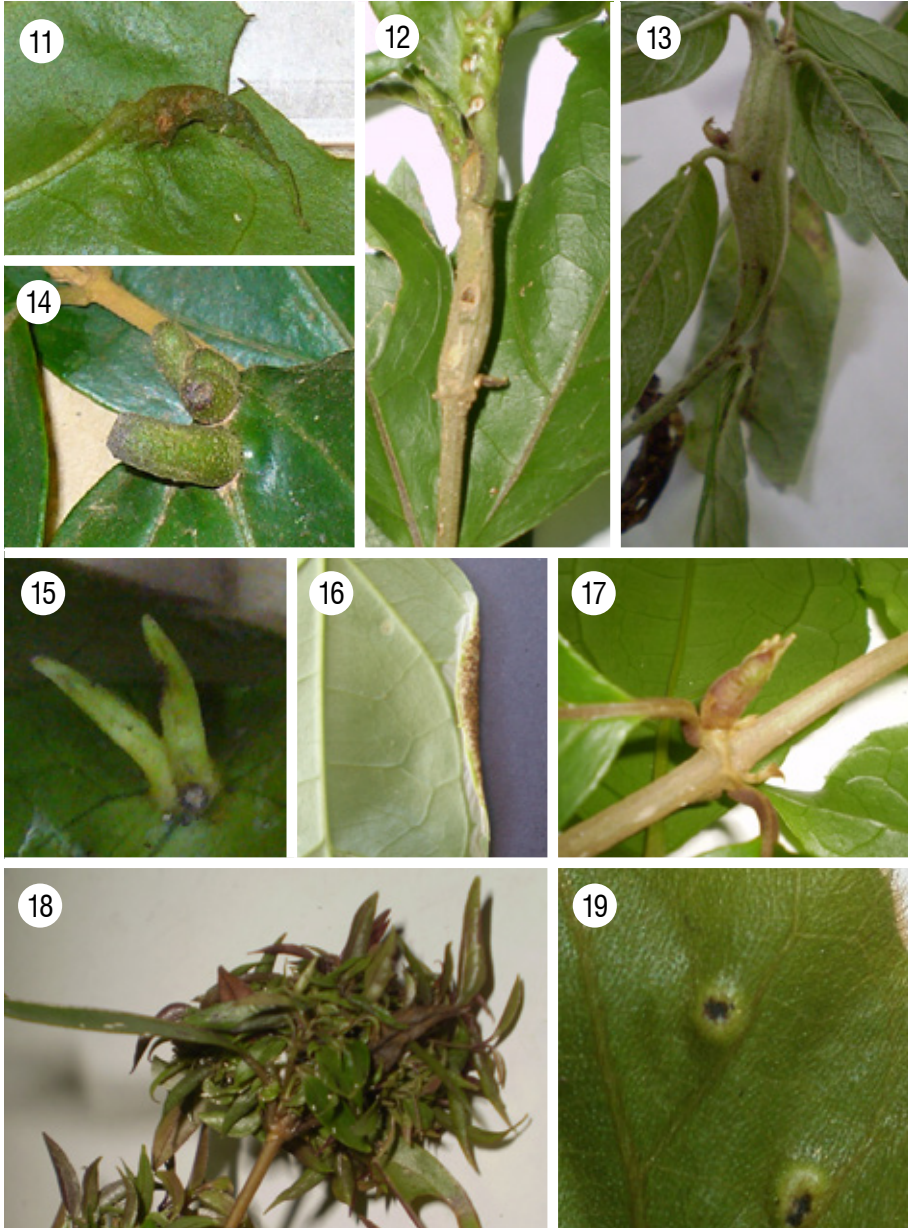
Midvein swelling, fusiform, brown, glabrous, one-chambered (Fig. 22). Galler: not determined. Locality: EBSL Tapinoã.

Midvein swelling, globose, greenish, one-chambered (Fig. 23). Galler: not determined. Locality: EBSL Tapinoã.

Mikania sp.2

Leaf gall, circular, purple, glabrous, one-chambered (Fig. 24). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and PNMSL.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 25). Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã.



Figs. 11-19. Insect galls of Santa Teresa (ES, Brazil): 11. *Baccharis serrulata*, midvein swelling; 12. *Baccharis serrulata* cfr., stem and midvein swelling; 13. *Eupatorium* sp., stem swelling; 14. *Mikania* cf. *laevigata*, leaf gall; 15. *Mikania* cf. *laevigata*, leaf gall; 16. *Mikania* cf. *laevigata*, marginal leaf roll; 17. *Mikania* cf. *laevigata*, bud gall; 18. *Mikania* cf. *lindbergii*, rosette bud gall; 19. *Mikania* sp. 1; leaf gall.

Mikania sp.3

Stem swelling, fusiform, red, glabrous, one-chambered (Fig. 26). Galler: Cecidomyiidae (Diptera). Locality: EBSL Túmulo.

Mikania sp.4

Vein swelling, globose or fusiform, green, glabrous, one-chambered (Fig. 27). Galler: not determined. Localities: EBSL Indaiaçu and PNMSL.

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 28). Galler: not determined. Locality: PNMSL

Mikania sp.5

Leaf gall, globose, yellowish, glabrous, one-chambered (Fig. 29). Galler: not determined. Locality: EBSL Túmulo.

Mikania sp.6

Stem swelling, fusiform, brown, glabrous, multi-chambered (Fig. 30). Galler: not determined. Locality: EBSL Tapinoã.

Bud gall, globose, green, glabrous, one-chambered (Fig. 31). Galler: Cecidomyiidae (Diptera). Localities: PNMSL and EBSL Tapinoã.

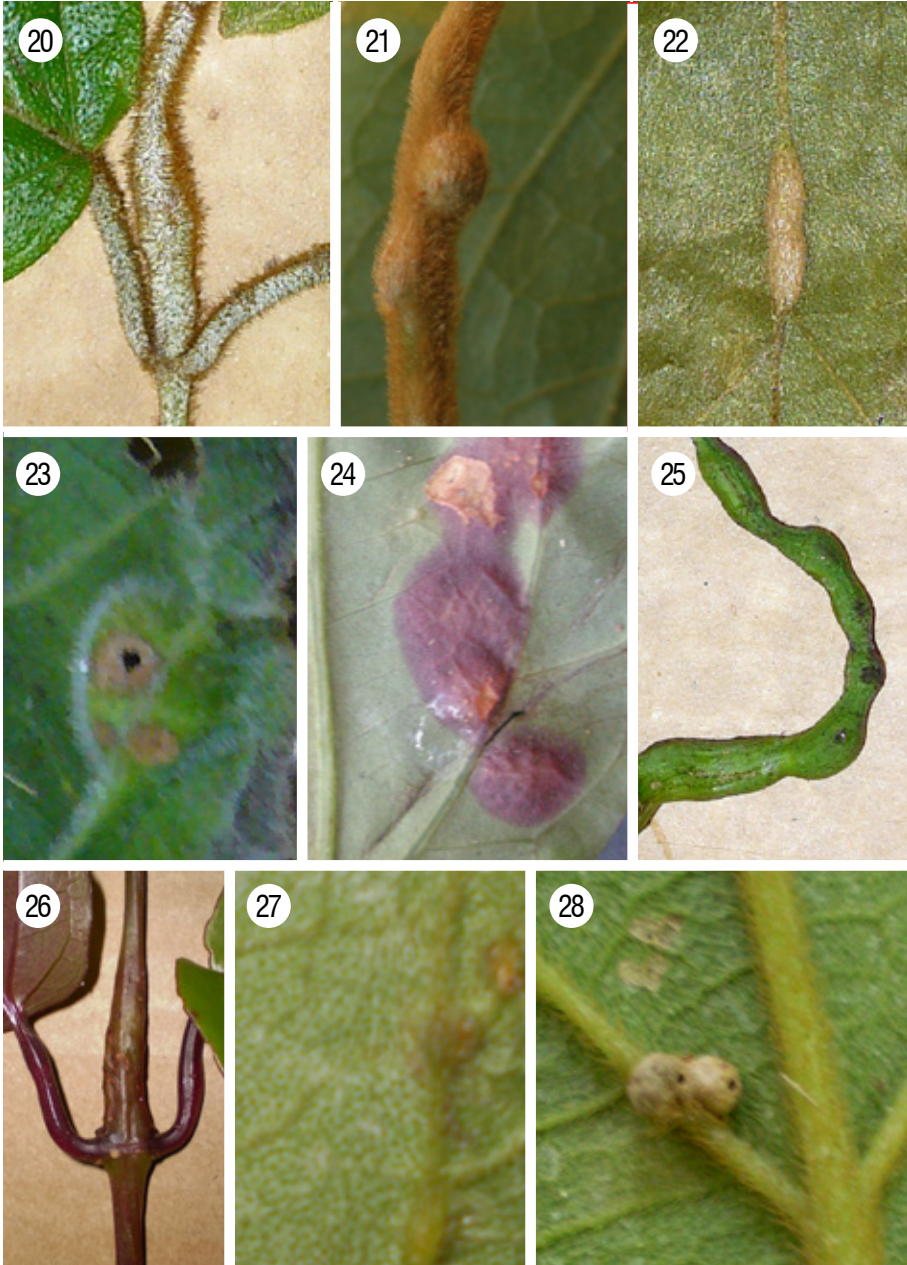
Petiole swelling, fusiform, brown, glabrous, one-chambered (Fig. 32). Galler: not determined. Locality: PNMSL.

Leaf gall, conical, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçu.

Mikania sp.7

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 33). Galler: not determined. Locality: EBSL Indaiaçu.

Previous records on *Mikania*: Rübsaamen, 1907 (one leaf gall on *Mikania* sp. from Palmeiras, RJ, and one stem gall on *M. lindleyana* DC. from Juruá, Amazonas); Rübsaamen, 1908 (one leaf gall on *Mikania* sp. from Serra dos Órgãos, RJ); Rübsaamen, 1916 (one petiole or vein gall on *Mikania* sp. from Amazonas); Rübsaamen, 1917a (one leaf or stem gall on *M. guaco* Bonpl. and *Mikania* sp. from Rio de Janeiro State); Tavares, 1909 (one stem gall on *M. hirsutissima* DC. from São Leopoldo, RS); Fernandes *et al.*, 2001 (two leaf galls on *Mikania* sp.1, one leaf gall on *Mikania* sp.2, one stem gall on *Mikania* sp.3, one leaf gall on *Mikania* cf. *acuminata* DC., and five galls on *M. hirsutissima* DC., four on leaf and one on stem from Vale do Rio Doce, MG); Maia, 2001 (one leaf and one stem gall on *M. hoehnei* Robinson from Maricá, RJ); Maia & Fernandes, 2004 (one stem gall on *M. lindbergii* Baker, one leaf gall on *M. micrantha* Kunth, and two leaf galls on *M. sessilifolia* DC.



Figs. 20-28. Insect galls of Santa Teresa (ES, Brazil): 20. *Mikania* sp.1 Stem swelling; 21. *Mikania* sp.1, stem swelling; 22. *Mikania* sp.1, midvein swelling; 23. *Mikania* sp.1, midvein swelling; 24. *Mikania* sp.2, leaf gall; 25. *Mikania* sp.2, stem swelling; 26. *Mikania* sp.3, stem swelling; 27. *Mikania* sp.4, vein swelling; 28. *Mikania* sp.4, leaf gall.

from Serra de São José, MG); Oliveira & Maia, 2005 (one stem and two leaf galls on *M. glomerata* Spreng from Grumari, Rio de Janeiro, RJ); Maia *et al.*, 2008 (two leaf galls on *M. argyreiae* DC., eight galls on *Mikania* cf. *biformis* DC., two on leaf or stem, one on stem, petiole or leaf vein, one on stem, one on leaf vein, one on petiole or leaf vein, one on bud, one on leaf; three galls on *Mikania* cf. *glomerata* Spreng., one on petiole, one on stem and other on leaf; two galls on *M. involucrata* Hook. & Arn., one on leaf and other on stem; one petiole or vein gall on *Mikania* cf. *micrantha* Kunth.; and two galls on *M. ternata* (Vell.) B. L. Rob., one on bud, and other on stem from Bertioaga, SP); Carneiro *et al.*, 2009a (two stem galls on *M. glabra* D. J. N. Hind, one stem gall on *M. glauca* Mart., three galls on *M. nummularia* DC., one on leaf, other on stem and the third on bud; and one stem gall on *M. parvifolia* Baker from Serra do Espinhaço, MG); Maia & Oliveira, 2010 (one stem or leaf and three leaf galls on *Mikania* sp. from Ilha Grande, RJ); and Santos *et al.*, 2011a (one leaf and one leaf or stem gall on *Mikania* sp. from Pernambuco).

Vernonanthura montevidensis (Spreng.) H. Rob.

Stem swelling, fusiform, green, glabrous, one-chambered. Galler: Lepidoptera. Locality: RBAR.

Previous record on *Vernonanthura*: Coelho *et al.*, 2009 (two galls on *V. phosphorica* (Vell.) H. Rob., one on leaf and other on stem from Serra do Cipó, MG).

Vernonia lanuginosa Gardner

Bud gall, globose, green, glabrous, one-chambered. Galler: not determined. Localities: EBSL Túmulo and PNMSL.

No previous record on *V. lanuginosa*.

Vernonia sp.

Stem gall, fusiform, brown, glabrous, one-chambered (Fig. 34). Galler: Tephritidae (Diptera). Locality: EBSL Indaiaçú.

Previous records on *Vernonia*: Möhn, 1964 (one stem gall on *Vernonia* sp. from Minas Gerais State); Fernandes *et al.*, 1988 (one leaf gall and one leaf or stem gall on *V. polyanthes* Less. from Belo Horizonte, MG); Gagné, 1994 (one stem and one petiole gall on *V. polyanthes* (Spreng.) Less. from MG); Fernandes *et al.*, 1997 (galls on *V. elegans* Gardn., *Vernonia* cf. *barbata* Less. and *Vernonia* sp. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (two stem galls, one on *Vernonia* sp.1 and other on *Vernonia* sp.2, two galls on *V. scorpioides* (Lam.) Pers., one leaf gall on *Vernonia* cf. *condensata* Baker, and nine galls on *V. polyanthes*, three on stem, and six on leaf from

Vale do Rio Doce, MG); Maia, 2001 (one bud gall on *V. rufogrisea* St. Hill. from Carapebus, RJ); Julião *et al.*, 2002 (one stem gall on *V. brasiliana* from Pantanal sul-matogrossense, MS); Urso-Guimarães *et al.*, 2003 (one bud gall on *V. polyanthes* from Delfinópolis, MG); Maia & Fernandes, 2004 (one leaf gall on *V. crotonoides* Schult., one stem gall on *V. polyanthes*, one bud or leaf gall on *V. obscura* Less., and one stem gall on *Vernonia* sp. from Serra de São José, MG); Fernandes & Negreiros, 2006 (one stem gall on *V. polyanthes* from Aimorés, MG); and Maia *et al.*, 2008 (one stem or bud gall on *V. beyrichii* Less. from Bertioiga, SP).

Bignoniaceae

Adenocalymma sp.

Midvein and petiole swelling, fusiform, brown, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiaçu.

No previous record on *Adenocalymma* Benth.

Tabebuia sp.

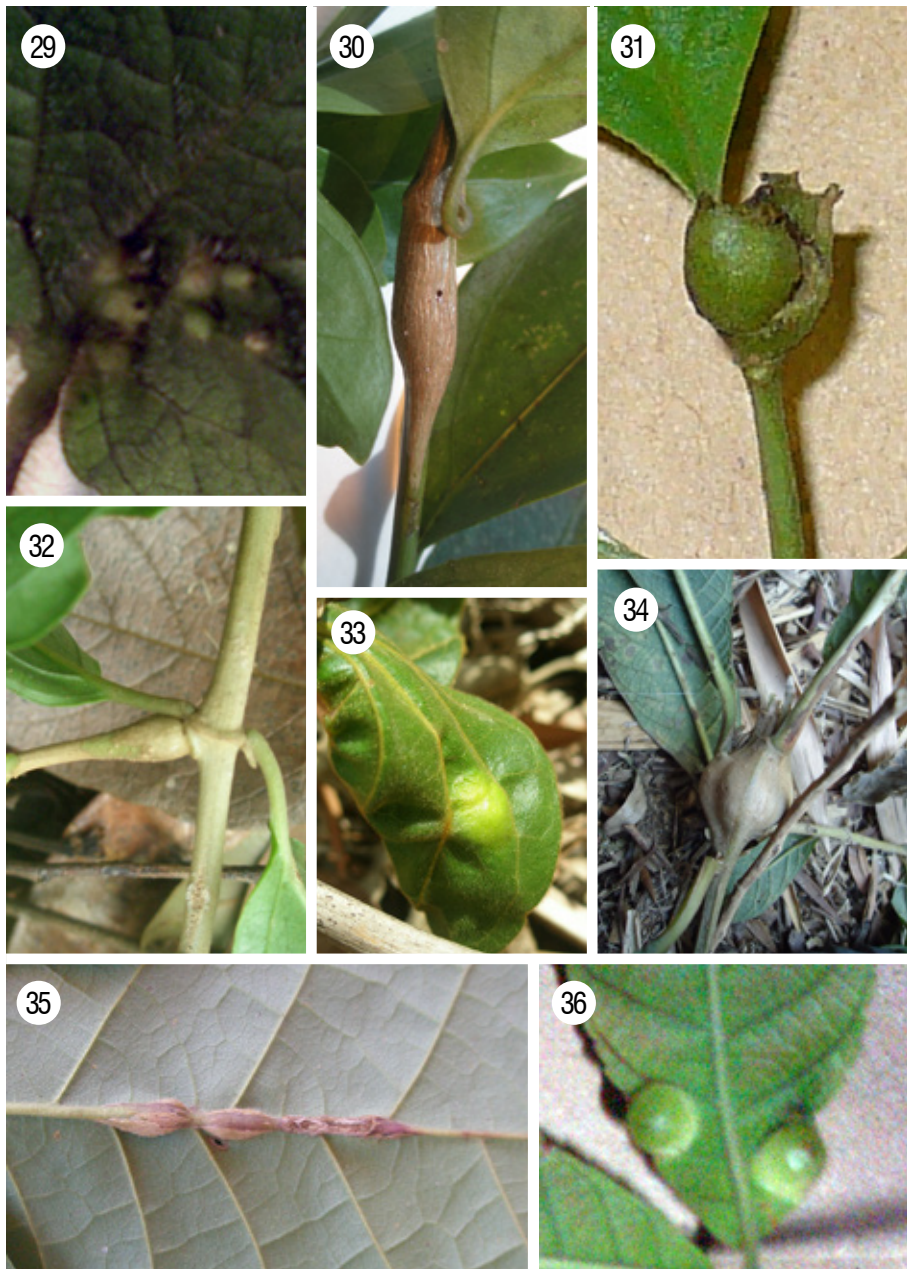
Midvein swelling, fusiform, green, glabrous, one-chambered (Foto 35). Galler: not determined. Locality: EBSL Túmulo.

Previous records on *Tabebuia*: Fernandes *et al.*, 1988 (one leaf gall on *T. ochracea* (Cham.) Standl. from Belo Horizonte, MG); Fernandes *et al.*, 1997 (one leaf and three stem galls on *T. ochracea*, one stem gall on *Tabebuia* sp.1 and other on *Tabebuia* sp.2 from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one stem gall on *T. ochracea* from Vale do Rio Doce, MG); Julião *et al.*, 2002 (one leaf gall on *T. aurea* (Silva Manso) Benth. & Hook f. ex S. Moore from Pantanal-sulmatogrossense, MS); Fernandes & Negreiros, 2006 (two leaf galls on *T. chrysotricha* (Mart. ex A. DC.) Standl. from Aimorés, MG); Santos *et al.*, 2011b (one leaf gall on *T. impetiginosa* (Mart. ex. DC.) Standl. from Pernambuco); Fernandes *et al.*, 1988 (one stem or bud gall on *T. ochracea* from Belo Horizonte, MG), Urso-Guimarães *et al.*, 2003 (one leaf gall on *T. ochracea* from Delfinópolis, MG); Urso-Guimarães & Scareli-Santos, 2006 (one leaf and one stem gall on *T. ochracea* from Santa Rita do Passa Quatro, SP); Carneiro *et al.* 2009a (one stem gall on *T. pumila* A.H. Gentry, and two stem galls on *Tabebuia* sp. from Serra do Espinhaço, MG); and Maia *et al.*, 2008 (one leaf gall on *Tabebuia* sp. from Bertioiga, SP).

Stizophyllum sp.

Petiole swelling, fusiform, green, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiaçu.

No previous records on *Stizophyllum* Miers.



Figs. 29-36. Insect galls of Santa Teresa (ES, Brazil): 29. *Mikania* sp. 5, leaf gall; 30. *Mikania* sp.6, stem swelling; 31. *Mikania* sp.6, bud gall; 32. *Mikania* sp.6, petiole swelling; 33. *Mikania* sp.7, leaf gall; 34. *Vernonia* sp., stem gall; 35. *Tabebuia* sp., midvein swelling; 36. Bombacaceae not determined, leaf gall.

Bombacaceae

Bombacaceae not determined

Leaf gall, globose, green, glabrous, one-chambered (Fig. 36). Galler: not determined. Localities: EBSL Indaiáçu and PNMSL.

Vein swelling, ovoid, yellow, glabrous, one-chambered (Fig. 37). Galler: not determined. Locality: PNMSL.

Previous records on Bombacaceae: Fernandes *et al.*, 1997 (one stem and two leaf galls on *Bombax macrophyllum* R. Schum. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one leaf gall on Bombaceae sp.); and Almada & Fernandes, 2011 (one leaf gall on *Bombax* sp. from Porto de Trombetas, PA).

Boraginaceae

Cordia curassavica (Jacq.) Roem & Schult.

Leaf gall, globose, green, hairy, one-chambered (Fig. 38). Galler: *Cordiamyia globosa* Maia, 1996 (Cecidomyiidae, Diptera). Locality: EBSL Túmulo.

Previous records of the same gall morphotype: Maia, 2001 (from Maricá, and Carapebus, RJ); Maia *et al.*, 2008 (from Bertioga, SP); Carneiro *et al.*, 2009a (from Serra do Espinhaço, MG); and Bregonci *et al.*, 2010 (from Guarapari, ES). Other records on *C. curassavica*: Fernandes *et al.*, 1988 (one stem gall from Belo Horizonte, MG, as *C. verbenacea*); Fernandes *et al.*, 1997 (one stem gall from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one stem gall from Vale do Rio Doce, MG); Maia, 2001 (one flower and one petiole or midvein gall from Maricá, and Carapebus, RJ); Maia *et al.*, 2008 (three galls, one on stem, one on inflorescence, and other on leaf from Bertioga, SP); and Silva & Rodrigues, 2011 (one stem, one leaf and one inflorescence gall from Cabo Frio, RJ).

Bromeliaceae

Neoregelia ampullacea (E. Morren) L. B. Sm.

Root gall, globose, brown, glabrous, one-chambered (Fig. 39). Galler: not determined. Locality: EBSL Túmulo.

No previous records on *N. ampullacea*.

No previous records on *Neoregelia* L. B. Sm.

Previous records on Bromeliaceae: Santos *et al.*, 2011a (one leaf gall on a not determined Bromeliaceae from wetland forests of Pernambuco).

Clusiaceae

Clusia sp.

Leaf gall, ovoid, greenish or yellowish, glabrous, one-chambered (Fig.

40). Galler: Lepidoptera. Locality: EBSL Túmulo and Indaiaçu.

Marginal leaf roll, green, glabrous, one-chambered (Fig. 41). Galler: not determined. Locality: RBAR.

Leaf gall, globose, yellowish, glabrous, one-chambered (Fig. 42). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo, Indaiaçu, RBAR and PNMSL.

Bud gall, conical, green, glabrous, one-chambered (Fig. 43). Galler: not determined. Locality: RBAR.

Previous records on *Clusia*: Rübсаamen, 1905 (one bud gall on *Clusia* sp. from Amazonas); Maia, 2001 (one leaf gall on *C. fluminensis* Tr. & Pl. from Maricá, RJ; one leaf gall on *C. hilariana* Schltld. from Carapebus, RJ; and one leaf gall on *C. lanceolata* Camb. from Maricá, RJ); Maia, 2006 (one leaf gall on *C. lanceolata* from Maricá, RJ); Maia *et al.*, 2008 (one leaf gall on *Clusia criuva* Cambess. subsp. *parviflora* Vesque from Bertiooga, SP); Oliveira & Maia, 2005 (one leaf gall on *C. fluminensis* from Grumari, Rio de Janeiro, RJ); Maia, 2006 (one leaf gall on *C. lanceolata* from Maricá, RJ); Bregonci *et al.*, 2010 (two leaf galls on *C. hilariana* from Guarapari, ES); and Almada & Fernandes, 2011 (one leaf gall on *Clusia insignis* Mart. from Porto de Trombetas, PA).

Dennstaedtiaceae

Pteridium sp.

Bud gall, globose, brown, hairy, one-chambered (Fig. 44). Galler: *Clinodiplosis* sp. (Diptera, Cecidomyiidae). Localities: EBSL Túmulo and PNMSL.

No previous records on *Pteridium* Gled. ex Scop.

No previous records on Dennstaedtiaceae.

Dilleniaceae

Davilla sp.

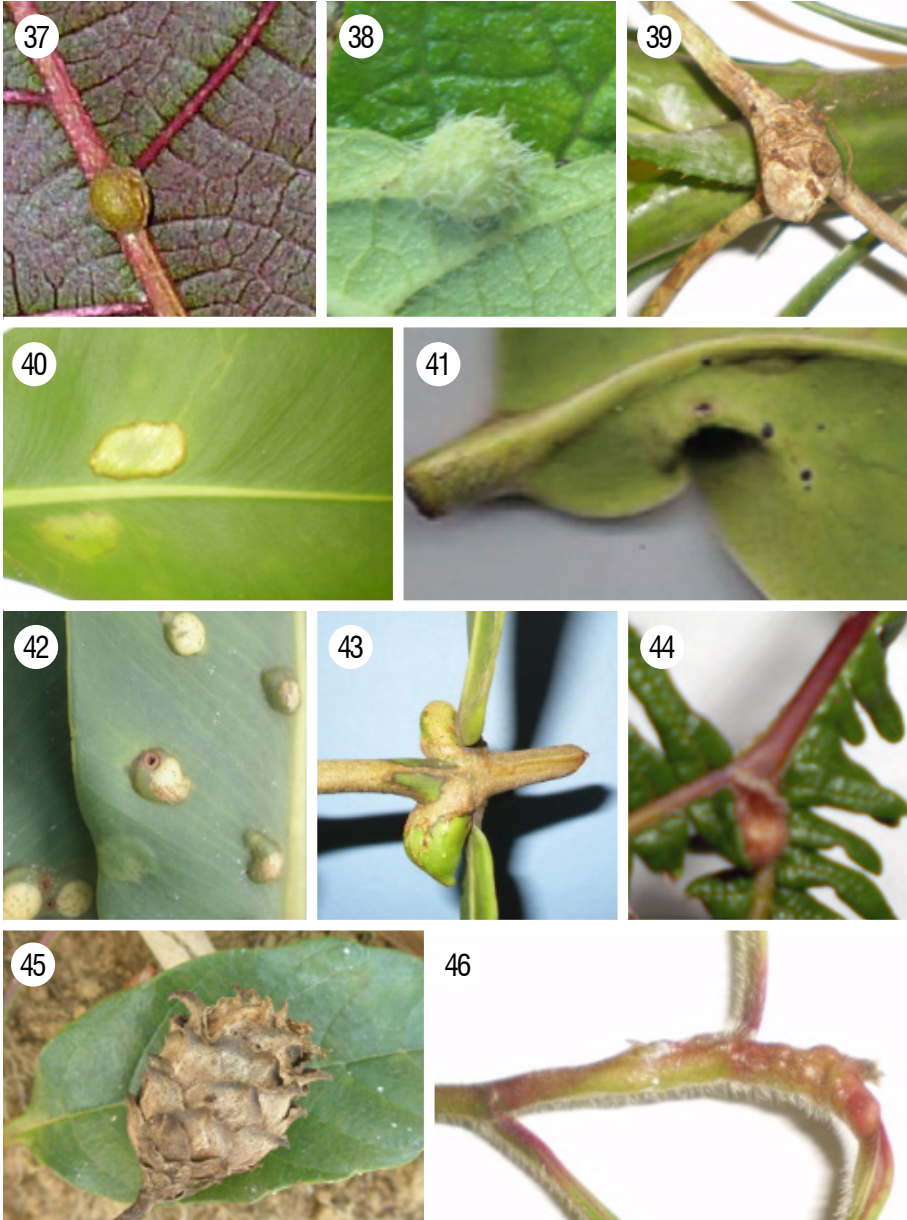
Bud gall, imbricated, brown, glabrous (Fig. 45). Galler: Lepidoptera. Other dwellers: *Clinodiplosis* sp. (Diptera, Cecidomyiidae) - inquiline. Localities: EBSL Indaiaçu, PMSL and RBAR.

Previous records of the same gall morphotype: Maia & Fernandes, 2004 (on *Davilla braziliana* DC. from Serra de São José, MG).

Leaf gall, conical, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Stem swelling, globose, reddish, glabrous, one-chambered (Fig. 46). Galler: not determined. Locality: PNMS.

Midvein swelling, fusiform, yellowish, glabrous, one-chambered (Fig. 47). Galler: not determined. Locality: RBAR.



Figs. 37-46. Insect galls of Santa Teresa (ES, Brazil): 37. Bombacaceae not determined, vein swelling; 38. *Cordia curassavica*, leaf gall; 39. *Neoregelia ampullacea*, root gall; 40. *Clusia* sp., leaf gall; 41. *Clusia* sp., marginal leaf roll; 42. *Clusia* sp., leaf gall; 43. *Clusia* sp., bud gall; 44. *Pteridium* sp., bud gall; 45. *Davilla* sp., bud gall; 46. *Davilla* sp., stem swelling.

Stem swelling, fusiform, reddish, glabrous, one-chambered (Fig. 48). Galler: not determined. Localities: EBSL Indaiaçu, PNMSL, RBAR.

Leaf gall, circular, yellowish, glabrous, one-chambered (Fig. 49). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçu and PNMS. Previous records of the same gall morphotype: Maia & Fernandes, 2004 (on *Davilla braziliiana* DC. from Serra de São José, MG).

Bud gall, globose, pedunculed, yellowish or reddish, glabrous, one-chambered (Fig. 50). Galler: Cecidomyiidae (Diptera). Localities: EBSL, Indaiaçu, PNMSL and RBAR.

Previous records on *Davilla*: Tavares, 1922 (one leaf and one flower gall on *D. rugosa* Poir. from Nova Friburgo, RJ); Fernandes *et al.*, 1997 (three leaf and two flower galls on *Davilla* sp. from Vale do Jequitinhonha, MG); Maia & Fernandes, 2004 (one bud and one leaf gall on *D. braziliiana* DC. from Serra de São José, MG); Almada & Fernandes, 2011 (one leaf gall on *D. rugosa* from Porto de Trombetas, PA); and Fernandes *et al.*, 2001 (one leaf and one stem gall on *D. rugosa* from Vale do Rio Doce, MG).

Elaeocarpaceae

Sloanea sp.

Petiole gall, globose, brown, glabrous, one-chambered. Galler: not determined. Locality: EBSL Tapinoã.

Previous records on *Sloanea*: Maia *et al.*, 2008 (two leaf gall and one bud gall on *Sloanea guianensis* (Aubl.) Benth. from Bertioga, SP); and Santos *et al.*, 2011a (one leaf on *Sloanea* sp. from wetland forests of Pernambuco).

Erythroxylaceae

Erythroxylum ovalifolium Peyr.

Leaf gall, ovoid, greenish, glabrous, one-chambered (Fig. 51). Galler: *Dasineura ovalifoliae* Maia & Fernandes, 2011 (Diptera, Cecidomyiidae). Localities: EBSL Túmulo and Tapinoã.

Previous records of the same gall morphotype: Maia, 2001 (from Maricá, and Carapebus, RJ); and Oliveira & Maia, 2005 (from Grumari, Rio de Janeiro, RJ).

Bud gall, conical, green, glabrous, one-chambered (Fig. 52). Galler: *Lopesia erythroxylis* Rodrigues & Maia, 2010 (Diptera, Cecidomyiidae). Locality: EBSL Indaiaçu.

Previous records of the same gall morphotype: Maia, 2001 (from Maricá, and Carapebus, RJ); Oliveira & Maia, 2005 (from Grumari, Rio de Janeiro, RJ); Maia & Oliveira, 2010 (from Ilha Grande, RJ).

Marginal leaf roll, green, glabrous, one-chambered (Fig. 53). Galler: *Clinodiplosis* sp. (Diptera, Cecidomyiidae). Localities: EBSL Indaiaçu and

PNMSL. Previous records of the same gall morphotype: Maia, 2001 (Maricá, and Carapebus, RJ); Oliveira & Maia, 2005 (from Grumari, Rio de Janeiro, RJ); and Maia & Oliveira, 2010 (from Ilha Grande, RJ).

Other records on *E. ovalifolium*: Maia, 2001 (one flower gall from Maricá and Carapebus, RJ); Oliveira & Maia, 2005 (one flower and one fruit gall from Grumari, Rio de Janeiro, RJ).

Erythroxyllum sp.

Leaf gall, globose, green, hairy, one-chambered (Fig. 54). Galler: Cecidomyiidae (Diptera). Other dweller: (inquiline) *Resseliella* sp. (Diptera, Cecidomyiidae). Localities: EBSL Túmulo and PNMSL.

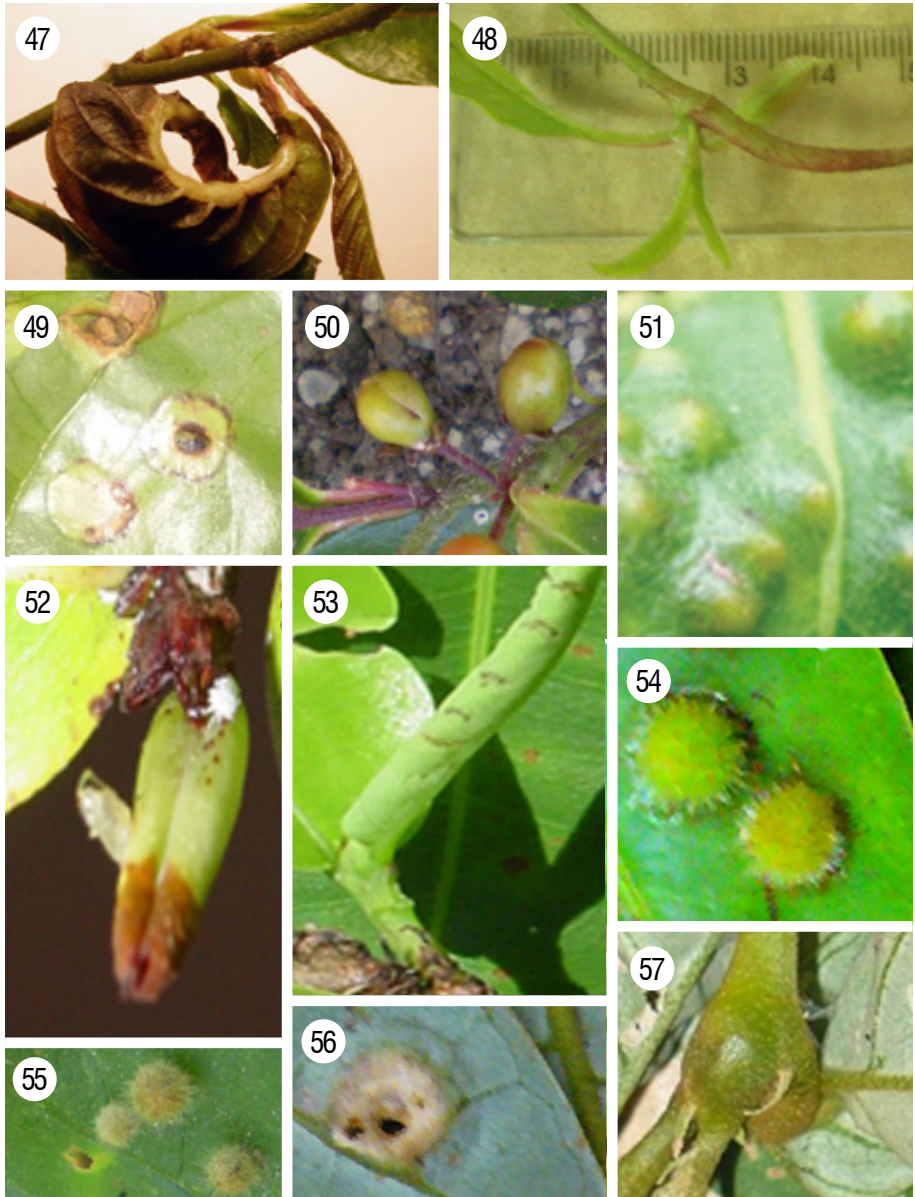
Previous records on *Erythroxyllum*: Fernandes *et al.*, 1988 (one bud gall on *E. frangulifolium* A. St.-Hil., and one leaf gall on *E. coelophlebium* Mart., both from Belo Horizonte, MG); Fernandes *et al.*, 1997 (one leaf gall on *E. campestre* A.-St. Hil. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one stem gall on *E. gonocladum* (Mart.) O. E. Shulz. from Vale do Rio Doce, MG); Julião *et al.*, 2002 (three leaf and one stem gall on *E. anguifugum* Mart. from Pantanal sul-matogrossense, MS); Urso-Guimarães *et al.*, 2003 (one leaf gall on *E. daphnites* Mart. from Delfinópolis, MG); Maia & Fernandes, 2004 (two leaf galls on *E. suberosum* St. Hil., one leaf and one bud gall on *E. frangulifolium* St. Hil., and one leaf gall on *Erythroxyllum* sp. from Serra de São José, MG); Urso-Guimarães & Scareli-Santos, 2006 (one leaf gall on *E. suberosum* A. St. Hill. from Santa Rita do Passa Quatro, SP); Maia *et al.*, 2008 (one bud gall on *E. amplifolium* (Mart.) O. E. Schulz from Bertiooga, SP); Coelho *et al.*, 2009 (two galls on *E. citrifolium* A. St.-Hil., one on bud and other on leaf; two galls on *E. vacciniifolium* Mart., one on stem and other on leaf from Serra do Cipó, MG); Santos *et al.*, 2011a (one leaf gall on *E. mucronatum* Benth.); Santos *et al.*, 2011b (one leaf gall on *Erythroxyllum* cf. *pungens* O. E. Schulz from Pernambuco); Almada & Fernandes, 2011 (one stem gall on *E. marcrophyllum* Cav. from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (one leaf and one stem gall on *E. suberosum* from Luiz Antônio, SP).

Euphorbiaceae

Croton floribundus Spreng.

Leaf or stem gall, globose, yellow, hairy, one-chambered (Fig. 55). Galler: *Clinodiplosis* sp. (Diptera, Cecidomyiidae). Localities: EBSL Tapinoã, Indaiaçu and Túmulo, PNMSL and RBAR.

Previous records of the same gall morphotype: Urso-Guimarães *et al.*, 2003 (from Delfinópolis, MG) and Maia & Fernandes, 2004 (from Serra de São José, MG).



Figs. 47-57. Insect galls of Santa Teresa (ES, Brazil): 47. *Davilla* sp., midvein swelling; 48. *Davilla* sp., stem swelling; 49. *Davilla* sp., leaf gall; 50. *Davilla* sp.; bud gall; 51. *Erythroxylum ovalifolium*, leaf gall; 52. *Erythroxylum ovalifolium*, bud gall; 53. *Erythroxylum ovalifolium*, marginal leaf roll; 54. *Erythroxylum* sp., leaf gall; 55. *Croton floribundus*, leaf or stem gall; 56. *Croton floribundus*, leaf gall; 57. *Croton floribundus*, stem swelling.

Leaf gall, discoid, brown, glabrous, one-chambered (Fig. 56). Galler: Cecidomyiidae (Diptera). Localities: EBSL Tapinoã Indaiaçu and Túmulo, PNMSL and RBAR.

Previous records of the same gall morphotype: Maia & Fernandes, 2004 (from Serra de São José, MG).

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 57). Galler: *Neolasioptera* sp. (Diptera, Cecidomyiidae). Other dwellers: (inquiline) *Resseliella* sp (Diptera, Cecidomyiidae). Localities: EBSL Indaiaçu, Túmulo and PNMSL.

Bud gall, conical, brown, glabrous, one-chambered (Fig. 58). Galler: not determined. Locality: PNMSL.

Stem swelling, claviform, brown, glabrous, one-chambered (Fig. 59). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Previous records on *C. floribundus*: Maia & Fernandes, 2004 (three galls from Bertioça, SP).

Croton sp.

Leaf gall, ovoid, yellowish, glabrous, one-chambered (Fig. 60). Galler: not determined. Localities: EBSL Indaiaçu and Tapinoã.

Previous records on *Croton*: Rübсаamen, 1905 (one stem gall on *C. buxifolius* (Baill.) Müll. Arg. and leaf galls on *Croton* sp. from Itabininha, RJ); Tavares, 1922 (one stem gall on *C. migrans* Casar. from Serra da Caraça, MG); Tavares, 1925 (one leaf gall on *C. hemiargyreus* Müll. Arg. from Ceará); Fernandes *et al.*, 2001 (one leaf gall on *Croton* sp., and one stem gall on *C. migrans* Casar from Vale do Rio Doce, MG); Fernandes & Maia, 2004 (two leaf galls on *C. antisiphiliticus* Mart., one stem gall on *C. gnidiaceus* Baill., and one stem gall on *Croton timandroides* (Didr.) Müll. Arg. from Serra de São José, MG); Carneiro *et al.*, 2009a (one stem gall on *C. staechadis* var. *silvaticus* (Chodat & Hassl.) Croizat, and one leaf gall on *C. buxifolius* Müell. Arg. from Serra do Espinhaço, MG); Santos *et al.*, 2011b (one stem gall on *C. adamantinus* Müll. Arg., one leaf gall on *C. blanchetianus* Baill., one leaf gall on *C. echioides* Müll. Arg., and one leaf gall on *C. rhamnifolioides* Pax. & K. Hoffm. from Pernambuco); Almada & Fernandes, 2011 (one leaf gall on *C. lanjouwensis* Jabl. from Porto de Trombetas, PA); Silva & Rodrigues, 2011 (one stem gall on *C. compressus* Lam. from Cabo Frio, RJ); and Malves & Frieiro-Costa, 2012 (one stem and three leaf galls from Ingaí, MG).

Tetraplandra sp.

Leaf gall, globose, green, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiaçu.

No previous records on *Tetraplandra* Baill.

Fabaceae

Abarema laeta (Benth.) Barneby & J W Grimes

Midvein swelling, fusiform, green, glabrous, one-chambered. Galler: not determined. Locality: EBSL Túmulo.

No previous records on *A. laeta*.

Previous records on *Abarema*: Maia *et al.*, 2008 (one leaf gall on *A. brachystachya* (DC.) Barneby & J. W. Grimes from Bertioga, SP).

Andira fraxinifolia Benth.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 61). Galler: Curculionidae (Coleoptera). Locality: PNMSL.

Previous records of the same gall morphotype: Maia & Fernandes 2004 (from Serra de São José, MG) and Maia *et al.*, 2008 (from Bertioga, SP).

Leaf gall, globose, yellow, glabrous, one-chambered (Fig.62). Galler: Asphondyliina (Diptera, Cecidomyiidae). Locality: EBSL Túmulo and Tapinoã. Previous records of the same gall morphotype: Maia & Fernandes 2004 (from Serra de São José, MG, and Maia *et al.*, 2008 (from Bertioga, SP).

Previous records on *A. fraxinifolia*: Maia *et al.*, 2008 (one stem gall from Bertioga, SP).

Andira sp.

Vein swelling, linear, green, glabrous, one-chambered (Fig. 63). Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã.

Previous record of the same gall: Maia & Fernandes, 2004 (from Serra de São José, MG) and Maia *et al.*, 2008 (on *A. fraxinifolia* from Bertioga, SP).

Midvein swelling, fusiform, yellow, glabrous, one-chambered (Fig. 64). Galler: Cecidomyiidae (Diptera). Locality: RBAR.

Previous records on *Andira*: Tavares, 1920b (one petiole gall and one leaf gall on *Andira* sp. from Salvador, Bahia); Tavares, 1922 (one leaf gall on *Andira* sp. from Salvador, Bahia); Fernandes *et al.*, 1988 (one stem and one petiole gall on *A. parvifolia* Mart. ex Benth. from Belo Horizonte, MG); Gagné, 1994 (one leaf gall on *A. parvifolia* Mart. ex Benth. from Minas Gerais); Fernandes *et al.*, 2001 (one leaf gall on *Andira* sp. from Vale do Rio Doce, MG); Julião *et al.*, 2002 (two leaf galls on *A. inermes* (Sw.) Kunth from Pantanal sulmatogrossense, MS); Maia *et al.*, 2002 (one leaf gall on *A. fraxinifolia* Benth. from Cabo Frio, RJ); Maia & Fernandes, 2004 (two leaf and two stem galls on *Andira* sp. from Serra de São José, MG); Araújo *et al.*, 2007 (one gall on *Andira* sp. from Pirenópolis, GO; no data on plant organ); Bregonci *et al.*, 2010

(two leaf galls on *A. nitida* Mart. ex Benth. from Guarapari, ES); Santos *et al.*, 2011a (one leaf gall on *Andira* sp. from Pernambuco); Almada & Fernandes, 2011 (one leaf gall on *A. surinamensis* (Bondt) Splitg. ex Pulle, two leaf galls on not determined species of *Andira* from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (one leaf gall on *Andira* sp. from Luiz Antônio, MG).

Bauhinia sp.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 65).
Galler: not determined. Locality: RBAR.

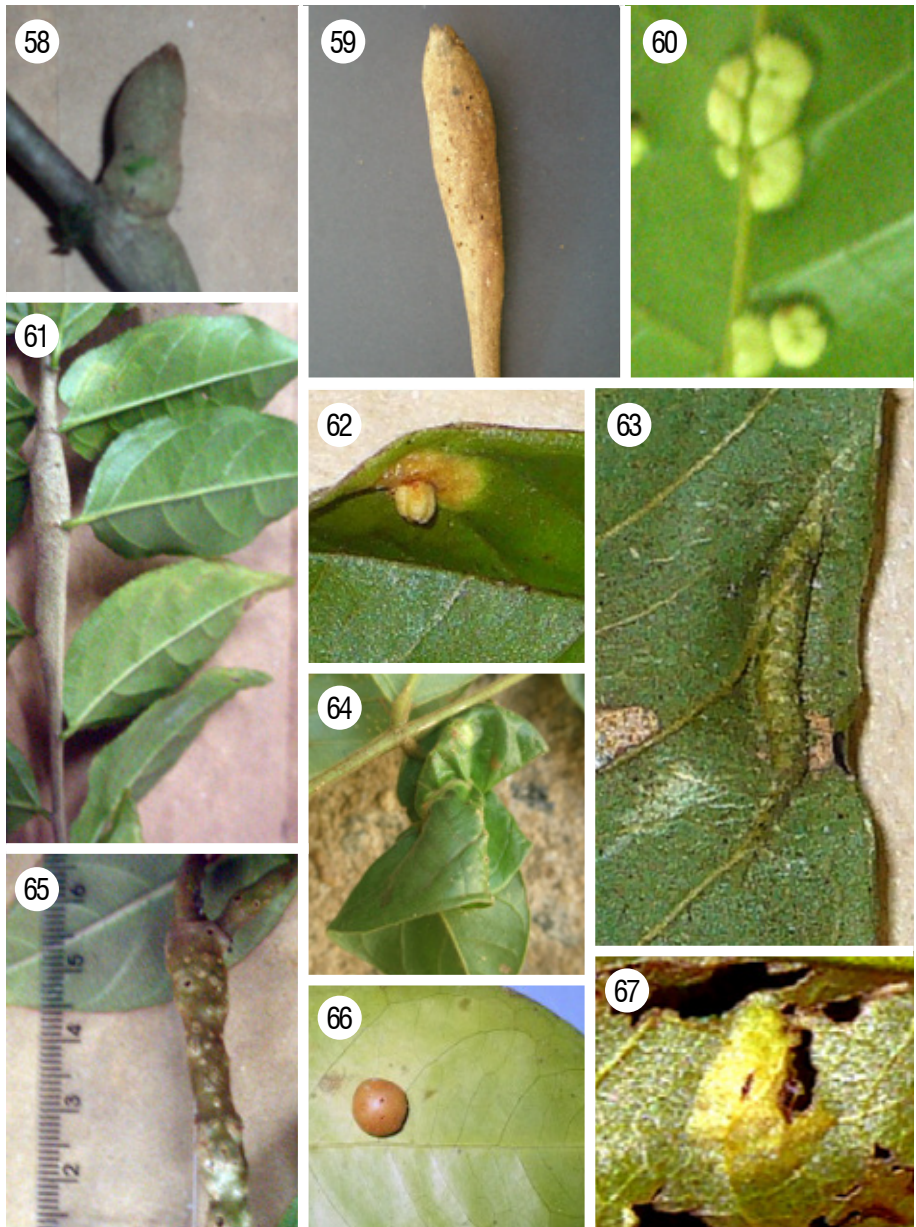
Leaf gall, circular, yellowish, glabrous, one-chambered (Fig. 66).
Galler: not determined. Locality: EBSL Tapinoã.

Previous records on *Bauhinia*: Rübсаamen, 1907 (one stem gall on *Bauhinia* sp. from Juruá, Amazonas); Tavares, 1920b (stem or leaf gall on *Bauhinia* sp. from Nova Friburgo, RJ); Fernandes *et al.*, 1988 (one leaf gall on *B. forficata* Link from Belo Horizonte, MG); Fernandes *et al.*, 1997 (one leaf and three stem galls on *B. brevipes* Vogel, three stem and two leaf galls on *B. pulchella* Benth., one leaf gall on *Bauhinia* sp.1, two stem galls and one leaf gall on *Bauhinia* sp.2 from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one leaf gall on *Bauhinia* sp. from Vale do Rio Doce); Julião *et al.*, 2002 (one leaf and one stem gall on *B. bauhinioides* (Mart.) J. F. Macbr from Pantanal sul-matogrossense, MS); Urso-Guimarães *et al.*, 2003 (one leaf and one stem gall on *B. unguolata* L. from Delfinópolis, MG); Urso-Guimarães & Scareli-Santos, 2006 (one stem and two leaf galls on *B. rufa* (Bong.) Steud from Santa Rita do Passa Quatro, SP); Carneiro *et al.*, 2009a (one stem gall on *Bauhinia* sp. from Serra do Espinhaço, MG); Coelho *et al.*, 2009 (four galls on *B. brevipes* Vogel, two on leaf and two on stem; three galls on *B. longifolia* (Bong.) Steud., two on leaf and one on stem; one stem gall on *B. rufa*, and two galls on *Bauhinia* sp., one from leaf and other on stem from Serra do Cipó, MG); Santos *et al.*, 2010 (one leaf gall on *B. unguolata* and one stem gall on *Bauhinia* sp. from Goiânia, GO); Santos *et al.*, 2011b (two leaf galls on *B. autimouta* Aubl. from Pernambuco); Santos *et al.*, 2011a (one stem and two leaf galls on *B. acuruana* Moric, one stem and three leaf galls on *M. cheilanta* (Bong.) Steud. from Pernambuco); and Saito & Urso-Guimarães, 2012 (one leaf gall on *B. rufa* from Luiz Antônio (MG)).

Copaifera sp.

Leaf gall, globose, succulent, brown, glabrous, one-chambered (Fig. 67).
Galler: not determined. Locality: RBAR.

Previous records on *Copaifera*: Fernandes *et al.*, 1988 (seven galls on stem, bud and leaf of *C. langsdorffii* Desf. from Belo Horizonte, MG); Fernandes *et al.* 1997 (two leaf and two stem galls on *C. langsdorffii* from Vale do Jequitinhonha,



Figs. 58-67. Insect galls of Santa Teresa (ES, Brazil): 58. *Croton floribundus*, bud gall; 59. *Croton floribundus*, stem swelling; 60. *Croton* sp., leaf gall; 61. *Andira fraxinifolia*, stem swelling; 62. *Andira fraxinifolia*, leaf gall; 63. *Andira* sp., vein swelling; 64. *Andira* sp., midvein swelling; 65. *Bauhinia* sp., stem swelling; 66. *Bauhinia* sp., leaf gall; 67. *Copaifera* sp., leaf gall.

MG); Maia & Fernnades, 2004 (one bud, one stem, and four leaf galls on *C. langsdorffii* from Serra de São José, MG); Urso-Guimarães & Scareli-Santos, 2006 (two leaf galls on *C. langsdorffii* from Santa Rita do Passa-Quatro, SP); Coelho *et al.*, 2009 (one leaf gall on *C. langsdorffii* from Serra do Cipó, MG); and Santos *et al.* 2001a (one leaf gall on *C. langsdorffii* from Pernambuco).

Dalbergia sp.

Leaf gall, discoid, green, glabrous, one-chambered (Fig. 68). Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã.

Previous records of the same gall morphotype: Maia & Fernandes, 2004 (from Serra de São José, MG).

Previous records on *Dalbergia*: Rübsaamen, 1905 (one bud gall on *Dalbergia* sp. from Pedras Grandes, SC, and one leaf gall from Serra do Macaé, RJ); Rübsaamen, 1907 (one fruit gall on *D. monetaria* L. f. from Ponta Negra, AM, one leaf, one stem and one petiole or vein gall on *Dalbergia* sp. from Fábrica, RJ); Tavares, 1922 (one leaf gall on *Dalbergia ecastophylla* (L.) Taub. from Itaparica, BA); Maia, 2001 a-b (one leaf gall on *D. ecastophylla* from Carapebus, RJ); Fernandes *et al.*, 2001 (three stem galls, one on *D. miscolobium* Benth., and two on *D. nigra* Benth. from Vale do Rio Doce, MG); Maia *et al.*, 2008 (one discoid leaf gall on *D. frutescens* (Vell.) Britton, one stem gall on *D. sampaioana* Kuhlm. & Hoehne, and one stem gall on *Dalbergia* sp. from Bertioiga, SP); Carneiro *et al.*, 2009a (one stem and one leaf gall on *D. miscolobium* Benth. from Serra do Espinhaço, MG); Maia & Oliveira, 2010 (one leaf gall on *D. ecastophylla* from Ilha Grande, RJ); and Almada & Fernandes, 2011 (two leaf galls, one on *D. atropurpurea* Duke, and other on *D. inundata* Spruce, one leaf and one stem gall on *D. spruceana* (Benth.) Benth., and two leaf galls on *Dalbergia* sp. from Porto de Trombetas, PA).

Inga sp.1

Leaf gall, circular, yellowish, glabrous, one-chambered (Fig. 69). Galler: not determined. Localities: Indaiáçu and PNMSL.

Marginal leaf roll, green, glabrous, one-chambered (Fig. 70). Galler: *Lopesia* sp. (Diptera, Cecidomyiidae). Localities: EBSL Indaiáçu, Túmulo and PNMSL.

Leaf gall, claviform, fusiform or ovoid, pedunculate, green, red, yellow, one-chambered (Fig. 71). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu, Túmulo, Tapinoã and PNMSL.

Bud, stem or leaf gall, globose, green, red or yellow, succulent, glabrous, one-chambered (Fig. 72). Galler: not determined. Dweller: Hymenoptera - parasitoid. Locality: EBSL Indaiáçu.

Stem swelling, fusiform, brown, woody, glabrous, one-chambered (Fig. 73). Galler: not determined. Locality: EBSL Túmulo.

Leaf gall, ovoid, green, with brown trichomes apically, one-chambered (Fig. 74). Galler: Cecidomyiidae (Diptera). Other dwellers: *Resseliella* sp. (Diptera, Cecidomyiidae) - inquiline. Locality: PNMSL.

Leaf gall, globose, green, succulent, glabrous, one-chambered (Fig. 75). Galler: not determined. Locality: PNMSL.

Leaf gall, globose, brownish, hairy, one-chambered (Fig. 76). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo and RBAR.

Leaf gall, globose, yellowish, hairy (Fig. 77). Galler: not determined. Localities: EBSL Túmulo, Tapinoã and RBAR.

Midvein swelling, fusiform, brown, glabrous, one-chambered (Fig. 78). Galler: not determined. Localities: EBSL Túmulo and PNMSL.

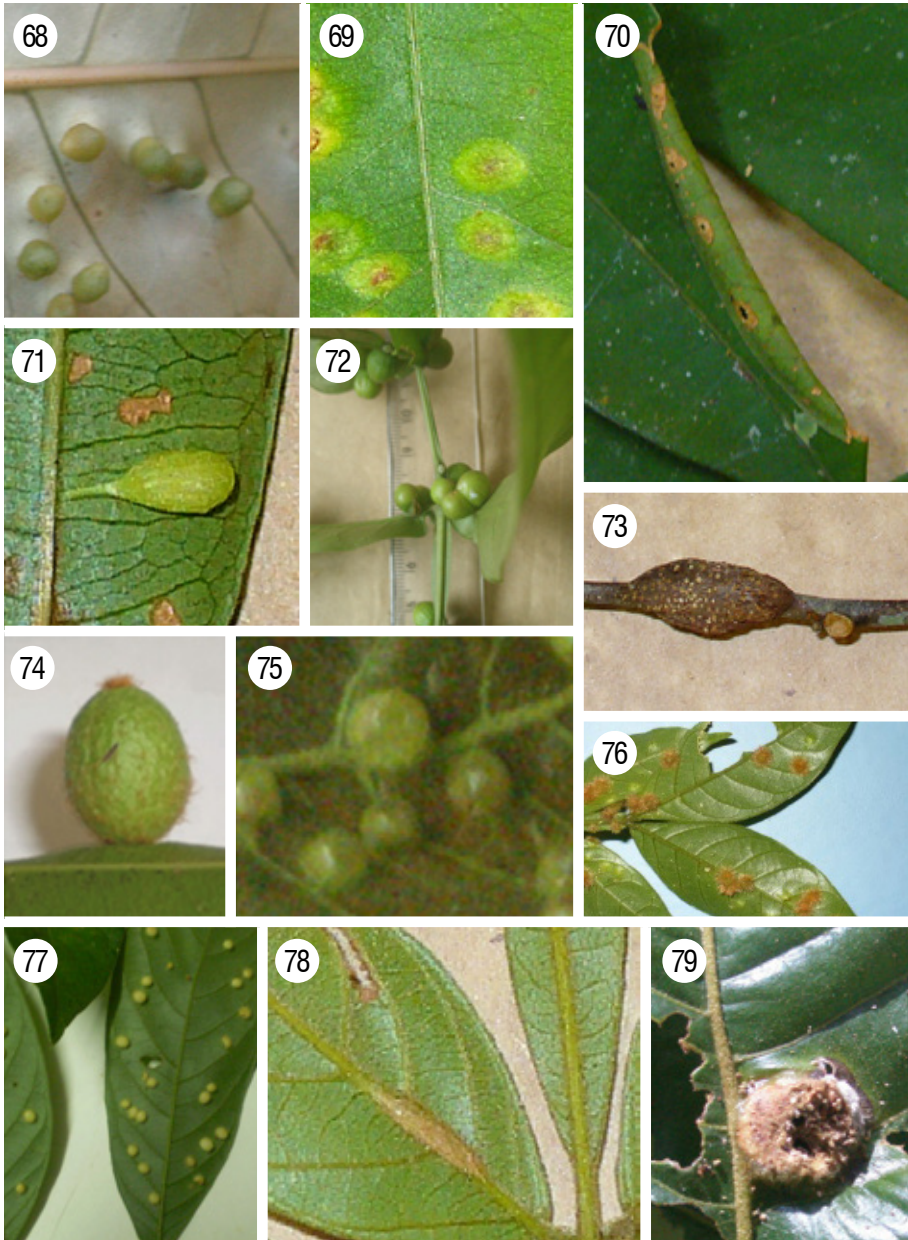
Inga sp.2

Leaf gall, globose, brown, glabrous, one-chambered (Fig. 79). Galler: not determined. Localities: EBSL Indaiaçu and PNMSL.

Inga sp.3

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 80). Galler: not determined. Locality: EBSL Tapinoã.

Previous records on *Inga*: Rübсаamen, 1907 (one bud gall on *I. strigillosa* Spruce ex Benth. and leaf gall on *Inga* sp., both from Juruá, AM); Fernandes *et al.*, 1988 (one leaf gall on *Inga ingoides* (Rich.) Willd. from Belo Horizonte, MG); Fernandes *et al.*, 1997 (two leaf galls on *I. edulis* Mart. from Vale do Jequitinhonha, MG); Maia, 2001 (stem, petiole or midvein gall on *I. maritima* Benth. from Maricá, RJ); Julião *et al.*, 2002 (three leaf and two stem galls on *I. vera* Willd. from Pantanal sul-matogrossense, MS); Maia *et al.*, 2002 (two leaf galls on *I. laurina* (Sw) Willd. from Maricá, RJ); Urso-Guimarães *et al.*, 2003 (one leaf gall on *I. edulis* Mart. from Delfinópolis, MG); Maia & Fernandes, 2004 (two leaf galls on *Inga* sp. from Serra de São José, MG); Oliveira & Maia, 2005 (one leaf gall on *Inga maritima* Benth. from Grumari, RJ); Fernandes & Negreiros, 2006 (two leaf galls on *Inga* sp. from Aimorés, MG); Maia *et al.*, 2008 (four leaf galls on *I. edulis*, and two leaf galls on *I. sellowiana* Benth. from Bertioiga, SP); Santos *et al.*, 2010 (three leaf galls on *I. cylindrica* (Vell.) Mart. and one leaf gall on *I. uruguensis* Hooker et Arnott from Goiania, GO); Maia & Oliveira, 2010 (one leaf gall on *Inga* sp. from Ilha Grande, RJ); Maia, 2011 (one leaf gall on *I. cayennensis* Sagot ex Benth., one leaf gall on *I. coriacea* var. *leptopus* (Benth.) J. F. Macbr., one stem and two leaf galls on *I. rubiginosa* (Rich.) DC., and three leaf galls on *I. umbellifera* (Vahl) Steud. from Porto de



Figs. 68-79. Insect galls of Santa Teresa (ES, Brazil): 68. *Dalbergia* sp., leaf gall; 69. *Inga* sp.1, leaf gall; 70. *Inga* sp.1, marginal leaf roll; 71. *Inga* sp.1, leaf gall; 72. *Inga* sp.1, bud, stem or leaf gall; 73. *Inga* sp.1, stem swelling; 74-77. *Inga* sp.1, leaf galls; 78. *Inga* sp.1, midvein swelling; 79. *Inga* sp.2, leaf gall.

Trombetas, PA); Santos *et al.*, 2011a (two leaf galls on *I. bahiensis* Benth., one leaf gall on *I. edulis*, and one leaf and one stem gall on *I. striata* Benth from Pernambuco); and Almada & Fernandes, 2011 (two leaf galls on *I. alba* (Sw.) Willd., seven leaf galls, each on *I. edulis* Mart., *I. falcistipula* Ducke, *I. gracilifolia* Ducke, *I. nitida* Willd., *I. paraensis* Ducke, *I. ramiflora* G. Don., and *I. thibaudiana* D. C., two leaf galls on *I. laurina* (S. W.) Willd., two leaf galls on *I. rubiginosa* (Rich.) D. C., and six leaf galls on six not determined species of *Inga* from Porto de Trombetas, PA).

Machaerium sp.

Stem gall, globose, brown, glabrous, one-chambered. Galler: not determined. Locality: PNMSL.

Previous records on *Machaerium*: Rübsaamen, 1907 (two leaf galls on *Machaerium* sp., one from Tubarão, SC, and other from Rio de Janeiro, RJ); Tavares, 1916 (one leaf gall on *Machaerium* sp. from Nova Friburgo, RJ); Tavares, 1920b (one stem swelling and one vein swelling on *Machaerium* sp. from Nova Friburgo, RJ); Fernandes *et al.*, 1987 (one leaf gall on *M. angustifolium* Vog. from Belo Horizonte, MG); Fernandes *et al.*, 1988 (one leaf gall on *M. aculeatum* Raddi from Belo Horizonte, MG); Gagné, 1994 (one leaf gall on *M. caratinganum* Kuhlm & Hoehne from Minas Gerais); Fernandes *et al.*, 2001 (two stem galls, one on *M. angustifolium* Vog., and other on *Machaerium* sp. from Vale do Rio Doce, MG); Fernandes & Negreiros, 2006 (one leaf gall on *Machaerium* cf. *fulvovenosum* and stem gall on *Machaerium* sp. from Aimorés, MG); Maia *et al.*, 2008 (two leaf galls on *M. uncinatum* (Vell.) Benth. from Bertioiga, SP); Almada & Fernandes, 2011 (four leaf galls, one on *M. hoehneanum* Ducke, other on *M. quinata* (Aubl.) Sandwith., the third on *M. hirtum* (Vell.) Stelfeld, and the fourth on *M. latifolium* Rusby, and two leaf galls on two not determined species of *Machaerium* from Porto de Trombetas, PA); and Malves & Frieiro-Costa, 2012 (one stem gall on *M. aculeatum* from Ingaí, MG).

Swartzia langsdorffii Raddi

Leaf gall, yellowish, glabrous, one-chambered, causing leaf coalescence (Fig. 81). Galler: *Burseramyia braziliensis* Maia & Fonseca, 2011 (Diptera, Cecidomyiidae). Localities: EBSL Tapinoã and Indaiaçu.

Previous records of the same gall morphotype: Maia *et al.*, 2008 (from Bertioiga, SP).

Marginal leaf roll, green, glabrous, one-chambered (Fig. 82). Galler: *Clinodiplosis* sp. (Diptera, Cecidomyiidae). Locality: EBSL Indaiaçu.

No previous records on *Swartzia langsdorffii*.

Previous records on *Swartzia*: Rübsaamen, 1908 (one leaf gall on *S. stipulifera* Harms from Cachoeiras dos Marmelos, AM, and other on *Swartzia* sp. from São Joaquim, AM); Almada & Fernandes, 2011 (one leaf gall on *S. polyphylla* DC. from Porto de Trombetas, PA).

Fabaceae not determined sp.1

Leaf gall, circular, brown, glabrous, one-chambered (Fig. 83). Galler: not determined. Localities: RBSL Tapinoã, PNMSL and RBAR.

Leaf gall, globose, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu and PNMSL.

Leaf gall, circular, yellow, glabrous, one-chambered. Galler: not determined. Locality: RBAR.

Stem swelling, globose, green, glabrous, one-chambered (Fig. 84). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu and Túmulo.

Fabaceae not determined sp.2

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 85). Galler: not determined. Localities: EBSL Tapinoã AND PNMSL.

Bud gall, globose, brown, glabrous, one-chambered (Fig. 86). Galler: not determined. Localities: EBSL Indaiáçu and RBAR.

Fabaceae not determined 3

Leaf gall, globose, yellow with red trichomes, one-chambered (Fig. 87). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Fabaceae not determined 4

Leaf gall, circular, yellow, glabrous, one-chambered (Fig. 88). Galler: not determined. Locality: EBSL Túmulo.

Flacourtiaceae

Casearia arborea (Rich.) Urb.

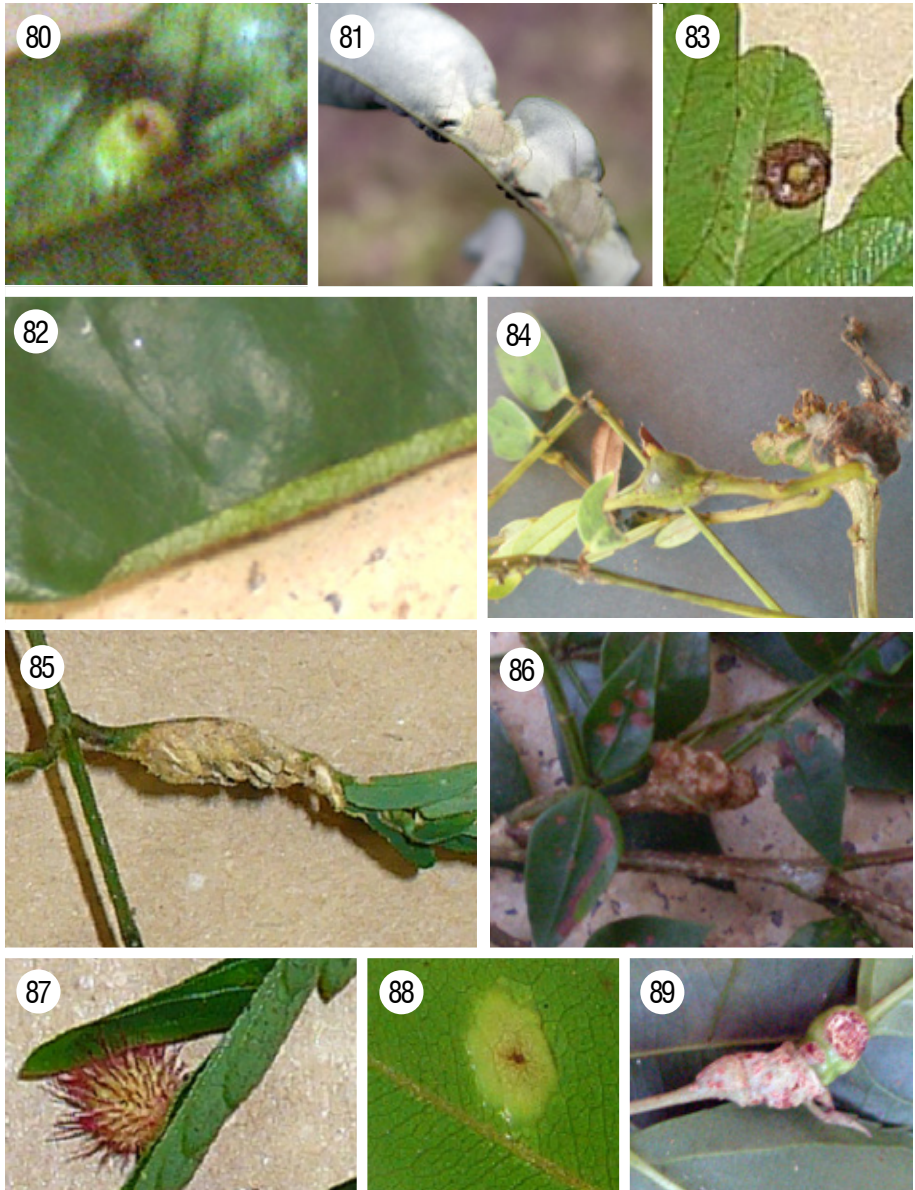
Stem swelling, fusiform, brown, glabrous (Fig. 89). Galler: not determined. Locality: EBSL Indaiáçu.

No previous records of other gall morphotypes on *C. arborea*.

Casearia sp.

Stem swelling, fusiform, green, glabrous, one-chambered. Galler: not determined. Localities: EBSL Indaiáçu, Tapinoã and RBAR.

Leaf gall, linear, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiáçu.



Figs. 80-89. Insect galls of Santa Teresa (ES, Brazil): 80. *Inga* sp.3 , leaf gall; 81. *Swartzia langsdorffii*, leaf gall; 82. *Swartzia langsdorffii*, marginal leaf roll; 83. Fabaceae not determined sp.1, leaf gall; 84. Fabaceae not determined sp.1, stem swelling; 85. Fabaceae not determined sp.2, stem swelling; 86. Fabaceae not determined sp.2, bud gall; 87. Fabaceae not determined sp.3, leaf gall; 88. Fabaceae not determined sp.4, leaf gall; 89. *Casearia arborea*, stem swelling.

Previous records on *Casearia*: Rübsaamen, 1905 (one bud gall on *Casearia* sp. from Palmeiras, RJ); Fernandes & Negreiros, 2006 (one leaf gall on *Casearia* cf. *aculeata* from Aimorés, MG); Coelho *et al.*, 2009 (one leaf gall on *C. rupestris* Eichler from Serra do Cipó, MG); and Almada & Fernandes, 2011 (one leaf gall on *C. arborea* (Rich.) Urb., and two leaf galls on *Casearia* sp. from Porto de Trombetas, PA); and Santos *et al.*, 2011a (two leaf galls on *C. javitensis* Kunth from Pernambuco).

Hypericaceae

Vismia cf. *reichardtiana* (Küntze) Ewan

Stem gall, globose, brown, glabrous, multi-chambered (Fig. 90). Galler: not determined. Localities: RBSL Indaiaçu, Tapinoã, Túmulo, PNMSL and RBAR.

No previous records on *Vismia* cf. *reichardtiana*.

Previous records on *Vismia*: Tavares, 1922 (two leaf galls on *V. guianensis* (Aubl.) Pers. from Itaparica, BA); Fernandes *et al.*, 2001 (one stem gall on *Vismia* sp. from Vale do Rio Doce, MG); Almada & Fernandes, 2011 (one leaf and one stem gall on *V. cayennensis* (Jacq.) Pers., one leaf and one stem gall on *V. guianensis*, one stem and four leaf galls on *V. latifolia* (Aubl.) Choisy., and one leaf gall on *V. schultesii* N. Robson from Porto de Trombetas, PA).

Lauraceae

Nectandra sp.

Leaf gall, cylindrical, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and Túmulo.

Previous records on *Nectandra*: Tavares, 1909 (one stem swelling on *Nectandra* spp. from São Leopoldo, RS); Tavares, 1921 (two leaf and three stem galls from Nova Friburgo, RJ, and two leaf galls on *Nectandra* spp. from Caeteté, BA); Maia *et al.*, 2008 (one leaf or stem and two leaf galls on *N. oppositifolia* Nees from Bertiooga (SP); Santos *et al.*, 2010 (one leaf gall on *N. cuspidata* Ness. from Goiânia, GO); and Saito & Urso-Guimarães, 2012 (one leaf gall on from Luiz Antônio, MG).

Ocotea sp.

Leaf gall, cylindrical, green, glabrous, one-chambered (Fig. 91). Galler: not determined. Locality: EBSL Indaiaçu.

Previous records on *Ocotea*: Rübsaamen, 1908 (one leaf gall on *Ocotea tristis* Mart. from Cabo Frio, RJ); Fernandes *et al.*, 2001 (one leaf gall on *O. dispersa* (Nees) Mez., and two leaf galls on *O. macropoda* Mez. from Vale do Rio Doce, MG); Maia, 2001 (one bud gall on *O. notata* (Nees) Mez. from Maricá, RJ),

Julião *et al.*, 2002 (one leaf gall on *O. suaveolens* (Meisn.) Benth. & Hook. f. ex Hieron. from Pantanal sul-matogrossense, MS); Maia & Fernandes, 2004 (one leaf gall on *Ocotea* sp. from Serra de São José, MG); Maia, 2006 (one leaf gall on *O. notata* (Ness) Mez. from Maricá, RJ); Maia *et al.*, 2008 (one leaf and one stem gall on *O. lobbii* (Meisn.) Rohwer., and seven galls on *Ocotea pulchellai* (Meisn.) Rohwer, three on leaf, two on stem, one on bud, and the other on bud or stem from Bertiooga, SP); Carneiro *et al.*, 2009a (two leaf galls, one on *O. coymbosa* (Meisn.) Mez and other on *O. glaucina* (Meisn.) Mez from Serra do Espinhaço, MG); Bregonci *et al.*, 2010 (one leaf gall on *O. notata* from Guarapari, ES); Almada & Fernandes, 2011 (five leaf galls, one on *O. brachybotrya* (Meisn.) Mez., one on *O. esmeraldana* Moldenke, two on *O. myriantha* (Meisn.) Mez, and other on *Ocotea* sp. from Porto de Trombetas, PA); Santos *et al.*, 2011a (one leaf gall on *Ocotea* cf. *glomerata* (Ness) Mez from Pernambuco) and Saito & Urso-Guimarães, 2012 (one leaf gall on *Nectandra* sp. from Luiz Antônio, SP).

Lauraceae not determined sp.1

Leaf gall, globose, green, glabrous, one-chambered (Fig. 92). Galler: *Bruggmannia* sp. (Cecidomyiidae, Diptera). Locality: RBAR.

Loranthaceae

Phoradendron sp.

Bud gall, globose, brownish, glabrous, one-chambered (Fig. 93). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and Tapinoã.

Previous records on *Phoradendron*: Carneiro *et al.*, 2009a (one stem gall on *P. crassifolium* (Pohl ex DC) Eichler from Serra do Espinhaço, MG).

Loranthaceae not determined sp.1

Leaf gall, conical, green, glabrous, one-chambered (Fig. 94). Galler: not determined. Localities: EBSL Indaiaçu, Túmulo and RBAR.

Leaf gall, globose, green, glabrous, one-chambered (Fig. 95). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo, Indaiaçu and RBAR.

Aerial root swelling, fusiform, brown, glabrous, one-chambered (Fig. 96). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo and RBAR.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 97). Galler: not determined. Locality: RBAR.

Malpighiaceae

Byrsonima sp.1

Bud gall, conical, green, glabrous, one-chambered. Galler:

Cecidomyiidae (Diptera). Locality: RBAR

Byrsonima sp.2

Stem swelling, fusiform, brown, glabrous, one-chambered. Galler: not determined. Localities: EBSL Indaiáçu, Túmulo and RBAR.

Leaf gall, globose, brownish, glabrous, one-chambered (Fig. 98). Galler: not determined. Locality: PNMSL.

Previous records on *Byrsonima*: Tavares, 1921 (one leaf gall on *B. verbascifolia* (L.) DC. from Caeteté and Camassary, BA); Gagné, 1994 (one flower gall on *B. crassa* Nied. from Minas Gerais); Fernandes *et al.*, 1997 (three leaf galls on *B. crassa*, five on *B. coriacea* (Sw.) DC., two on *B. sericea* DC., two on *B. spicata* Rich. ex Kunth, two on *B. variabilis* A. Juss., two on *Byrsonima* sp.1 and other on *Byrsonima* sp.2 from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one stem gall on *B. intermedia* A. Juss. and one leaf and two stem galls on *B. variabilis* A. Juss. from Vale do Rio Doce, MG); Maia, 2001 (one leaf gall, one flower gall and one stem gall on *B. sericea* DC. from Maricá, and Carapebus, RJ); Julião *et al.*, 2002 (one leaf and one stem gall on *B. intermedia* from Pantanal sul-matogrossense, MS); Urso-Guimarães *et al.*, 2003 (one leaf gall on *B. sericea* from Delfinópolis, MG); Maia & Fernandes, 2004 (one stem and one leaf gall on *B. variabilis*, one leaf gall on *B. verbascifolia*, and one stem gall on *Byrsonima* sp. from Serra de São José, MG); Oliveira & Maia, 2005 (one leaf and one stem gall on *B. sericea* from Grumari, Rio de Janeiro, RJ); Urso-Guimarães & Scareli-Santos, 2006 (one stem gall on *B. intermedia* from Santa Rita do Passa Quatro, SP); Araújo *et al.*, 2007 (one gall on *Byrsonima* sp.1 and other on *Byrsonima* sp.2 from Pirenópolis, GO; no data on plant organ); Carneiro *et al.*, 2009a (five stem galls, one on *B. arctostaphylloides* Nied., one on *B. clauseniana* A. Juss. and three on *B. variabilis*., eight galls on *B. coccolobifolia* Kunth, four on leaf, three on stem and one on bud, and two stem galls and one leaf gall on *Byrsonima* sp. from Serra do Espinhaço, MG); Bregonci *et al.*, 2010 (one stem and one leaf gall on *B. sericea* from Guarapari, ES); Maia & Oliveira, 2010 (one leaf and one stem gall on *B. sericea* from Ilha Grande, RJ); Santos *et al.*, 2011a (one leaf and one stem gall on *B. sericea* from Pernambuco); Santos *et al.*, 2011b (three leaf galls on *B. gardneriana* A. Juss., *B. intermedia*, and *Byrsonima* sp. from Pernambuco); Almada & Fernandes, 2011 (twelve leaf galls: two on *B. aerugo* Sagot, one on *B. chrysophylla* Kunth, one on *B. clauseniana* A. Juss., one on *B. crassifolia* (L.) Kunth, two on *B. crispa* A. Juss., one on *B. schumburgkiana* Benth., three on *B. stipulacea* A. Juss. and one on *Byrsonima* sp. from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (six galls on *B. intermedia*, two on leaf, two on bud, and two on stem from Luiz Antônio, MG).

Heteropteris sp.

Leaf gall, circular, yellowish, glabrous, one-chambered (Fig. 99).
Galler: not determined. Locality: PNMSL.

Leaf gall, cylindrical, yellowish, glabrous, one-chambered (Fig. 110).
Galler: not determined. Localities: EBSL Indaiaçu, PNMSL and RBAR.

Previous records on *Heteropteris*: Rübсаamen 1907 (leaf gall on *H. salicifolia* Knuth from Fábrica, RJ); Gagné, 1994 (one flower gall on *Heteropteris* sp. from Maricá, RJ); Fernandes *et al.*, 1997 (two galls on *H. byrsonimifolia* A. Juss. from Vale do Jequitinhonha, MG); Maia 2001 (one flower gall on *H. nitida* DC. from Maricá, RJ); Urso-Guimarães & Scareli-Santos, 2006 (one stem gall on *H. byrsonimifolia* from Santa Rita do Passa Quatro, SP); Maia *et al.*, 2008 (one leaf gall on *H. nitida* (Lam.) Kunth from Bertioga, SP); Coelho *et al.*, 2009 (two galls on *Heteropteris* sp., one on leaf and other on stem from Serra do Cipó, MG); and Santos *et al.*, 2011b (one leaf gall on *Heteropteris*. cf. *anoptera* from Pernambuco).

Mascagnia sp.

Stem or petiole swelling, fusiform, brown, glabrous, one-chambered (Fig. 101). Galler: not determined. Locality: RBAR.

No previous records on *Mascagnia* (Betero ex DC.) Colla

Malvaceae

Abutilon sp.

Stem swelling, globose, brown, glabrous, one-chambered. Galler: not determined. Locality: EBSL Tapinoã.

No previous records on *Abutilon* Mill.

Pavonia makoyana E. Morren

Leaf gall, globose, yellow, hairy, one-chambered (Fig. 102). Galler: *Clinodiplosis* sp. (Diptera, Cecidomyiidae). Localities: EBSL Indaiaçu, Túmulo, PNMSL and RBAR.

No previous records on *P. makoyana*.

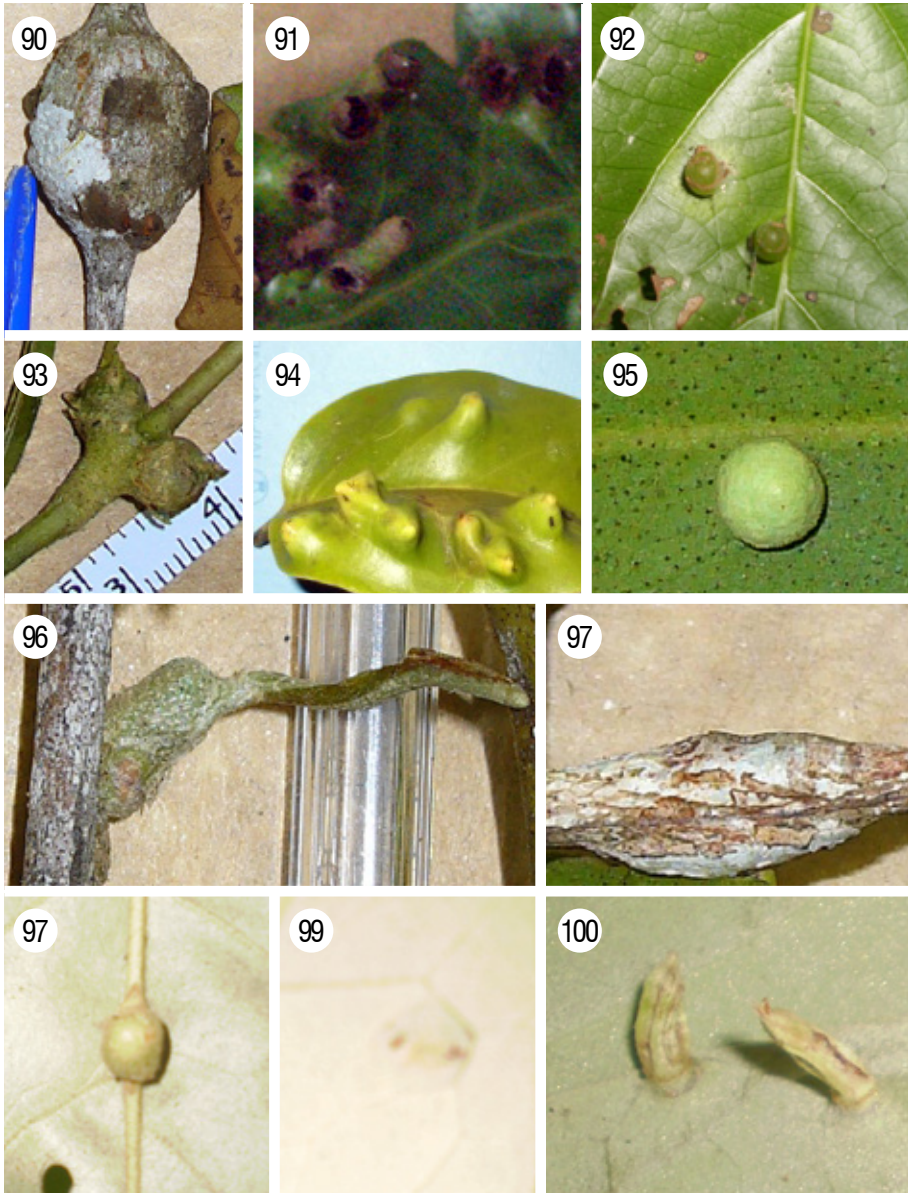
No previous records on *Pavonia* Cav.

Melastomataceae

Clidemia cf. *amygdaloides* DC.

Leaf gall, globose, green, with long trichomes, one-chambered (Fig. 103). Galler: not determined. Locality: PNMSL.

Bud gall, globose, yellow, grainy, one-chambered (Fig. 104). Galler: not determined. Localities: EBSL Indaiaçu, Tapinoã, PNMSL and RBAR.



Figs. 90-100. Insect galls of Santa Teresa (ES, Brazil): 90. *Vismia* cf. *reichardtiana*, stem gall; 91. *Ocotea* sp., leaf gall; 92. Lauraceae not determined sp.1, leaf gall; 93. *Phoradendron* sp., bud gall; 94. Loranthaceae not determined sp.1, leaf gall; 95. Loranthaceae not determined sp.1; leaf gall; 96. Loranthaceae not determined sp.1, aerial root swelling; 97. Loranthaceae not determined sp.1, stem swelling; 98. *Byrsonima* sp.2, leaf gall; 99. *Heteropteris* sp., leaf gall; 100. *Heteropteris* sp., leaf gall.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 105).
Galler: not determined. Localities: EBSL Indaiáçu, Tapinoã and PNMSL.

Midvein swelling, fusiform, green, glabrous, one-chambered (Fig. 106).
Galler: not determined. Localities: EBSL Indaiáçu and RBAR.

Leaf gall, globose, red, green or yellow, glabrous (Fig. 107). Galler:
not determined. Locality: PNMSL.

Petiole swelling, fusiform, yellowish, glabrous, one-chambered (Fig.
108). Galler: not determined. Locality: EBSL Indaiáçu.

No previous records of other gall morphotypes on *C. amygdaloides*.

Clidemia capilliflora (Naudin) Cogn.

Bud or leaf gall, globose, yellow with red trichomes, one-chambered
(Fig. 109). Galler: Lepidoptera. Localities: EBSL Túmulo, Tapinoã and RBAR.
No previous records of other gall morphotypes on *C. capilliflora*.

Clidemia sp.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 110).
Galler: not determined. Locality: EBSL Tapinoã.

Previous records of other gall morphotypes on *Clidemia*: Tavares, 1917b (one
twig and one leaf gall on *Clidemia* sp. from Nova Friburgo, RJ); Fernandes *et*
al., 2001 (one stem gall on *C. uceolata* DC. from Vale do Rio Doce, MG); Maia
et al., 2008 (one leaf gall on *C. neglecta* D. Don from Bertioga, SP); Santos *et*
al., 2011a (one leaf or stem gall on *Clidemia* sp. from Pernambuco).

Leandra melastomoides Raddi.

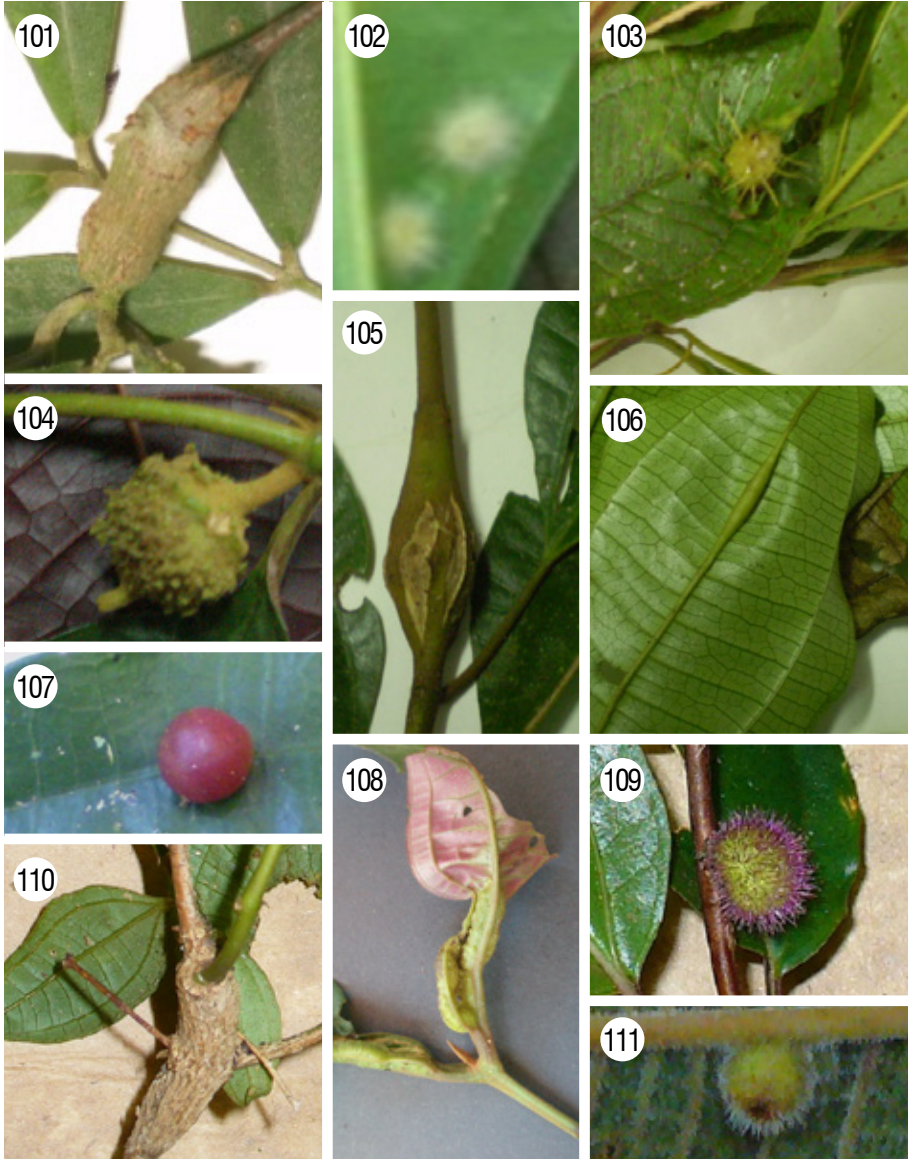
Leaf gall, ovoid, yellowish, hairy, one-chambered (Fig. 111). Galler:
Cecidomyiidae (Diptera). Localities: EBSL Indaiáçu, Túmulo, Tapinoã and
PNMSL.

Previous records on *L. melastomoides*: Fernandes *et al.*, 2001 (four stem galls
and one leaf gall from Vale do Rio Doce, MG).

Previous records of other gall morphotypes on *Leandra*: Fernandes *et al.*, 2001
(two leaf and one stem gall on *Leandra* cf. *lacunosa* Cogn. from Vale do Rio
Doce, MG); Maia & Fernandes, 2004 (one leaf and one bud gall on *L. aurea*
(Cham.) Cogn. from Serra de São José, MG); Carneiro *et al.*, 2009a (one stem
gall on *L. aurea* from Serra do Espinhaço, MG); and Maia *et al.*, 2008 (one leaf
gall on *Leandra* cf. *ionopogon* (Mart.) Cogn. from Bertioga, SP).

Miconia pyrifolia Naudin

Leaf or bud gall, globose, yellowish, hairy, one-chambered. Galler:
Lopesia sp. (Cecidomyiidae, Diptera). Locality: RBAR.



Figs. 101-111. Insect galls of Santa Teresa (ES, Brazil): 101. *Mascagnia* sp., stem or petiole swelling; 102. *Pavonia makoyana*, leaf gall; 103. *Clidemia* cf. *amygdaloides*, leaf gall; 104. *Clidemia* cf. *amygdaloides*, bud gall; 105. *Clidemia* cf. *amygdaloides*, stem swelling; 106. *Clidemia* cf. *amygdaloides*, midvein swelling; 107. *Clidemia* cf. *amygdaloides*, leaf gall; 108. *Clidemia* cf. *amygdaloides*, petiole swelling; 109. *Clidemia capilliflora*, bud or leaf gall; 110. *Clidemia* sp., stem swelling; 111. *Leandra melastomoides*, leaf gall.

Stem swelling, fusiform, brown, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçu.
No previous records on *Miconia pyrifolia*.

Miconia sp.1

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 112). Galler: not determined. Other dwellers: Hymenoptera – parasitoid. Localities: EBSL Tapinoã and PNMSL.

Leaf gall, cylindrical, green, glabrous, one-chambered (Fig. 113). Galler: not determined. Localities: EBSL Indaiaçu, Tapinoã and PNMSL.

Vein swelling, fusiform, green, glabrous, one-chambered (Fig. 114). Galler: not determined. Locality: PNMSL.

Miconia sp.2

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 115). Galler: not determined. Locality: PNMSL.

Miconia sp. 3

Midveind and petiole swelling, fusiform, brown, glabrous, one-chambered (Fig. 116). Galler: not determined. Locality: EBSL Túmulo.
Previous records on *Miconia*: Rübсаamen, 1907 (one leaf gall on *Miconia* sp. from Rio de Janeiro State; one stem gall from Serra dos Órgãos, RJ; one leaf gall on *M. tomentosa* Don., one leaf, one stem, and one fruit gall on *Miconia* sp., all from from Juruá, AM; one leaf gall on *Miconia* sp. from Serra do Macaé, RJ; and one leaf gall on *Miconia* sp. from Teresópolis, RJ); Tavares, 1917b (one stem gall on *Miconia* sp. from Nova Friburgo, RJ); Fernandes *et al.*, 1997 (three galls on *M. albicans* (Sw.) Triana from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (three leaf and two stem galls on *M. chartacea* Triana; two leaf and one stem gall on *M. corallina* Spring, one stem gall on *M. dodecandra* (Desf.) Cogn., and one stem gall on *Miconia* cf. *latecrenata* Naud. from Vale do Rio Doce, MG); Maia, 2001 (one bud gall on *M. cinnamomifolia* (DC.) Naudin. from Carapebus, RJ); Maia & Fernandes, 2004 (two leaf galls on *Miconia* sp.1, two leaf or stem galls, one on *Miconia* sp.2 and other on *Miconia* sp.3, three bud and two leaf galls on *M. theaezans* (Bonpl.) Cogn. from Serra de São José, MG); Urso-Guimarães & Scareli-Santos, 2006 (one leaf gall on *M. stenostachya* DC. from Santa Rita do Passa Quatro, SP); Maia *et al.*, 2008 (four leaf galls, one on *M. fasciculata* Gardner, other on *M. hymenonervia* (Raddi) Cogn., the third on *M. pusilliflora* (DC.) Naudin, and the fourth on *M. rigidiuscula* Cogn. from Bertioiga, SP); Carneiro *et al.*, 2009a (two

stem and one leaf galls on *Miconia* sp.1, and one stem gall from *Miconia* sp.2 from Serra do Espinhaço, MG); Maia, 2011 (four leaf and two stem galls on *M. stenostachya* DC. from Porto de Trombetas, PA); Malves & Frieiro-Costa, 2012 (three leaf galls on *Miconia* sp.1, and two stem galls, one on *Miconia* sp.2 and other on *Miconia* sp.3 from Ingaí, MG); Almada & Fernandes, 2011 (two leaf galls on *M. gratissima* Benth. ex Triana, one leaf and one stem gall on *M. longifolia* (Aul.) DC., five leaf galls, one on *M. longispicata* Triana, other on *M. minutiflora* (Bonpl.) DC., the third on *M. multiflora* Cogn., the fourth on *M. pyrifolia* Naudin, and the fifth on *Miconia* sp. 1, and one stem gall on *Miconia* sp. 2 from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (one leaf gall on *M. albicans* Sw. from Luiz Antônio, MG).

Tibouchina sp.

Leaf gall, globose, yellow with red trichomes, one-chambered (Fig. 117). Galler: *Lopesia* sp. (Cecidomyiidae, Diptera). Locality: RBAR. Previous records of other gall morphotypes on *Tibouchina*: Rübssaamen, 1908 (one leaf vein, petiole or stem gall on *T. granulosa* (Desr.) Cogn. from Serra dos Órgãos, RJ); Tavares, 1917a (two leaf galls on *Tibouchina* sp. from Nova Friburgo, RJ); Fernandes *et al.*, 2001 (one leaf and one stem gall on *T. martiusiana* Cogn. from Vale do Rio Doce, MG); Maia & Fernandes, 2004 (one leaf, one stem, and one leaf or stem gall on *T. candolleana* (Mart. ex DC.) Cogn. from Serra de São José, MG); Maia *et al.*, 2008 (one stem gall on *T. clavata* (Pers.) Wurdack, three galls on *T. pulchra* Cogn., one on leaf, one on bud, and one on petiole or vein, four galls on *T. trichopoda* (DC.) Baill., one on bud, one on stem, one on leaf or stem, and one on bud or stem from Bertioga, SP); and Carneiro *et al.*, 2009a (two stem galls, one on *T. arenaria* Cogn. and other on *T. multiflora* Cogn. from Serra do Espinhaço, MG).

Melastomataceae not determined sp.1

Leaf gall, globose, green, glabrous, one-chambered (Fig. 118). Galler: Cecidomyiidae (Diptera). Locality: RBAR.

Melastomataceae not determined sp.2

Petiole swelling, fusiform, reddish, glabrous, one-chambered (Fig. 119). Galler: not determined. Locality: RBAR.

Bud gall, conical, green, glabrous, one-chambered (Fig. 120). Galler: not determined. Locality: RBAR.

Leaf gall, ovoid, green, glabrous, one-chambered (Fig. 121). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Melastomataceae not determined sp.3

Leaf gall, globose, brown, glabrous, one-chambered (Fig. 122). Galler: not determined. Locality: PNMSL

Melastomataceae not determined sp.4

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 123). Galler: not determined. Localities: EBSL Túmulo and RBAR.

Melastomataceae not determined sp.5

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 124). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Melastomataceae not determined sp.6

Rosette bud gall, green, glabrous (Fig. 125). Galler: *Clinodiplosis* sp. (Cecidomyiidae, Diptera). Locality: EBSL Tapinoã.

Meliaceae

Guarea guidonia (L.) Sleumer

Stem, petiole or vein swelling, fusiform, green or brown, glabrous, one-chambered (Figs.157a, 157b). Galler: *Neolasioptera* sp. (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu, Túmulo, PNMSL and RBAR.

Previous records of the same gall morphotype: Fernandes *et al*, 2001 (from Vale do Rio Doce, MG); and Santos *et al*, 2011a (from Pernambuco).

Other records: Fernandes *et al*, 2001 (one leaf gall from Vale do Rio Doce, MG).

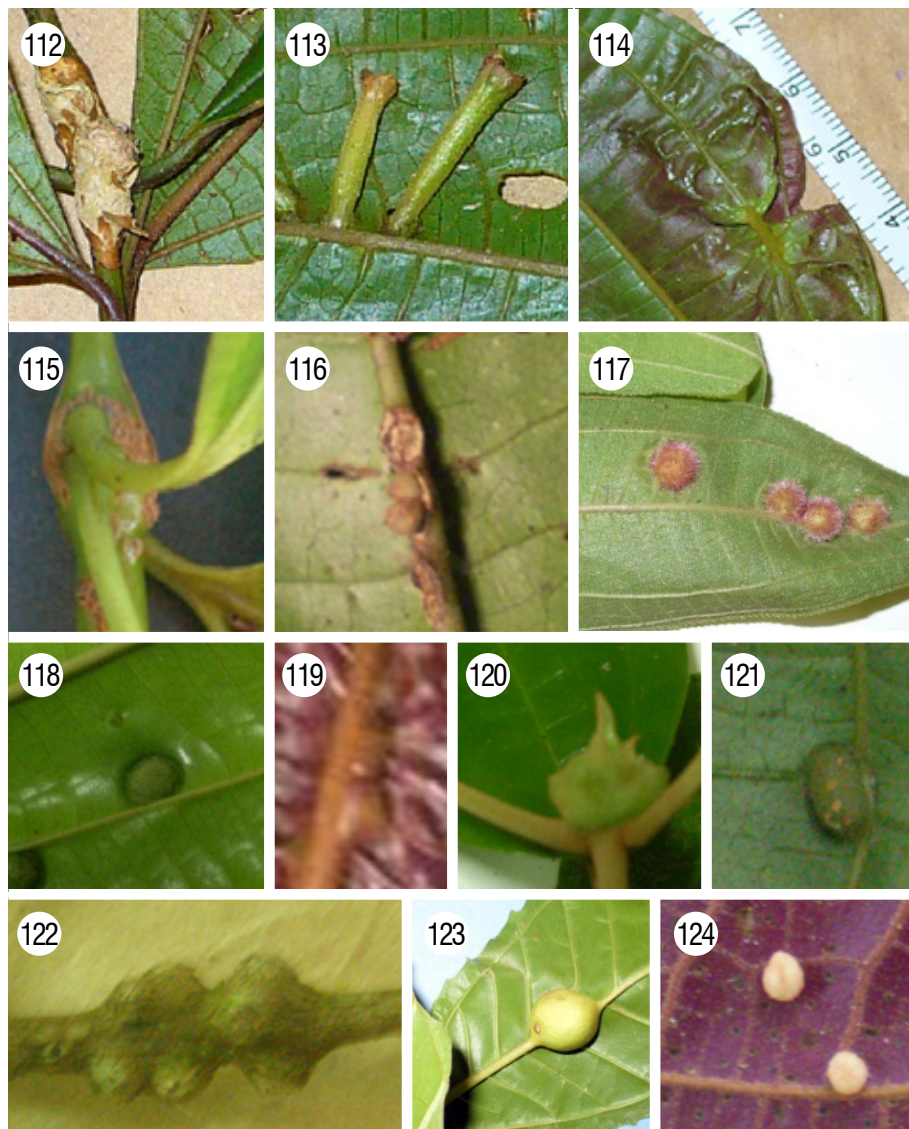
Guarea sp.

Petiole or vein swelling, fusiform, green, glabrous, one-chambered (Fig.126). Galler: *Neolasioptera* sp. (Cecidomyiidae, Diptera). Locality: RBAR. Previous records on *Guarea*: Tavares, 1909 (leaf gall on *Guarea trichilioides* L. (= *Guarea guidonia* (L.) Sleumer) in São Leopoldo, RS); Maia *et al.*, 2008 (four leaf galls on *G. macrophylla* Vahl subsp. *tuberculata* (Vell.) D. Penn. from Bertioga, SP); and Santos *et al.* 2011a (one leaf gall on *Guarea cf. macrophylla tuberculata* from Pernambuco).

Moraceae

Pourouma guianensis Aubl.

Vein swelling, fusiform, brown, glabrous, one-chambered (Fig. 127). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo and Tapinoã. Previous records of the same gall morphotype: Maia, 2011 (from Porto de Trombetas, PA).



Figs. 112-124. Insect galls of Santa Teresa (ES, Brazil): 112. *Miconia* sp.1, stem swelling; 113. *Miconia* sp.1, leaf gall; 114. *Miconia* sp.1, vein swelling; 115. *Miconia* sp.2, stem swelling; 116. *Miconia* sp. 3, midvein and petiole swelling; 117. *Tibouchina* sp., leaf gall; 118. Melastomataceae not determined sp.1, leaf gall; 119. Melastomataceae not determined sp.2, petiole swelling; 120. Melastomataceae not determined sp. 2, bud gall; 121. Melastomataceae not determined sp.2, leaf gall; 122. Melastomataceae not determined sp.3, leaf gall; 123. Melastomataceae not determined sp.4, leaf gall; 124. Melastomataceae not determined sp.5, leaf gall.

Other records on *P. guianensis*: Maia, 2011 (two leaf galls from Porto de Trombetas, PA).

Myrsinaceae

Myrsine sp.

Leaf gall, circular, yellow, glabrous, one-chambered (Fig. 128). Galler: not determined. Localities: EBSL Indaiaçu and RBAR.

Midvein swelling, fusiform, yellow, glabrous, one-chambered (Fig. 129). Galler: not determined. Locality: RBAR.

Stem swelling, globose, brown, glabrous, one-chambered (Fig. 130). Galler: not determined. Locality: RBAR.

Previous records on *Myrsine*: Tavares, 1906 (one leaf gall on *Myrsine* sp. from São Leopoldo, RS); Tavares, 1909 (one stem, one bud gall, and two leaf galls on *Myrsine* sp. from São Leopoldo, RS); and Tavares, 1922 (leaf gall on *Myrsine* sp. from Itu, SP); Fernandes *et al.*, 2001 (two leaf and two stem galls on *Myrsine* sp.1 and sp.2 from Vale do Rio Doce, MG); Maia, 2001 (one leaf gall on *Myrsine parvifolia* (A. DC.) from Maricá, RJ); Maia & Fernandes, 2004 (one leaf and one stem gall on *M. andina* (Mez.) Pipoly from Serra de São José, MG); Maia *et al.*, 2008 (one leaf and one stem gall on *M. ferruginea* (Ruiz & Pav.) Spreng. from Bertioaga, SP); and Maia & Oliveira, 2010 (one stem gall on *Myrsine* sp. from Ilha Grande, RJ). In all of these records, *Myrsine* spp. were referred as *Rapanea*.

Myrtaceae

Calyptranthes cf. *grandiflora* O. Berg

Leaf gall, globose, green, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiaçu.

No previous on *Calyptranthes grandiflora*.

Previous records on *Calyptranthes*: Houard, 1926 (one leaf gall on *C. affinis* O. Berg. from Brazil); and Maia *et al.*, 2008 (two leaf galls on *Calyptranthes* sp. from Bertioaga, SP).

Campomanesia cf. *laurifolia* Gardner

Leaf gall, circular, yellow, glabrous, one-chambered (Fig. 131). Galler: not determined. Locality: EBSL Indaiaçu.

Leaf gall, globose, yellowish, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiaçu.

No previous records on *Campomanesia laurifolia*.

Previous records on *Campomanesia*: Maia & Fernandes, 2004 (one leaf gall on *C. pubescens* (DC.) O. Berg. from Serra de São José, MG); and Maia *et al.*,

2008 (one leaf gall on veins of *C. guaviroba* (DC.) Kiaersk. from Bertiooga, SP).

Eugenia cf. *melanogyna* (D. Legrand) Sobral

Leaf gall, globose, brown, glabrous, one-chambered (Fig. 132). Galler: not determined. Locality: RBAR.

Stem swelling, globose, brown, glabrous, one-chambered (Fig. 133). Galler: not determined. Locality: RBAR.

Leaf gall, conical, green, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã

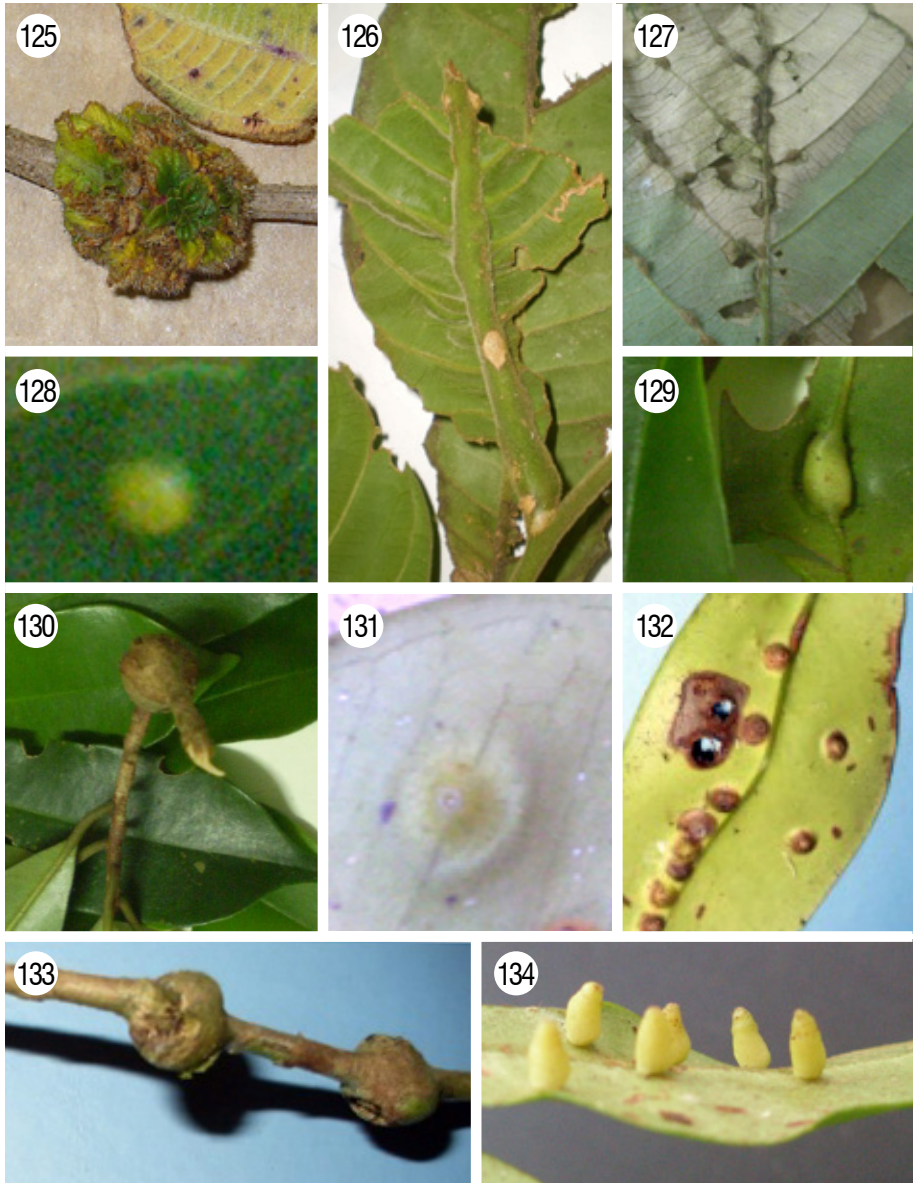
No previous records on *Eugenia melanogyna*.

Eugenia sp.

Leaf gall, conical, yellow, glabrous, one-chambered (Fig. 134). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiáçu and RBAR.

Leaf gall, circular, reddish, glabrous, one-chambered (Fig. 135). Galler: Cecidomyiidae (Diptera). Locality: RBAR.

Previous records on *Eugenia*: Tavares, 1916 (one leaf or stem gall on *Eugenia* sp. from Nova Friburgo, RJ); Tavares, 1921 (two leaf galls on *Eugenia* sp., one from Nova Friburgo and other from Rio de Janeiro, RJ, and one stem and two leaf galls on *Eugenia* sp. from Salvador, BA); Fernandes *et al.*, 1988 (one leaf gall on *E. ovalifolia* from Belo Horizonte, MG); Fernandes *et al.*, 1997 (four galls, one on *E. adstringens* Camb., other on *E. bimarginata* DC., the third on *E. dysenterica* DC., and the fourth on *E. florida* DC. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one leaf gall on *Eugenia* cf. *glazioviana* Kiaersk, two leaf galls on *E. sphenophylla* Berg. from Vale do Rio Doce, MG); Maia, 2001 (two leaf galls on *E. copacabanensis* Kiaersk. from Maricá, RJ; one stem and five leaf galls on *E. multiflora* Camb. from Carapebus, RJ; one stem and two leaf galls on *E. rotundifolia* Casar from Maricá, RJ; one fruit and two leaf galls on *E. uniflora* L. from Maricá, RJ); Julião *et al.*, 2002 (one leaf gall on *E. florida* from Pantanal sul-matogrossense, MS); Maia & Fernandes, 2004 (one stem gall on *Eugenia* sp.1, one leaf gall on *Eugenia* sp.2, and one leaf gall on *Eugenia* cfr. *ovalifolia* Camb. from Serra de São José, MG); Oliveira & Maia, 2005 (one stem gall on *E. ovalifolia* Camb., two leaf galls on *E. uniflora*, and one stem and two leaf galls on *Eugenia* sp. from Grumari, RJ); Urso-Guimarães & Scareli-Santos, 2006 (one leaf gall on *E. bimarginata* DC. from Santa Rita do Passa Quatro, SP); Maia *et al.*, 2008 (two leaf galls on *E. monosperma* Vell., one leaf gall on *E. speciosa* Cambess., two bud galls on *E. sulcata* Spring, one leaf gall on *E. umbelliflora* O. Berg, and one leaf gall on *E. uniflora* L. from Bertiooga, SP); Carneiro *et al.*, 2009a (one stem gall on *E. puniceifolia* DC. from Serra do Espinhaço, MG); Coelho *et al.*, 2009 (one stem gall on *E. sonderiana*



Figs. 125-134. Insect galls of Santa Teresa (ES, Brazil): 125. Melastomataceae not determined sp.6, bud gall; 126. *Guarea* sp., petiole or vein swelling; 127. *Pourouma guianensis*, vein swelling; 128. *Myrsine* sp., leaf gall; 129. *Myrsine* sp., midvein swelling; 130. *Myrsine* sp., stem swelling; 131. *Campomanesia* cf. *laurifolia*, leaf gall; 132. *Eugenia* cf. *melanogyna*, leaf gall; 133. *Eugenia* cf. *melanogyna*, stem swelling; 134. *Eugenia* sp., leaf gall.

O. Berg from Serra do Cipó, MG); Maia & Oliveira, 2010 (one leaf and one bud gall on *E. jaboticaba* (Vell.) Kiaersk; one leaf and one stem gall on *E. uniflora*, and one stem and two leaf galls on *Eugenia* sp. from Ilha Grande, RJ); Santos *et al.*, 2011a (one leaf gall on *Eugenia* sp. from Pernambuco); Santos *et al.*, 2011b (one leaf gall on *Eugenia* cf. *punicifolia* (Kunth.) DC. from Pernambuco); Almada & Fernandes, 2011 (one leaf gall on *Eugenia cumini* (L.) Druce from Porto de Trombetas, PA); Silva & Oliveira, 2011 (two leaf galls on *E. uniflora* from Cabo Frio, RJ); Malves & Frieiro-Costa, 2012 (two leaf galls on *Eugenia* sp.1, one leaf and one stem gall on *Eugenia* sp.2, and one leaf gall on *Eugenia* sp.3 from Ingaí, MG); and Saito & Urso-Guimarães, 2012 (one leaf and one stem gall on *E. aurata* O. Berg., one leaf gall on *E. marginata* DC. from Luiz Antônio, MG).

Marlierea cf.

Leaf gall, conical, yellowish, glabrous, one-chambered (Fig. 136). Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã. No previous records of other gall morphotypes on *Marlierea* Benth.

Myrcia ovata Cambess.

Leaf gall, globose, brown, glabrous, multi-chambered (Fig. 137). Galler: *Dasineura* sp. (Cecidomyiidae, Diptera). Localities: EBSL Túmulo and PNMSL. Previous records of the same gall morphotype: Maia, 2001 (from Maricá, and Carapebus, RJ). Other records on *M. ovata*: Maia, 2001 (one bud gall and one flower peduncle gall from Maricá and Carapebus, RJ).

Myrcia sp.1

Leaf or stem gall, globose, green, glabrous, one-chambered (Fig. 138). Galler: Cecidomyiidae (Diptera). Other dwellers: *Trotteria* sp. (Diptera, Cecidomyiidae) – inquiline. Localities: EBSL Indaiaçu, Túmulo, Tapinoã PNMSL and RBAR.

Bud gall, ovoid, green, glabrous, one-chambered (Fig. 139). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu, Túmulo and RBAR.

Marginal leaf roll, green, glabrous, one-chambered (Fig. 140). Galler: Cecidomyiidae (Diptera). Other dwellers: *Trotteria* sp. (Diptera, Cecidomyiidae) – inquiline. Localities: EBSL Indaiaçu, Túmulo, Tapinoã and PNMSL.

Bud or leaf gall, red, globose, glabrous (Fig. 141). Galler: Thysanoptera. Other dwellers: Cecidomyiidae (Diptera). Localities: EBSL Túmulo, Tapinoã, PNMSL and RBAR.

Bud gall, ovoid, brown, glabrous, multi-chambered (Fig. 142). Galler:

not determined. Localities: EBSL Indaiaçu, Tapinoã and PNMSL.

Petiole swelling, globose, brown, hairy, one-chambered. Galler: not determined. Locality: PNMSL.

Petiole swelling, globose, green, glabrous, one-chambered (Fig. 143). Galler: not determined. Locality: PMNSL.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig 144). Galler: Cecidomyiidae (Diptera). Locality: EBSL Túmulo, Tapinoã, PNMSL and RBAR.

Myrcia sp.2

Leaf gall, cylindrical, yellowish, glabrous, one-chambered (Fig. 145). Galler: Cecidomyiidae (Diptera). Locality: RBAR.

Myrcia sp. 3.

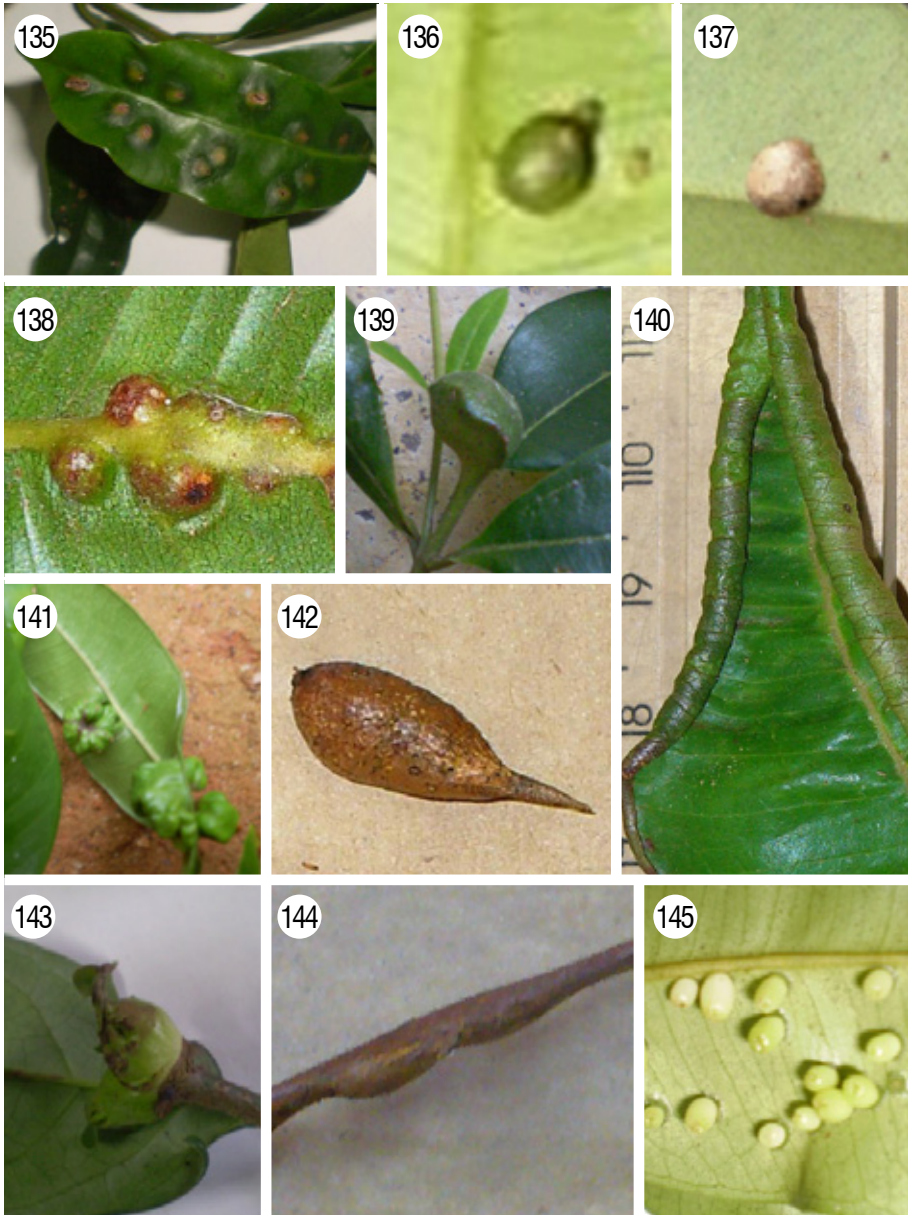
Midvein leaf gall, fusiform, yellow, glabrous, one-chambered (Fig. 146). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçu.

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 147). Galler: not determined. Locality: EBSL Indaiaçu.

Leaf gall, stellate, whitish, glabrous, one-chambered (Fig. 148). Galler: not determined. Locality: EBSL.

Leaf gall, globose, green, glabrous, one-chambered (Fig. 149). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Previous records on *Myrcia*: Fernandes *et al.*, 1988 (three leaf galls on *M. itambensis* O. Berg from Belo Horizonte, MG); Fernandes *et al.*, 1997 (three galls on *M. multiflora* (Lam.) DC, four on *M. rostrata* DC., two on *M. torta* DC., and one on *M. variabilis* DC. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one stem and one leaf gall on *Myrcia* cf. *fallax* (Rich.) DC., one stem and three leaf galls on *M. formosiana* A. DC., one stem gall on *Myrcia* cf. *tomentosa* (Aubl.) DC., seven leaf and two stem galls on *M. multiflora* (Lam.) DC., two leaf galls on *M. subcordata* DC., one leaf gall on *Myrcia* sp.1, and one stem and two leaf galls on *Myrcia* sp.2 from Vale do Rio Doce, MG); Maia & Fernandes, 2004 (three leaf and two bud galls on *Myrcia* sp. from Serra de São José, MG); Urso-Guimarães & Scareli-Santos, 2006 (three galls on *M. bella* Cambess., one on bud, other on stem, and the third on stem and leaf vein; one flower bud gall on *M. uberavensis* O. Berg from Santa Rita do Passa Quatro, SP); Araújo *et al.*, 2007 (one gall on *M. tomentosa* from Pirenópolis, GO; no data on plant organ); Maia *et al.*, 2008 (seven galls on *M. fallax*, two on leaf, two on stem, two on bud, and one on stem or vein; one leaf gall on *M. multiflora* (Lam.) DC.; one leaf and one bud gall on *M. palustris* DC. from Bertioiga, SP); Carneiro *et al.*, 2009a (two stem galls, one on *M. montana* Cambess. and



Figs. 135-145. Insect galls of Santa Teresa (ES, Brazil): 135. *Eugenia* sp., leaf gall; 136. *Marlierea* cf., leaf gall; 137. *Myrcia ovata*, leaf gall; 138. *Myrcia* sp.1, leaf or stem gall; 139. *Myrcia* sp.1, bud gall; 140. *Myrcia* sp.1, marginal leaf roll; 141. *Myrcia* sp.1, bud or leaf gall; 142. *Myrcia* sp.1, bud gall; 143. *Myrcia* sp.1, petiole swelling; 144. *Myrcia* sp.1, stem swelling; 145. *Myrcia* sp.2, leaf gall.

other on *M. rufipes* DC. from Serra do Espinhaço, MG); Coelho *et al.*, 2009 (four galls on *M. splendens* (Sw.) DC., three on leaf and one on stem, and four leaf galls on *M. tomentosa* from Serra do Cipó, MG); Santos *et al.*, 2010 (one leaf gall on *Myrcia* sp. and one leaf gall on *M. rostrata* DC. from Goiânia, GO); Santos *et al.*, 2011a (one leaf gall on *Myrcia* cf. *fallax*, one stem gall on *Myrcia* sp., and four galls on stem and leaf of *M. sylvatica* (G. Mey) DC. from Pernambuco); Malves & Frieiro-Costa, 2012 (one fruit and one leaf gall on *M. guianensis* (Aubl.) DC., and one stem gall on *M. splendens* from Ingaí, MG); and Saito & Urso-Guimarães, 2012 (one leaf gall on *Myrcia* cf. *lingua* O. Berg (Mattos) from Luiz Antônio, MG).

Myrciaria floribunda (H. West ex Willd) O. Berg

Leaf gall, discoid, brown, glabrous, one-chambered (Fig. 150). Galler: not determined. Locality: EBSL Indaiaçu.

Marginal leaf roll, green, glabrous, one-chambered (Fig. 151). Galler: *Dasineura myrciariae* Maia, 1993 (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu, Túmulo and PNMSL.

Previous record: Maia, 1993 (from Maricá, and Carapebus, RJ); Gagné, 1994 (from Maricá, RJ), and Bregonci *et al.*, 2010 (from Guarapari, RJ).

Leaf gall, cylindrical, greenish, glabrous, one-chambered (Fig. 152). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu, Túmulo and PNMSL.

Other records on *M. floribunda*: Maia, 2001 (one bud gall and one leaf gall from Maricá, and Carapebus, RJ); Bregonci *et al.*, 2010 (two leaf galls from Guarapari, ES); and Almada & Fernandes, 2011 (one leaf gall from Porto de Trombetas, PA).

Myrtaceae not determined sp. 1

Swelling do stem, fusiform, brown, glabrous, one-chambered (Fig. 153). Galler: not determined. Locality: EBSL Tapinoã.

Nyctaginaceae

Guapira opposita (Vell.) Reitz.

Bud or leaf gall, green, globose, glabrous, trilocular (Fig. 154). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu, Tapinoã, Túmulo and PNMSL. Previous records of the same gall: Maia *et al.*, 2008 (from Bertioiga, SP); and Bregonci *et al.*, 2010 (from Guarapari, ES).

Leaf gall, globose, red or yellow, hairy, one-chambered (Fig. 155). Galler: *Bruggmannia robusta* Maia & Couri, 1993 (Cecidomyiidae, Diptera). Localities: EBSL Túmulo, Tapinoã, PNMSL and RBAR.

Previous records of the same gall morphotype: Maia & Couri, 1993 (from Maricá, and Carapebus, RJ); Maia *et al.*, 2008 (from Bertioga, SP); and Maia & Oliveira, 2010 (from Ilha Grande, RJ).

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 156). Galler: *Proasphondylia guapirae* Maia, 1993 (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu, Túmulo, Tapinoã, PNMSL and RBAR.

Previous records of the same gall morphotype: Maia, 1993 (from Maricá, RJ); Maia, 2001 (from Maricá and Carapebus, RJ); Maia *et al.*, 2008 (from Bertioga, SP); and Maia & Oliveira, 2010 (from Ilha Grande, RJ).

Bud gall, globose, green or reddish, glabrous, one-chambered (Fig. 157). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçu.

Leaf gall, circular, reddish, yellow or green, glabrous, one-chambered (Fig. 158). Galler: *Bruggmannia elongata* Maia & Couri, 1993 (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu, Túmulo and PNMSL.

Previous records of the same gall morphotype: Maia, 1993 (from Maricá, RJ); Maia, 2001 (from Maricá and Carapebus, RJ); Maia *et al.*, 2008 (from Bertioga, SP); and Maia & Oliveira, 2010 (from Ilha Grande, RJ).

Leaf gall, conical, green, glabrous, one-chambered (Fig. 159). Galler: *Bruggmannia acaudata* Maia, 2004 (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu, Túmulo and PNMSL.

Previous records of the same gall morphotype: Maia, 2001 (from Maricá, and Carapebus, RJ); and Maia & Oliveira, 2010 (from Ilha Grande, RJ).

Leaf gall, globose, green, glabrous, one-chambered (Fig. 160). Galler: *Bruggmannia* sp. (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu, Túmulo, Tapinoã, PNMSL and RBAR.

Previous records of the same gall morphotype: Maia *et al.*, 2008 (from Bertioga, SP); and Bregonci *et al.*, 2010 (from Guarapari, ES).

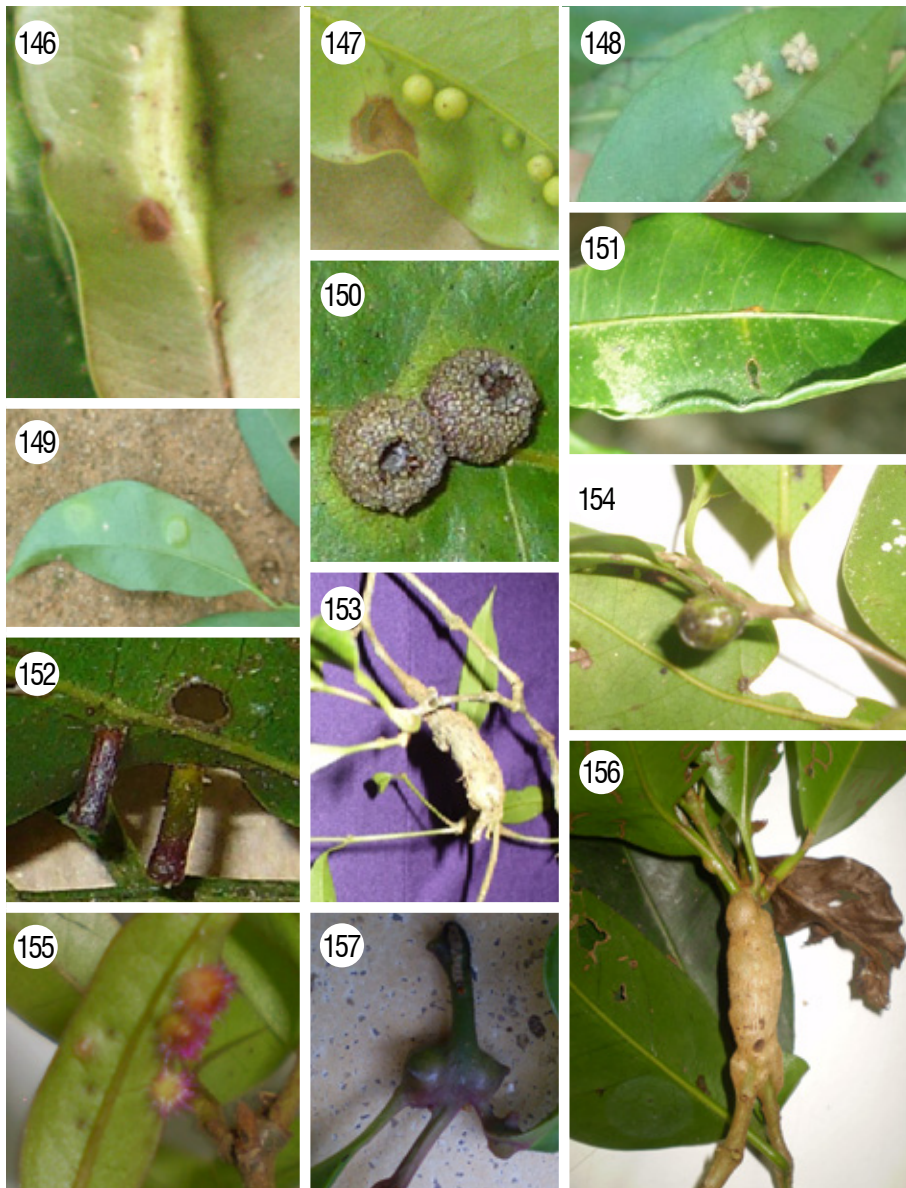
Rosette bud gall, green, glabrous (Fig. 161). Galler: *Pisphondylia braziliensis* Couri & Maia, 1992 (Cecidomyiidae, Diptera). Localities: EBSL Indaiaçu and Túmulo. Previous records of the same gall morphotype: Couri & Maia, 1992 (from Maricá, RJ); Maia, 2001 (from Maricá, RJ); Maia *et al.*, 2008 (from Bertioga, SP); and Maia *et al.*, 2010 (from Minas Gerais and Rio Grande do Sul).

Orchidaceae

Orchidaceae not determined

Root gall, fusiform, brown, glabrous, one-chambered (Fig. 162). Galler: Cecidomyiidae (Diptera). Locality: EBSL, Túmulo.

Previous records on Orchidaceae: Molliard, 1903 (aerial root galls on *Cattleya* spp., *Laelia* spp., and *Epidendrum* spp. From Brazil); Bregonci



Figs. 146-157. Insect galls of Santa Teresa (ES, Brazil): 146. *Myrcia* sp. 3., midvein leaf gall; 147. *Myrcia* sp.3, leaf gall; 148. *Myrcia* sp.3, leaf gall; 149. *Myrcia* sp.3, leaf gall; 150. *Myrciaria floribunda*, leaf gall; 151. *Myrciaria floribunda*, marginal leaf roll; 152. *Myrciaria floribunda*, leaf gall; 153. Myrtaceae not determined sp. 1, stem swelling; 154. *Guapira opposita*, bud or leaf gall; 155. *Guapira opposita*, leaf gall; 156. *Guapira opposita*, stem swelling; 157. *Guapira opposita*, bud gall.

et al., 2010 (one leaf gall on *Epidendrum denticulatum* Barb. Rodr. from Guarapari, ES).

Phyllanthaceae

Phyllanthus sp.

Leaf gall, globose, green, glabrous, one-chambered (Fig. 163). Galler: not determined. Locality: EBSL Indaiáçu.

No previous records on *Phyllanthus* L.

No previous records Phyllanthaceae.

Picramniaceae

Picramnia sp.

Leaf gall, globose, brown, hairy, one-chambered (Fig. 164). Galler: *Alexomyia* cf. (Anadiplosini, Cecidomyiidae, Diptera). Locality: RBAR.

Petiole swelling, ovoid, green, glabrous, one-chambered (Fig. 165). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Previous records on *Picramnia*: Maia *et al.*, 2008 (one leaf gall on *Picramnia gardneri* Planch. from Bertioaga, SP).

Piperaceae

Piper arboreum Aubl.

Vein swelling, globose, green, glabrous, one-chambered (Fig. 166). Galler: not determined. Locality: EBSL Indaiáçu and Túmulo.

Bud gall, globose, brown, glabrous, one-chambered (Fig. 167). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiáçu and Túmulo.

Previous records on *P. arboreum*: Araújo *et al.*, 2007 (one gall from Pirenópolis, GO; no data on plant organ); Maia *et al.*, 2008 (one leaf gall from Bertioaga, SP); and Santos *et al.*, 2010 (one leaf and one stem gall from Goiânia, GO).

Piper mollicomum Kunth.

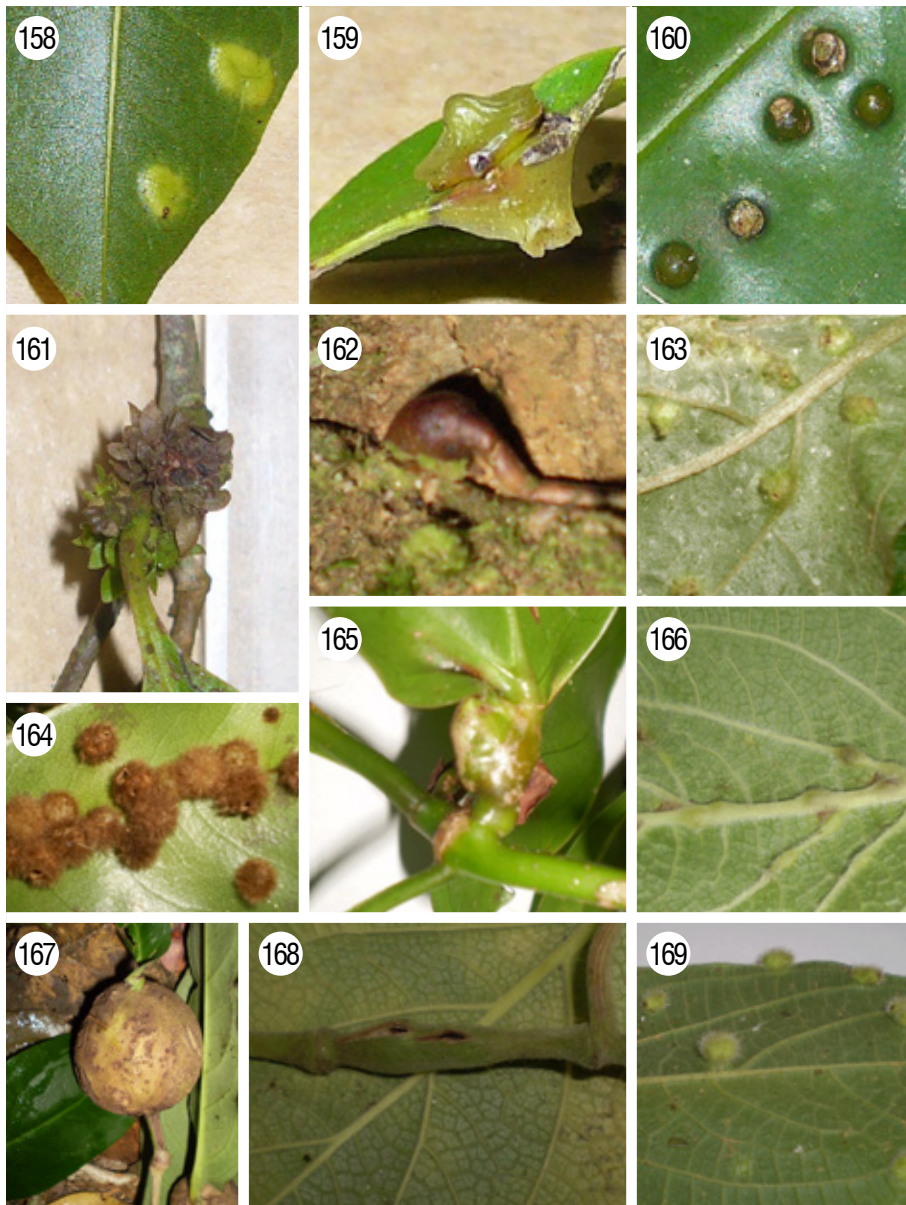
Vein swelling, globose, green, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiáçu, Túmulo, Tapinoã, PNMSL and RBAR.

Stem or petiole swelling, globose, green, glabrous, one-chambered (Fig. 168). Galler: not determined. Locality: RBAR.

Bud gall, globose, green, hairy, one-chambered. Galler: not determined. Locality: RBAR.

Leaf gall, ovoid, yellowish, hairy, one-chambered (Fig. 169). Galler: Cecidomyiidae (Diptera). Localities: PNMSL and RBAR.

No previous records on *P. mollicomum*.



Figs. 158-169. Insect galls of Santa Teresa (ES, Brazil): 158. *Guapira opposita*, leaf gall; 159. *Guapira opposita*, leaf gall; 160. *Guapira opposita*, leaf gall; 161. *Guapira opposita*, rosette bud gall; 162. Orchidaceae not determined, root gall; 163. *Phyllanthus* sp., leaf gall; 164. *Picramnia* sp., leaf gall; 165. *Picramnia* sp., petiole swelling; 166. *Piper arboreum*, vein swelling; 167. *Piper arboreum*, bud gall; 168. *Piper mollicomum*, stem or petiole swelling; 169. *Piper mollicomum*, leaf gall.

Piper pseudopothifolium C. DC

Vein swelling, globose, green, glabrous, one-chambered. Galler: not determined. Locality: RBAR.

No previous records of other gall morphotypes on *P. pseudopothifolium*.

Previous records on *Piper*: Rübсаamen, 1908 (four galls on *Piper* sp.: three on stem, two from Rio de Janeiro, and the third from Serra do Macaé, RJ; and one leaf gall from Fábrica, RJ); Tavares, 1925 (stem swelling on *Piper* sp. from Rio de Janeiro, RJ); Fernandes *et al.*, 2001 (one stem gall on *P. aduncum* L. from Vale do Rio Doce, MG); Maia, 2001 (one inflorescence gall on *P. divaricatum* Meyer from Carapebus, RJ); Maia & Fernandes, 2004 (one leaf or stem gall on *Piper* sp.1, one stem gall on *Piper* sp.2, one leaf, one bud and one stem gall on *Piper* sp.3 from Serra de São José, MG); Oliveira & Maia, 2005 (one stem gall on *P. amalago* L. from Grumari, RJ).

Piperaceae not determined sp.1

Midvein swelling, globose, green, hairy, one-chambered (Fig. 170). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiçu.

Plumbaginaceae

Plumbago zeylanica L.

Stem swelling, fusiform, green or reddish, glabrous, one-chambered (Fig. 171). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiçu.

No previous records on *Plumbago zeylanica*.

No previous records on *Plumbago* L.

No previous records on Plumbaginaceae.

Poaceae

Poaceae not determined

Leaf gall, globose, brown, hairy, one-chambered (Fig. 172). Galler: not determined. Locality: EBSL Indaiçu.

Bud gall, globose, brown, glabrous, one-chambered (Fig. 173). Galler: not determined. Locality: RBAR.

Previous records on Poaceae: Rübсаamen, 1907 (stem gall on *Bambusa* sp., from Juruá, AM); Tavares, 1916 (stem gall on *Paspalum conjugatum* P. J. Bergius from Salvador, BA, and Nova Friburgo, RJ); Soderstrom & Calderón, 1971 (adults on flowers of *Pariana stenolemma* Tutin from Pará); Cermeño *et al.*, 1985 (aborted seed on *Sorghum* spp. from Brazil); and Maia *et al.*, 2008 (one leaf gall on *Paspalum maritimum* Trin. from Bertioğa, SP).

Polygonaceae

Symmeria sp.

Leaf gall, globose, yellowish, glabrous, one-chambered (Fig. 174).

Galler: not determined. Locality: EBSL Indaiaçu.

Previous records on *Symmeria*: Rübsaamen, 1908 (two leaf galls on *Symmeria* sp. from Juruá, AM).

Previous records on Polygonaceae: Rübsaamen, 1908 (leaf gall on *Triplaris schomburgkiana* Benth. from Juruá, AM); Maia *et al.*, 2008 (one stem gall on *Coccoloba mosenii* Lind., one leaf gall on *Coccoloba warmingii* Meisn. from Bertioaga, SP); and Carneiro *et al.*, 2009a (one leaf and two stem galls on *Coccoloba acrostichoides* Cham. from Serra do Espinhaço, MG).

Rubiaceae

Chiococca alba (L.) Hitchc.

Leaf gall, cylindrical, green, glabrous, one-chambered. Galler: not determined. Locality: EBSL Indaiaçu.

Previous records on *Chiococca alba*.

Previous records on *Chiococca*. P. Browne.

Malanea macrophylla fo. *bahiensis* (Müll. Arg.) Steyerem.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 175). Galler: not determined. Locality: EBSL Indaiaçu.

Vein swelling, globose, green, glabrous, one-chambered (Fig. 176). Galler: not determined. Locality: EBSL Indaiaçu.

Petiole swelling, globose, green, glabrous, one-chambered (Fig. 177). Galler: not determined. Locality: EBSL Indaiaçu.

No previous records on *M. macrophylla* fo. *bahiensis*.

No previous records on *Malanea* Aubl.

Palicourea guianensis Aubl.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 178).

Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçu.

Previous records of other gall morphotypes on *P. guianensis*: Almada & Fernandes, 2011 (one leaf gall from Porto de Trombetas, PA).

Other records on *Palicourea*: Fernandes *et al.*, 1997 (one gall on *P. rigida* H.B.K. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one leaf gall on *P. rigida*, and two leaf galls on *Palicourea* sp. from Vale do Rio Doce, MG); Maia & Fernandes, 2004 (one leaf gall on *P. rigida* from Serra de São José, MG); and Carneiro *et al.*, 2009a (two leaf galls on *P. rigida* Kunth from Serra do Espinhaço, MG); Maia, 2012 (one stem and two leaf galls on *Palicourea* cf.

corymbifera (Müll. Arg.) Standl. from Porto de Trombetas, PA).

Posoqueria sp.

Bud gall, fusiform, green, glabrous, one-chambered (Fig. 179). Galler: not determined. Locality: PNMSL.

No previous records on *Posoqueria* Aubl.

Psychotria carthagenensis Jacq.

Leaf gall, globose, biconvex, green, glabrous, one-chambered (Fig. 180). Galler: Cecidomyiidae (Diptera). Locality: RBAR.

Previous records on *P.carthagenensis*: Julião *et al.*, 2002 (one leaf gall from Pantanal sul-matogrossense, MS); Maia *et al.*, 2008 (one bud gall from Bertioga, SP); Santos *et al.*, 2011a (one leaf gall from Pernambuco); and Saito & Urso-Guimarães, 2012 (one leaf gall from Luiz Antônio, MG).

Psychotria vellosiana Benth.

Young leaf roll, reddish, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and Túmulo.

Midvein swelling, fusiform, woody, green or brown, glabrous, one-chambered (Fig. 181). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu, Túmulo, Tapinoã and RBAR.

Leaf gall, globose, red or yellowish, glabrous, one-chambered (Fig. 182). Galler: not determined. Locality: EBSL Indaiaçu, Túmulo, PNMSL and RBAR.

Previous records of the same gall: Carneiro *et al.*, 2009a (from Serra do Espinhaço, MG).

Leaf gall, globose, red or yellowish, hairy, one-chambered (Fig. 183). Galler: not determined. Locality: EBSL Indaiaçu, Túmulo, PNMSL and RBAR.

Bud gall, conical, brown, glabrous, one-chambered (Fig. 184). Galler: Cecidomyiidae (Diptera). Locality: RBAR.

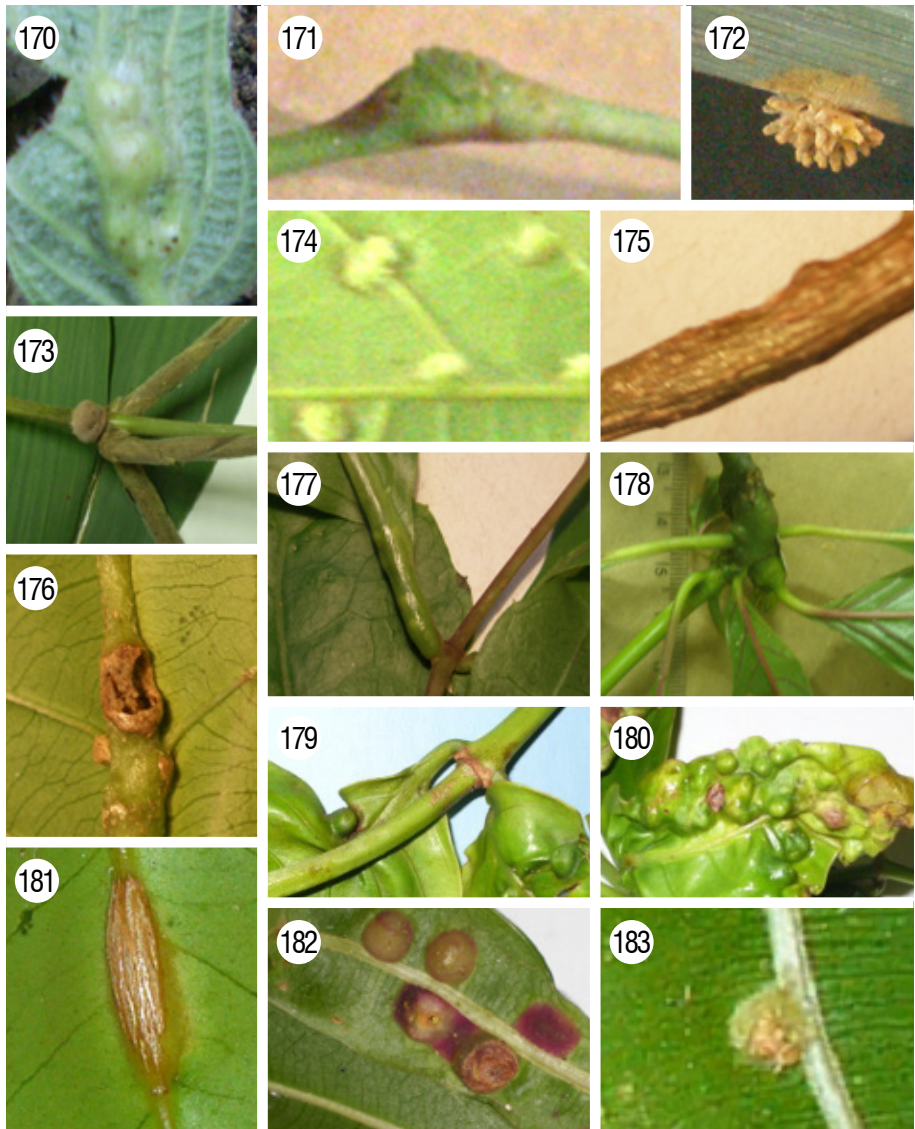
Petiole swelling, fusiform, yellow, glabrous, one-chambered. Galler: not determined. Localities: EBSL Indaiaçu and RBAR.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 185). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and Tapinoã.

Previous records on *P. vellosiana*: Carneiro *et al.*, 2009a (one leaf gall from Serra do Espinhaço, MG).

Psychotria sp.

Leaf gall, cylindrical, green, glabrous, one-chambered (Fig. 186). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu and PNMSL.



Figs. 170-183. Insect galls of Santa Teresa (ES, Brazil): 170. Piperaceae not determined sp.1, midvein swelling; 171. *Plumbago zeylanica*, stem swelling; 172. Poaceae not determined, leaf gall; 173. Poaceae not determined, bud gall; 174. *Symmeria* sp., leaf gall; 175. *Malanea macrophylla* f. *bahiensis*, stem swelling; 176. *Malanea macrophylla* f. *bahiensis*, vein swelling; 177. *Malanea macrophylla* f. *bahiensis*, petiole swelling; 178. *Palicourea guianensis*, stem swelling; 179. *Posoqueria* sp., bud gall; 180. *Psychotria carthagenensis*, leaf gall; 181. *Psychotria vellosiana*, midvein swelling; 182. *Psychotria vellosiana*, leaf gall; 183. *Psychotria vellosiana*, leaf gall.

Psychotria cfr.

Leaf gall, ovoid, green, glabrous, one-chambered (Fig. 187). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu.

Previous records on *Psychotria*: Tavares, 1922 (one leaf, one stem and one flower gall on *Psychotria* sp. from Nova Friburgo, RJ); Fernandes *et al.*, 1997 (two galls on *P. pubigera* Schltld. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one leaf gall on *P. cephalantha* (Muell. Arg.) Standl., one leaf gall on *P. harstisepala* Muell. Arg., two leaf galls on *P. stachyoides* Benth., two leaf galls, one on *P. tetraphylla* Muell. Arg., and other on *P. triphylla* Muell. Arg.; and one leaf gall on *Psychotria* sp. from Vale do Rio Doce, MG); Maia *et al.*, 2008 (one leaf gall on *P. hoffmannseggiana* (Willd. & Hoffg. Ex Roem. & Schult.) Müll. Arg., and one leaf gall on *P. leiocarpa* Cham. & Schltld. from Bertiooga, SP); Santos *et al.*, 2011a (one leaf gall on *P. barbiflora* DC., and one leaf gall on *P. sessilis* Vell. from Pernambuco); and Saito & Urso-Guimarães, 2012 (one leaf and one stem gall on *Psychotria* cf. *suterella* Müll. Arg., and leaf gall on *Psychotria* cf. *trichophora* Müll. Arg. from Luiz Antônio, SP).

Rolandra sp.

Stem swelling, fusiform, green, with short trichomes, one-chambered (Fig. 188). Galler: *Neolasioptera* sp. (Diptera, Cecidomyiidae). Localities: EBSL Indaiaçu, Túmulo, Tapinoã, RBAR and PNMSL.

Vein swelling, fusiform, yellowish, glabrous, one-chambered (Fig. 189). Galler: not determined. Locality: EBSL Indaiaçu.
No previous records on *Rolandra* Rottb.

Rubus sp.

Bud gall, globose, brown, glabrous, one-chambered (Fig. 190). Galler: not determined. Locality: PNMSL.

Previous records on *Rubus* L.: Tavares, 1918 (on leaf gall on *Rubus* sp. from Serra da Caraça, MG).

Sipanea sp.

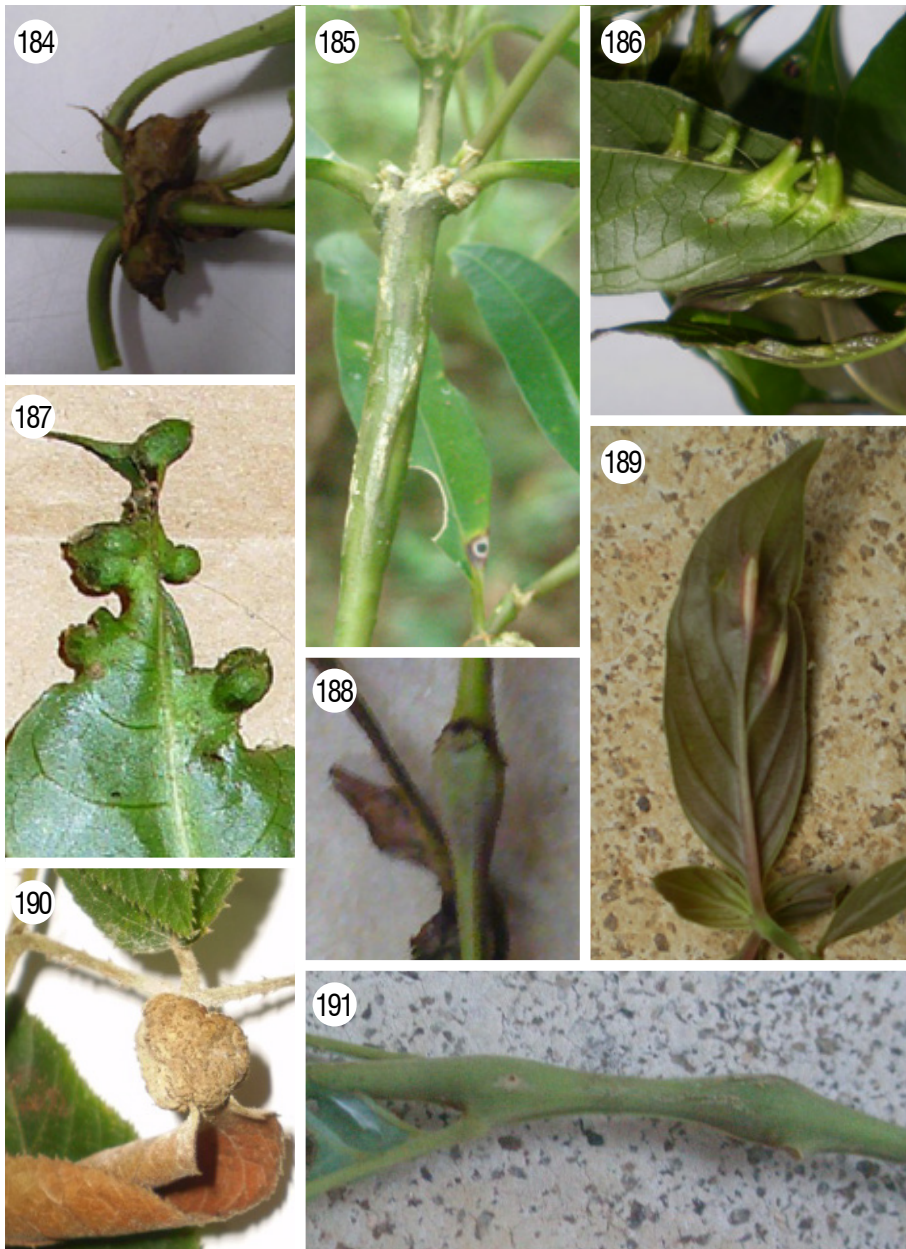
Leaf gall, globose, green or brown, glabrous, one-chambered). Galler: not determined. Localities: EBSL Indaiaçu and PNMSL.

Previous records on *Sipanea* Aubl.

Rutaceae

Dictyoloma vandellianum A. H. L. Juss.

Stem swelling, fusiform, green, glabrous, one-chambered (Fig. 191). Galler: Cecidomyiidae (Diptera). Locality: EBSL Tapinoã.



Figs. 184-191. Insect galls of Santa Teresa (ES, Brazil): 184. *Psychotria vellosiana*, bud gall; 185. *Psychotria vellosiana*, stem swelling; 186. *Psychotria* sp., leaf gall; 187. *Psychotria* cfr., leaf gall; 188. *Rolandra* sp., stem swelling; 189. *Rolandra* sp., vein swelling; 190. *Rubus* sp., bud gall; 191. *Dictyoloma vandellianum*, stem swelling.

No previous records on *D. vandellianum*.

No previous records on *Dictyoloma* A. Juss.

No previous records on Rutaceae.

Salicaceae

Homalium sp.

Bud gall, globose, green, glabrous, one-chambered (Fig. 192). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçú.

No previous records on *Homalium* Jacq.

Sapindaceae

Matayba cf. sp.

Young leaf roll, yellowish, glabrous, one-chambered. Galler: *Clinodiplosis* sp. (Diptera, Cecidomyiidae). Locality: EBSL Tapinoã.

Leaf gall, conical, yellowish, micropubescent, one-chambered (Fig. 193). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiaçú.

Previous records of the same gall morphotype: Maia *et al.*, 2008 (on *Matayba guianensis* Aubl. from Bertioga, SP).

Leaf gall, globose, yellow, glabrous, one-chambered (Fig. 194). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Previous records of the same gall morphotype: Maia *et al.*, 2008 (on *Matayba guianensis* Aubl. from Bertioga, SP).

Tendrill swelling, fusiform, brown, glabrous, one-chambered. Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçú and Tapinoã.

Previous records records on *Matayba*: Fernandes *et al.*, 2001 (two stem galls on *M. guianensis* Aubl. from Vale do Rio Doce, MG); Carneiro *et al.*, 2009a (one stem gall on *M. marginata* Radlk. from Serra do Espinhaço, MG); and Almada & Fernandes, 2011 (one leaf gall on *M. inelegans* Radlk. from Porto de Trombetas, PA).

Serjania sp.

Leaf gall, circular, green, glabrous, one-chambered (Fig. 195). Galler: not determined. Locality: EBSL Tapinoã.

Stem swelling, globose, brown, glabrous, one-chambered (Fig. 196). Galler: not determined. Localities: EBSL Tapinoã and Indaiaçú.

Previous records on *Serjania*: Rübsaamen, 1908 (one leaf gall on *Serjania communis* Camb. from Rio de Janeiro, RJ, and one flower gall on *S. leptocarpa* Radlk. from Juruá, AM); Fernandes *et al.*, 1997 (four galls on *S. cornata* Radlk. and one on *S. erecta* Radlk. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one stem and three leaf galls on *S. caracasana* Wild., two leaf galls on

S. lethalis St. Hil., and two leaf galls on *Serjania* sp. from Vale do Rio Doce, MG); Julião *et al.*, 2002 (three galls on *S. caracasana* (Jacq.) Willd., two on leaf and one on stem, two leaf galls on *S. erecta*, and two leaf galls on *Serjania* sp. from Pantanal- sulmatogrossense, MS); Maia *et al.*, 2008 (onr bud gall on *S. communis* Cambess. from Bertioga, SP); Coelho *et al.*, 2009 (two leaf galls on *Serjania* sp.1, one stem and two leaf galls on *Serjania* sp.2, and one leaf gall on *Serjania* sp.3 from Serra do Cipó, MG); Santos *et al.*, 2010 (one stem and two leaf galls on *S. obtusidentata* Radlk. from Goiania, GO); Santos *et al.*, 2011b (one leaf gall on *S. glabrata* Kunth. from Pernambuco); Almada & Fernandes, 2011 (one leaf gall on *Serjania* sp. from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (one leaf and one stem gall on *Serjania* cf. *erecta* from Luiz Antônio, SP).

Sapindaceae not determined sp.1

Petiole gall, globose, brown, glabrous, one-chambered (Fig. 197).

Galler: Cecidomyiidae (Diptera). Locality: EBSL Túmulo.

Stem swelling fusiform, unilateral, brown, glabrous, one-chambered (Fig. 198). Galler: Cecidomyiidae (Diptera). Locality: EBSL Túmulo.

Leaf gall, conical, green, glabrous, one-chambered (Fig. 199). Galler: Cecidomyiidae (Diptera). Locality: EBSL Túmulo.

Leaf gall, claviform, yellow, hairy, one-chambered (Fig. 200). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Sapindaceae not determined sp.2

Leaf gall, globose, brown, glabrous, one-chambered (Fig. 201). Galler: Cecidomyiidae (Diptera). Locality: EBSL Túmulo.

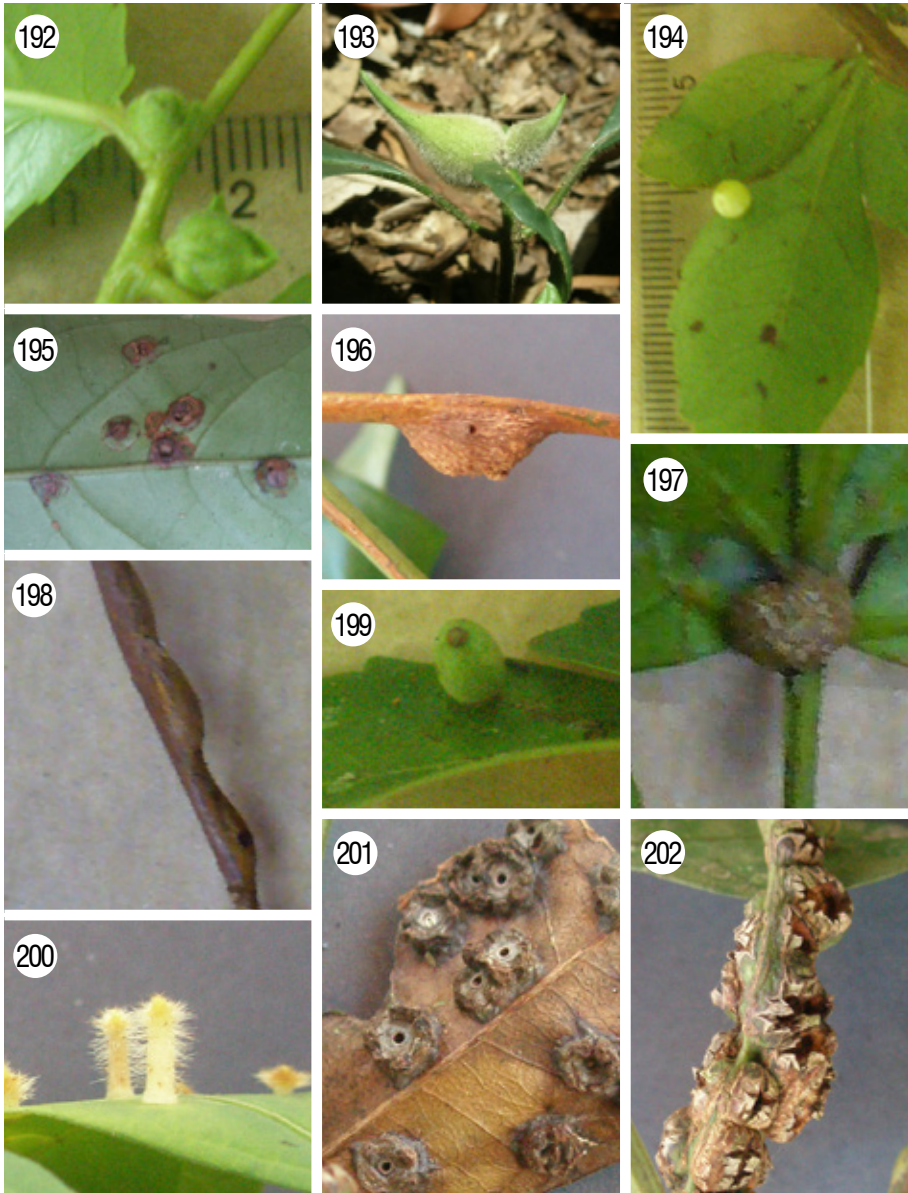
Stem gall, globose, brown, glabrous, one-chambered (Fig. 202). Galler: not determined. Locality: EBSL Túmulo.

Sapindaceae not determined sp.3

Midvein swelling, linear, green, glabrous, one-chambered (Fig. 203). Galler: *Neolasioptera* sp (Diptera, Cecidomyiidae). Other dwellers: Muscomorpha (larva) – inquiline. Localities: EBSL Túmulo, Tapinoã and PNSML.

Fold leaf, green, glabrous, one-chambered (Fig. 204). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Stem swelling, fusiform, brown, glabrous, one-chambered (Fig. 205). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.



Figs. 192-202. Insect galls of Santa Teresa (ES, Brazil): 192. *Homalium* sp., bud gall; 193. *Matayba* cf. sp., leaf gall; 194. *Matayba* cf. sp., leaf gall; 195. *Serjania* sp., leaf gall; 196. *Serjania* sp., stem swelling; 197. Sapindaceae not determined sp.1, petiole gall; 198. Sapindaceae not determined sp.1, stem swelling; 199. Sapindaceae not determined sp.1, leaf gall; 200. Sapindaceae not determined sp.1, leaf gall; 201. Sapindaceae not determined sp.2, leaf gall; 202. Sapindaceae not determined sp.2, stem gall.

Sapotaceae

Pouteria sp.

Leaf gall, globose, red, hairy, one-chambered (Fig. 206). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo and Tapinoã.

Midvein swelling, fusiform, green, glabrous, one-chambered (Fig. 207). Galler: Cecidomyiidae (Diptera). Localities: EBSL Túmulo and PNMSL.

Previous records on *Pouteria*: Rübsaamen, 1916 (leaf gall on *P. laurifolia* (Gomes) Radlk and *Pouteria* sp. from Rio de Janeiro State); Fernandes *et al.*, 1997 (one gall on *Pouteria* sp. from Vale do Jequitinhonha, MG); Fernandes *et al.*, 2001 (one leaf gall on *Pouteria* sp. from Vale do Rio Doce, MG); Maia, 2001 (one leaf gall on *P. caimito* (R. & P.) Radlk. var. *laurifolia* (Gomes) Baehni, and one leaf gall on *P. venosa* (Mart.) Baehni from Maricá, RJ); Julião *et al.*, 2002 (one leaf gall on *P. gardneri* (Mart. & Miq.) Baehni from Pantanal sulmatogrossense, MS); Oliveira & Maia, 2005 (two leaf galls, one on *P. caimito* and other on *P. psammophyla* (Mart.) Radlk. from Grumari, RJ); Fernandes & Negreiros, 2006 (one leaf gall on *Pouteria* sp. from Aimorés, MG); Urso-Guimarães & Scareli-Santos, 2006 (one leaf gall on *P. torta* (Mart.) Radlk. from Delfinópolis, MG); Maia *et al.*, 2008a (one leaf gall on *P. venosa* (Mart.) Baehni from Bertiooga, SP); Maia, 2011 (one leaf gall on *P. virescens* Baehni, and three leaf galls on *Pouteria* sp. from Porto de Trombetas, PA); Almada & Fernandes, 2011 (seven leaf galls, one on *Pouteria* aff. *ambelaniifolia* (Sandwith) T.D. Penn., one on *P. caimito* (Ruiz & Pav.) Radlk., one on *P. campanulata* Baehni, one on *P. macrophylla* (Lam.) Eyma, one on *Pouteria* sp., and two on *P. prancei* Pires from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (one leaf and one stem gall on *P. torta* (Mart.) Radlk from Luiz Antônio, SP).

Sapotaceae not determined sp.1

Marginal leaf roll, green, glabrous, one-chambered (Fig. 208). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu, Túmulo and Tapinoã.

Sapotaceae not determined sp.2

Bud gall, globose, brownish, glabrous, one-chambered (Fig. 209). Galler: Cecidomyiidae (Diptera). Localities: EBSL Indaiaçu.

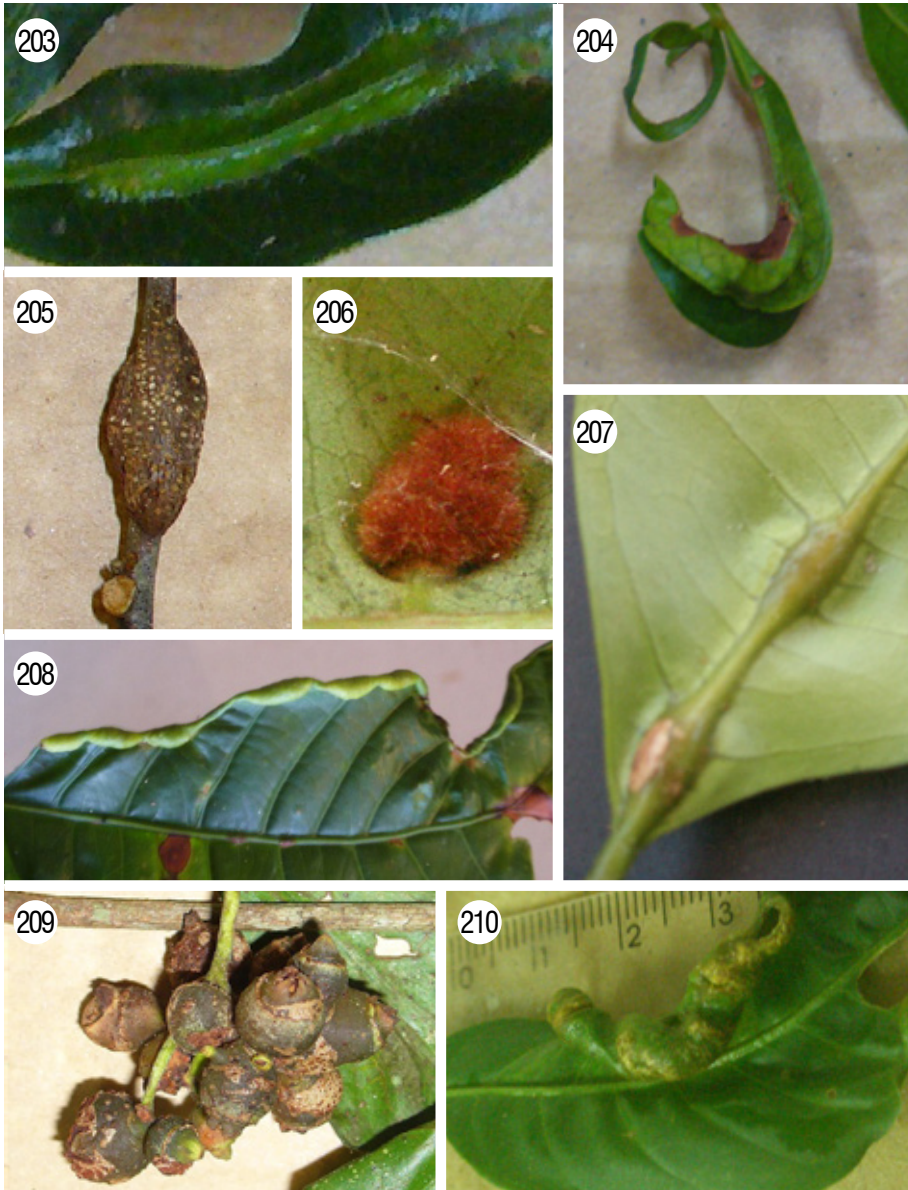
Simaroubaceae

Picrolemma sprucei Hook. f.

Marginal leaf roll, green, glabrous, one-chambered (Fig. 210). Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

No previous records on *Picrolemma sprucei*.

No previous records on *Picrolemma* Hook. f.



Figs. 203-210. Insect galls of Santa Teresa (ES, Brazil): 203. Sapindaceae not determined sp.3, midvein swelling; 204. Sapindaceae not determined sp.3; fold leaf gall; 205. Sapindaceae not determined sp.3, stem swelling; 206. *Pouteria* sp., leaf gall; 207. *Pouteria* sp., midvein swelling; 208. Sapotaceae not determined sp.1, marginal leaf roll; 209. Sapotaceae not determined sp.2, bud gall; 210. *Picrolemma spruce*, marginal leaf roll.

Previous records on Simaroubaceae: Almada & Fernandes, 2011 (one leaf gall on *Simarouba amara* Aubl. from Porto de Trombetas, PA).

Siparunaceae

Siparuna sp.

Midvein swelling, fusiform, green, glabrous, one-chambered (Fig. 211).
Galler: not determined. Locality: EBSL Tapinoã.

Previous records on *Siparuna*: Fernandes *et al.*, 2001 (one leaf gall on *S. arianeae* V. Pereira from Vale do Rio Doce, MG); Santos *et al.*, 2010 (one leaf gall on *S. guianensis* Aubl. from Goiania, GO); Maia, 2011 (one leaf gall on *Siparuna* sp. from Porto de Trombetas, PA); Almada & Fernandes, 2011 (four leaf galls, one on *S. amazonica* Mart. ex A. DC., one on *S. decipiens* (Tul.) A. DC., one on *S. guianensis* Aubl., and one on *Siparuna* sp.; two leaf galls on *Siparuna bifida* (Poepp. & Endl.) A. DC., and two stem galls, one on *S. cristata* (Poepp. & Endl.) A. DC., and other on *Siparuna* sp.2 from Porto de Trombetas, PA); and Saito & Urso-Guimarães, 2012 (one stem and two leaf galls on *S. guianensis* Aubl. from Luiz Antônio, SP).

Smilacaceae

Smilax sp.

Midvein swelling, globose, green, glabrous, one-chambered (Fig. 212).
Galler: Cecidomyiidae (Diptera). Locality: PNMSL.

Previous records on *Smilax*: Tavares, 1909 (one stem gall and one leaf gall on *Smilax* sp. from São Leopoldo, RS); Maia, 2001 (two leaf galls on *S. rufescens* Griseb from Maricá, and Carapebus, RJ); Julião *et al.*, 2002 (two leaf galls, one on *S. fluminensis* Steud. and other on *S. pilcomayensis* Guagl. & Gattuso from Pantanal sul-matogrossense, MS); Urso-Guimarães *et al.*, 2003 (one leaf gall on *S. coriifolia* A. DC. from Delfinópolis, MG); Maia & Fernandes, 2004 (one leaf gall on *S. elastica* Griseb from Serra de São José, MG); Oliveira & Maia, 2005 (two leaf galls on *S. rufescens* Griseb from Grumari, RJ); Maia, 2006 (one leaf gall on *S. rufescens* from Maricá and Carapebus, RJ); Urso-Guimarães & Scareli-Santos, 2006 (one leaf gall on *S. coriifolia* from Santa Rita do Passa Quatro, SP); Maia *et al.*, 2008 (three leaf galls on *S. quinquenervia* Vell. from Bertiooga, SP); Carneiro *et al.*, 2009a (one leaf gall on *S. brasiliensis* Spreng. from Serra do Espinhaço, MG); Coelho *et al.*, 2009 (one leaf gall on *Smilax* sp.1., one leaf gall on *Smilax* sp.2, and one stem gall on *Smilax* sp.3 from Serra do Cipó, MG); Bregonci *et al.*, 2010 (two leaf galls on *S. rufescens* from Guarapari, ES); Maia & Oliveira, 2010 (one leaf gall on *Smilax* sp. from Ilha Grande, RJ); Santos *et al.*, 2011a (one leaf gall on *Smilax* cf. *officinalis* Kunth from Pernambuco); Almada & Fernandes, 2011 (one leaf gall on *S.*

schomburgkiana Kunth from Porto de Trombetas, PA); and Malves & Frieiro-Costa, 2012 (one leaf gall on *Smilax* sp. from Ingaí, MG).

Solanaceae

Cestrum sp.

Leaf gall, globose, brownish, glabrous, one-chambered (Fig. 213). Galler: not determined. Locality: PNMSL.

Previous records on *Cestrum*: Tavares, 1909 (one bud swelling on *Cestrum* sp. from São Leopoldo, RS); Tavares, 1918 (one stem swelling on *Cestrum* sp. from Nova Friburgo, RJ); and Tavares, 1925 (one bud and one leaf gall on *Cestrum* sp. from Nova Friburgo, RJ); Maia *et al.*, 2008 (one leaf and one stem gall on *C. laevigatum* Schltld. from Bertioaga, SP).

Solanum swartzianum Roem. & Schult.

Leaf gall, globose, green, hairy, one-chambered. (Fig. 214). Galler: not determined. Locality: EBSL Indaiáçu.

No previous records on *S. swartzianum*.

Solanum sp.

Midvein swelling, fusiform, brown, glabrous, one-chambered (Fig. 215). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiáçu and Túmulo. Previous records on *Solanum*: Rübsaamen, 1908 (one leaf gall on *S. argenteum* Dunal from Rio de Janeiro, RJ, and one leaf gall on *Solanum* sp. from Juruá, AM); Tavares, 1918 (one stem or leaf gall on *Solanum* sp. from Salvador, BA); Fernandes *et al.*, 2001 (one leaf and one stem gall on *S. cernuum* L. from Vale do Rio Doce, MG); Maia, 2001 (one leaf gall on *S. affine* Sendth from Maricá, RJ; and one leaf gall on *S. inaequale* Vell. from Carapebus, RJ); Oliveira & Maia, 2005 (one leaf gall on *S. curvispinum* Dun. from Grumari, Rio de Janeiro, RJ); Fernandes & Negreiros, 2006 (one stem gall on *Solanum* sp. from Aimorés, MG); Maia *et al.*, 2008 (one stem gall on *Solanum* cf. *pseudoquina* A. St.-Hil. from Bertioaga, SP); Santos *et al.*, 2011b (one leaf gall on *Solanum* cf. *paludosum* Moric. from Pernambuco); Almada & Fernandes, 2011 (one leaf gall on *Solanum* sp. from Porto de Trombetas, PA); and Malves & Frieiro-Costa, 2012 (stem gall on *S. lycocarpum* St.-Hil. from Ingaí, MG).

Symplocaceae

Symplocos sp.

Leaf gall, globose, glabrous, succulent, brownish, glabrous, one-chambered (Fig. 216). Galler: not determined. Locality: RBAR.

Previous records on *Symplocos*: Tavares, 1922 (leaf gall on *Symplocos* sp. from Nova Friburgo, RJ).

Urticaceae

Pourouma velutina Mart. ex Miq.

Leaf gall, globose, woody, brown, glabrous, one-chambered. Galler: not determined. Locality: EBSL Túmulo and Tapinoã.

No previous records of other gall morphotypes on *P. velutina*.

Previous records on *Pourouma*: Maia, 2011 (three gall morphotypes on *P. guianensis* Aubl. from Porto de Trombetas, PA).

Verbenaceae

Lantana cfr. *lilacina* Desf.

Leaf gall, globose, yellowish or green, micropubescent (Fig. 217). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiáçu.

Leaf gall, cylindrical, green, glabrous, one-chambered (Fig. 218). Galler: Cecidomyiidae (Diptera). Locality: EBSL Indaiáçu.

Previous records on *Lantana lilacina*: Maia & Fernandes, 2004 (one stem and one leaf gall from Serra de São José, MG); and Carneiro *et al.*, 2009a (two stem galls and one bud gall from Serra do Espinhaço, MG).

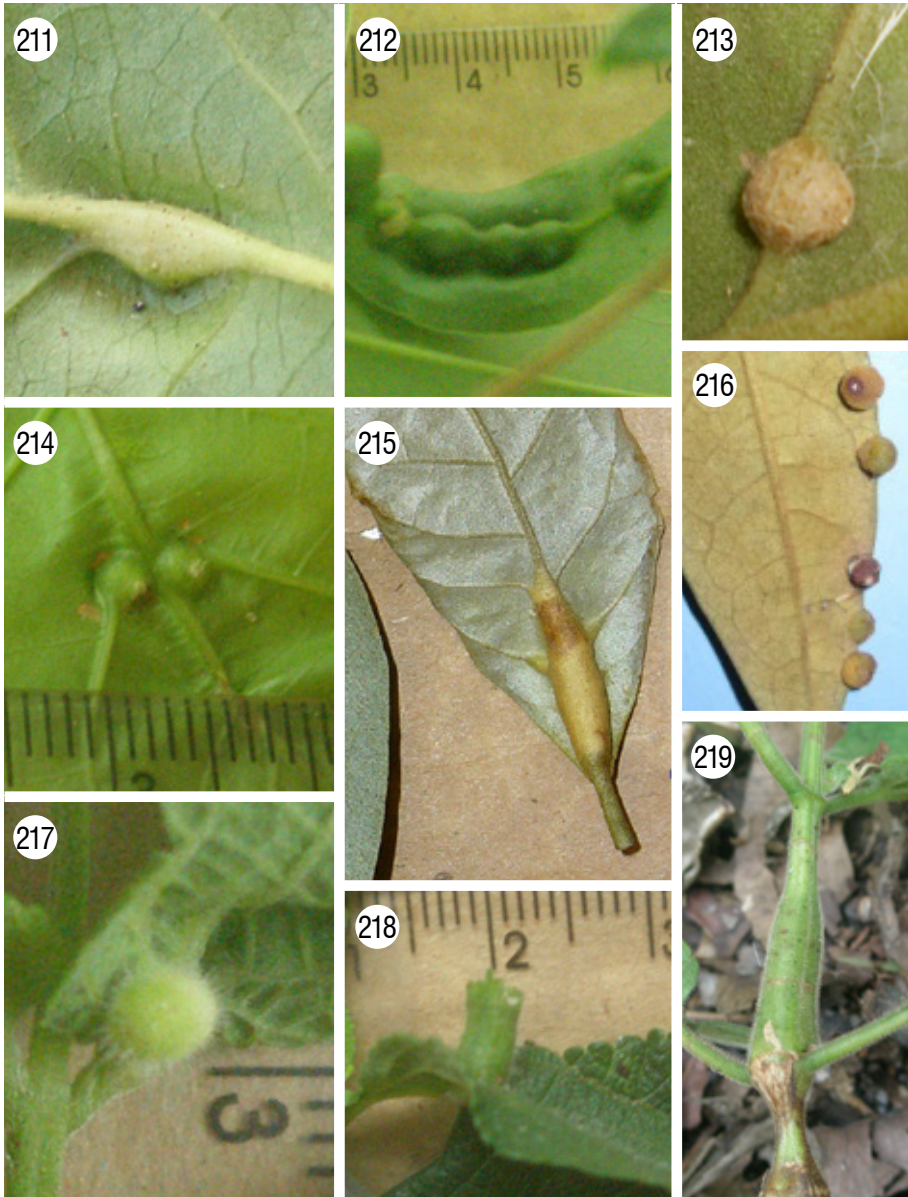
Lantana sp.

Stem swelling, fusiform, green, micropubescent, one-chambered (Fig. 219). Galler: Lepidoptera. Locality: EBSL Indaiáçu.

Previous records on *Lantana*: Rübсаamen, 1907 (one leaf gall on *Lantana* sp. from Cabo Frio and Palmeira, RJ, and Tubarão, SC); Tavares, 1909 (one leaf gall on *L. camara* L., *L. hispida* Kunth, *L. urticifolia* Mill., and *Lantana* spp. from Cabo Frio, RJ, and São Leopoldo, RS); Tavares, 1918 (one capitulum gall on *Lantana* sp. from Salvador, BA); Fernandes *et al.*, 1997 (one gall on *Lantana* sp. from Vale do Jequitinhonha, MG); Maia, 2001 (one leaf gall on *L. camara* from Maricá, RJ); Fernandes & Negreiros, 2006 (one leaf and one stem gall on *L. camara* from Aimorés, MG); Maia *et al.*, 2008 (one leaf gall on *L. undulata* Schrank from Bertioiga, SP); Coelho *et al.*, 2009 (one leaf gall on *L. fucata* Lindl. from Serra do Cipó, MG); Santos *et al.*, 2011b (one leaf and one stem gall on *L. camara* from Pernambuco).

Discussion

Two hundred and sixty five morphotypes of insect galls were found in Santa Teresa (ES). Previous studies on insect galls in Brazilian biomes have reported richness values ranging from 34 to 1038 (Table 6). The gall richness of Santa Teresa is one of the highest, behind only the Amazonian Forest.



Figs. 211-219. Insect galls of Santa Teresa (ES, Brazil): 211. *Siparuna* sp., midvein swelling; 212. *Smilax* sp. midvein swelling; 213. *Cestrum* sp., leaf gall; 214. *Solanum swartzianum*, leaf gall;; 215. *Solanum* sp., midvein swelling; 216. *Symplocos* sp., leaf gall; 217. *Lantana* cfr. *lilacina*, leaf gall; 218. *Lantana* cfr. *lilacina* leaf gall; 219. *Lantana* sp., stem swelling.

Table 6. Richness of insect galls in different Brazilian localities.

Locality	Biome	Number of gall morphotypes	Average number of gall per host plant species	Reference
Central Amazonian	Amazonian Forest	1038	2.1	Julião, 2007
Santa Teresa (ES)	Atlantic Forest	265	1.9	present study
Cadeia do Espinhaço (MG)	cerrado	241	1.7	Carneiro <i>et al.</i> , 2009a
Bertioga (SP)	Restinga (Atlantic Forest)	233	1.9	Maia <i>et al.</i> , 2008
Serra de São José (MG)	Rupestrian fields	137	1.9	Maia & Fernandes, 2004
Pantanal sul-Matogrossense (MS)	Pantanal	133	1.7	Julião <i>et al.</i> , 2002
Maricá (RJ)	Restinga (Atlantic Forest)	101	2.1	Maia, 2001
Serra do Cipó (MG)	cerrado	90	1.8	Coelho <i>et al.</i> , 2009
Trombetas (PA)	Amazonian Forest	76	1.9	Maia, 2011
Luis Antonio	cerrado	69	1.7	Saito & Urso-Guimarães, 2012
Pernambuco	caatinga	64	1.3	Santos <i>et al.</i> , 2011b
Ingai (MG)	cerrado	57	1.3	Malves & Frieiro-Costa, 2012
Grumari (RJ)	Restinga (Atlantic Forest)	43	1.7	Oliveira & Maia, 2005
Arraial do Cabo (RJ)	Restinga (Atlantic Forest)	41	1.5	Monteiro <i>et al.</i> , 1994
Parque Estadual Paulo César Vinha (ES)	Restinga (Atlantic Forest)	38	1.8	Bregonci <i>et al.</i> , 2010
Ilha Grande (RJ)	Restinga (Atlantic Forest)	36	1.6	Maia & Oliveira, 2010
Santa Rita do Passa Quatro (SP)	Cerrado	35	1.5	Urso-Guimarães & Scareli-Santos, 2006
Goiania (GO)	Seasonal Semideciduos Forest	34	1.7	Santos <i>et al.</i> , 2010
Delfinópolis	cerrado	22	1.1	Urso-Guimarães <i>et al.</i> , 2003
Pirenópolis (GO)	cerrado	21	1.0	Araujo <i>et al.</i> , 2007

However, several of the previous studies employed different methods of survey and consequently had different collecting efforts. Comparing to data for several areas of Atlantic Forest, Santa Teresa showed the greatest richness of galls.

The average number of gall morphotypes per host plant species was about 1.9. Similar values were found in other investigated areas, such as Bertioğa, SP (restinga), Porto de Trombetas, PA (Amazonian Forest) and Serra de São José, MG (rupestrian fields). In Brazilian inventories, the average ranges from 1.0 to 2.1. The highest value was found in Amazonian Central. These results can be explained by the fact of the many plant species support only one or two gall morphotypes, while few species are superhosts (Veldtman & McGeoch, 2003).

Asteraceae, Fabaceae, Myrtaceae, Melastomataceae, and Rubiaceae were the plant families with the greatest richness of galls. *Mikania* Willd. (Asteraceae), *Myrcia* DC. ex. Guill. (Myrtaceae), and *Inga* Mill. (Fabaceae) were the super host genera, while *Guapira opposita* (Vell.) Reitz. (Nyctaginaceae) was the super host species. These botanical taxa (excepting by Rubiaceae), have been pointed in other Brazilian inventories as the richest ones in number of gall morphotypes, corroborating the previous knowledge. These results also indicate that the greatest richness of galls is showed by the most speciose plant families as proposed by the plant richness hypothesis (Southwood, 1960).

Few records of galls on ferns are known throughout the world. In Brazil, only ten morphotypes were recorded on nine plant species, six genera and four families (Blechnaceae, Cyatheaceae, Hymenophyllaceae, and Polypodiaceae). They are induced by Eriophyidae, Lepidoptera, Thysanoptera, and Hemiptera (each responsible for one gall morphotype), and Diptera (responsible for the other galls) (Maia & Santos, 2011). This is the 11th record of gall on ferns in Brazil.

Globose and fusiform galls predominated. Similar results were recorded in Serra do Espinhaço, MG (cerrado, Carneiro *et al.* 2009a), Pernambuco (caatinga, Santos *et al.* 2011b), Espírito Santo (restinga, Bregonci *et al.* 2010), and Goiás (cerrado, Araújo *et al.* 2007), suggesting that this is the most common gall shapes in Brazil.

Concerning the color, green/grennish and brown/brownish galls were the most frequent. Bregonci *et al.*, 2010 recorded similar results. Other Brazilian inventories do not discuss color patterns. This predominance reflects the color of the two most galled plant organs: leaf and stem.

The majority of the galls was glabrous and one-chambered as in all other Brazilian galls inventories, excepting by Delfinópolis, where the number of hairy galls is slightly higher than glabrous (Urso-Guimarães *et al.*, 2003).

Leaves were the most galled plant organ, followed by stems and buds.

The highest diversity of leaf galls is observed in all Brazilian biomas, as well as in the world (Mani, 1964), probably because leaves represent an abundant and frequently renewable resource (Maia, 2001), with undifferentiated meristematic cells which are essential to gall growth. The great majority of the galls occurred on a single plant organ, corroborating the plant organ specificity.

Cecidomyiidae (Diptera) were the most frequent gallers. They are one of the most speciose families of Diptera, as well as the most important inducers in all zoogeographic regions (Gagné, 2010). Lepidoptera, Hemiptera and Thysanoptera were scarcely represented as in other Brazilian inventories.

In our study, all inducers were associated with a single plant species. According to Raman *et al.*, 2005, the majority of gall-inducing arthropods display high level of fidelity to particular host-plant species and specific organs of their host species. Concerning Brazilian fauna of Cecidomyiidae, 92.4% of the galling species are monophagous, only 5.6% are oligophagous, inducing galls on more than one congeneric host plant species, and only 2.0% are polyphagy (Carneiro *et al.*, 2009b). Our result confirm the host plant specificity.

Few inquilines were obtained. They are represented by Muscomorpha and three genera of gall midges (Cecidomyiidae), already recorded as inquilines.

Conclusion

Santa Teresa (ES) is the richest investigated Atlantic Forest area in number of insect galls. The plant families and genera with the greatest richness of galls are also the most speciose. Gall morphology, the most galled plant organs, the most frequent gallers and the inquiline taxa corroborate the known patterns.

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