

New records of thirteen Asteraceae from state of Bahia, Brazil

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Abstract: The Serra Geral of Licínio de Almeida (SGLA) is a chain of mountains included within Caatinga biome in the municipality of Licínio de Almeida, state of Bahia, located in the central portion of Espinhaço Mountain Range. From a previous floristic treatment undertaken in the SGLA, 13 new records were found for the state of Bahia, with four genera and six species from Vernoniaeae, three genera and five species from Heliantheae and two genera and two species from Eupatorieae.

Key words: Compositae, Espinhaço Range, Serra Geral, Licínio de Almeida, inventory

Espinhaço Mountain Range is a chain of mountains located at 10°00'–20°35' S and 040°10'–044°30' W, from Ouro Preto municipality, state of Minas Gerais, to Jacobina municipality, state of Bahia, where is referred to as Chapada Diamantina. It is composed mostly of Pre-Cambrian sandstone and metamorphic rocks, from which derive highly poor and acid soils (Harley 1995). These mountains have a latitudinal extension of about 1,100 km (Giulietti *et al.* 1997) and a longitudinal extension of 50–100 km. The altitude ranging from 700–2,000 m (Harley 1995).

Serra Geral of Licínio de Almeida (SGLA) is located in the central portion of Espinhaço Mountain Range, occupying a long and narrow belt west of the municipality of Licínio de Almeida (Figure 1), southeast state of Bahia. It extends through an area of about 24,000 ha between 14°25'–14°50' S and 042°35'–042°30' W, with altitudes ranging from 700–1,230 m. Different phytophysiognomies are found within the SGLA as Caatinga, Steppe and Wooded Savanna (*sensu* IBGE 2012), Campos Rupestres and Gallery Forests (Lower Montane Forests *sensu* Oliveira-Filho *et al.* 2006). The latter two occur from 900–1200 m, with Campos Rupestres occurring in lower altitudes than other areas throughout Espinhaço Mountains.

The SGLA acts as a biodiversity corridor between Espinhaço Range (state of Minas Gerais) and Chapada Diamantina (state of Bahia) and is included in a priority area for conservation within Espinhaço Mountain Range (Silva *et al.* 2008; Zappi 2008).

A total of seven field expeditions were performed between July 2011 and May 2013. All collected specimens were included in HUEFS and ALCB herbaria. Species were identified using

specialized literature (protologue and specific literature on the studied genera), as well as consulting type specimens (specimen and e-types). The most important reference collections for state of Bahia and Espinhaço Mountain Range were consulted: ALCB, BHCB, CEPEC, HUEFS, HUNEB DCH/VI, HB, HRB, MBM, R, RB, SP and SPF (acronyms according to Thiers 2014).

Maps were generated using ArcGIS software (ESRI 2010). Diagnostic characters, comments on the habitat occupied within the SGLA and its distribution in Brazil are presented for each species.

New records of thirteen species of Asteraceae were found in state of Bahia. These species belong to the tribes Vernoniaeae (*Eremanthus polycephalus*, *Lepidaploa barbata*, *Lessingianthus laevigatus*, *Lessingianthus psilophyllus*, *Lychnophora ramosissima*, and *Proteopsis argentea*), Heliantheae (*Aldama bracteata*, *Aldama oblongifolia*, *Aspilia egerii*, *Aspilia floribunda*, and *Riencourtia oblongifolia*) and Eupatorieae (*Mikania obtusata* and *Trichogonia hirtiflora*).

Aldama bracteata (Gardner) E.E. Schill. & Panero

Aldama bracteata is characterized by leaves alternate and sessile, lamina lanceolate to linear, base attenuate to cuneate, apex acute to acuminate, branches with a single terminal head, involucre bracts with 4–5(–6) series and cypselae setose. This species is endemic to Brazil, occurring in the states of Minas Gerais, Distrito Federal, Goiás and Mato Grosso do Sul (Nakajima *et al.* 2014). It was collected at the SGLA and on the municipality of Urandi, Bahia, within Campos Rupestres in altitudes between 1039 and 1115 m.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Serra do Saco da Onça, 21-VI-2012, N. Roque *et al.* 3,681 (ALCB); Serra do Saco da Onça, 14°46'15.7" S, 042°34'15.8 W, 1,039 m above sea level (a.s.l.), 24-V-2013, M. Alves *et al.* 176 (ALCB, HUEFS). Bahia: Urandi, road to Riacho de Areia, 14°46'54.6" S, 042°34'25.9" W, 1,115 m a.s.l., 24-V-2013, M. Alves *et al.* 184 (ALCB, HUEFS).

Aldama oblongifolia (Gardner) E.E. Schill. & Panero

This species is recognized by its lower opposite leaves, upper alternate leaves, petiole 1–6 mm long, lamina elliptic to narrow elliptic, base rounded to obtuse, apex obtuse to acute, peduncle long (*ca.* 30 cm long) and flexuous, involucre bracts in four series, ovate to ovate-lanceolate. *Aldama oblongifolia* is

endemic to Brazil and is recorded in the North (Pará, Tocantins), Northeast (Ceará, Maranhão), Midwest (Goiás, Mato Grosso) and Southeast (Minas Gerais) (Nakajima et al. 2014). In the SGLA it was found in Campo Rupestre vegetation.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, path after Cachoeirão, 14°41'52.4" S, 042°33'33" W, 1,023 m a.s.l., 23-I-2013, H.A. Ogasawara et al. 329 (ALCB).

Aspilia eglei J.U.Santos

This species differs from the others within the genus by its petiolate leaves, four series of involucre bracts, involucre cylindrical and pappus coroniform, with awns lacking (Santos 2001). This species was known only by its type collection from Diamantina municipality, Minas Gerais. In the SGLA, it was collected in Wooded Savanna (Figure 2a).

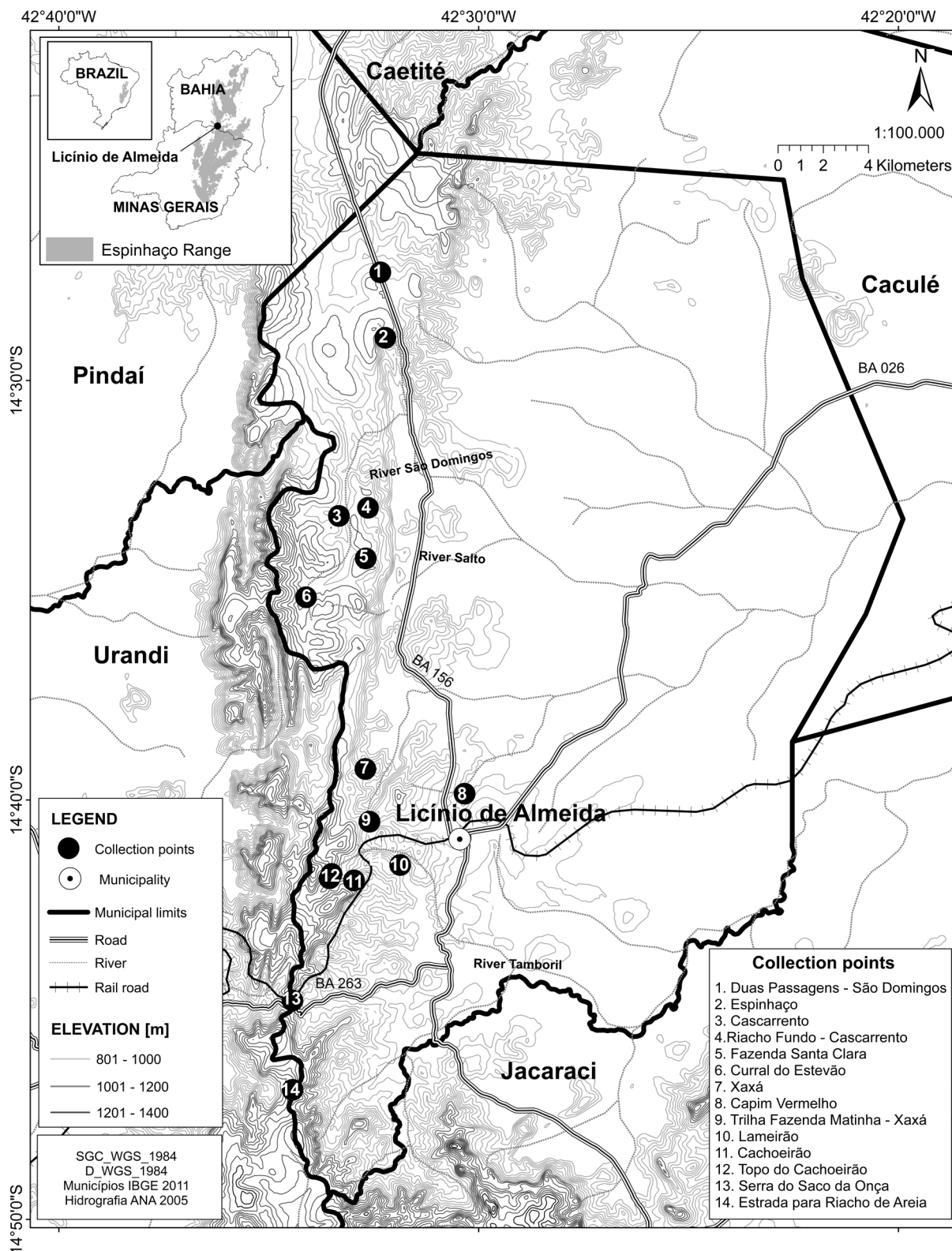


Figure 1. Serra Geral and collecting points of the species in the Licínio de Almeida municipality, Bahia, Brazil.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Cachoeirão, up after the railroad, 14°41'55" S, 42°32'58" W, 971 m a.s.l., 26-II-2012, M. Alves *et al.* 98 (ALCB); path of Riacho Fundo to Cascarrento, 14°33'02" S, 042°32'38" W, 969 m, M. Alves *et al.* 154 (ALCB, HUEFS).

ADDITIONAL SPECIMENS EXAMINED: Minas Gerais: Diamantina, W. Englers s.n., 1-1947 (Holotype: RB 59679).

***Aspilia floribunda* (Gardner) Baker**

This species differs from other of the genus by its leaves linear to linear-lanceolate or lanceolate, head corymbose, involucral bracts in four series with the apex acuminate, caudate

or cuspidate, pappus formed by two conspicuous awns (Santos 2001). This species is endemic to Brazil with records in the North (Tocantins), Northeast (Piauí), Midwest (Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Minas Gerais, São Paulo) and South (Paraná) (Nakajima *et al.* 2014). In the SGLA, it was collected on roadsides and Campos Rupestres vegetation. (Figure 2b).

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Capim Vermelho, 19°39'51" S, 042°30'20" W, 1,035 m a.s.l., 24-II-2012, M. Alves *et al.* 71 (ALCB); Serra do Saco da Onça, 14°45'02" S, 042°34'09" W, 907 m a.s.l., 25-II-2012, M. Alves *et al.* 73 (ALCB); Serra do Saco da Onça, 21-I-2013, H.A. Ogasawara *et al.* 334 (ALCB).



Figure 2. Images of the analyzed species. **A:** *Aspilia egerii* J.U. Santos. **B:** *Aspilia floribunda* (Gardner) Baker. **C:** *Mikania obtusata* DC. **D** and **G:** *Lychnophora ramosissima* Gardner. **E:** *Trichogonia hirtiflora* (DC.) Sch. Bip. ex Baker. **F:** *Proteopsis argentea* Mart. & Zucc. ex Sch. Bip. **H:** *Eremanthus polycephalus* (DC.) MacLeish. Photos by: A, B. Alves, M.; C, D, F-H. Roque, N.; E: Santana, F.A.

Eremanthus polycephalus (DC.) MacLeish

This species has as its diagnostic characters: heads with syncephaly, forming hemispheric glomerulus, involucre cylindrical, one flower per head and pappus pinkish. It is endemic to Espinhaço Range in state of Minas Gerais, occurring in Campo Rupestre vegetation (MacLeish 1987). In the SGLA it was collected within Cerrado. (Figure 2h).

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, path to Barragem de Tauape, 15-VII-2011, F.A. Santana et al. 32 (HUEFS), F.A. Santana et al. 39 (HUEFS); road of Duas Passagens to São Domingos, 14°28'11.5" S, 042°33'50.6" W, 954 m a.s.l., 16-VII-2011, F.A. Santana et al. 41 (HUEFS); Riacho Fundo up to Cascarrento, 19-VII-2012, F.A. Santana et al. 175 (HUEFS); Cascarrento, 14°33'13.7" S, 042°33'19.6" W, 970 m a.s.l., 19-VII-2012, F.A. Santana et al. 183 (HUEFS).

Lepidaploa barbata (Less.) H. Rob.

This species shows tomentose branches, leaves spirally arranged, ovate, base cordiform, sessile, apex mucronate, corolla lobes with glandular hairs and cypselae setose. *Lepidaploa barbata* is endemic to Brazil with records in Midwest (Distrito Federal, Goiás and Mato Grosso) and Southeast (Minas Gerais, São Paulo) (Nakajima et al. 2014). In the SGLA, it was collected in Wooded Savanna and Campo Rupestre vegetation.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, path to Cascarrento, 14°33'5.9" S, 042°33'51.7" W, 16-IX-2011, F.A. Santana et al. 75 (HUEFS), Serra do Saco da Onça, 14°44'46.8" S, 042°34'26" W, 980 m a.s.l., 17-IX-2011, F.A. Santana et al. 78 (HUEFS); Cascarrento, 14°33'13.7" S, 042°33'19.6" W, 970 m a.s.l., 19-VII-2012, F.A. Santana et al. 185 (HUEFS).

Lessingianthus laevigatus (Mart. ex DC.) H. Rob.

This species is recognized by its laminas linear, sessile, apex rounded to obtuse, head scorpioid and corolla lobes glabrate. This species is found in Bolívia, Paraguay and Brazil (Tropicos 2014). In Brazil it is recorded in Midwest (Distrito Federal, Goiás, Mato Grosso) and Southeast, within State of Minas Gerais (Nakajima et al. 2014). At the SGLA *L. laevigatus* was collected in Campo Rupestre.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Serra do Saco da Onça, 14°44'44.2" S, 042°34'23.5" W, 1,024 m a.s.l., 21-VII-2012, F.A. Santana et al. 200 (HUEFS).

Lessingianthus psilophyllus (DC.) H. Rob.

The diagnostic characters of this species are leaves narrow-elliptic, abaxial surface glabrous, heads solitary or in corymbose panicles, involucre bracts in five series and lanceolate. This species is endemic to Brazil with records on the North (Pará, Tocantins), Midwest (Distrito Federal, Goiás, Mato Grosso do Sul), Southeast (Minas Gerais, São Paulo) and South (Paraná) (Nakajima et al. 2014). In the SGLA, *L. psilophyllus* was collected in Wooded Savanna.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Serra do Saco da Onça, 14°44'46.8" S, 042°34'26" W, 25-II-2012, F.A. Santana et al. 107 (HUEFS); Cascarrento, 14°33'13.9" S, 042°33'28.2" W, 1,003 m a.s.l., 22-I-2013, H.A. Ogasawara et al. 305 (ALCB).

Lychnophora ramosissima Gardner

This species is recognized by laminas ovate (2.5–6 × 1 mm),

apex pungent, mucronate, one flower per head, pappus with external serie escamiform, inconspicuous or lacking internal serie palleaceous, whitish. *L. ramosissima* was known by a few specimens collected at Espinhaço Range, in state of Minas Gerais. In the SGLA, it was collected at Wooded Savanna and Campo Rupestre (Figures 2d and 2g).

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Curral do Estevão, 14°35'10.0" S, 042°34'06.6" W, 1,041 m a.s.l., 15-IX-2011, F.A. Santana et al. 56 (HUEFS), Santa Clara Farm, 14°34'14.4" S, 042°32'41.3" W, 1,020 m a.s.l., 16-IX-2011, F.A. Santana et al. 70 (HUEFS); Espinhaço, 22-XII-2011, F.A. Santana et al. 97 (ALCB), Cascarrento, 14°33'13.7" S, 042°33'19.6" W, 19-VII-2012, F.A. Santana et al. 179 (HUEFS); Xaxá, 14°39'15.6" S, 042°32'41.7" W, 942 m a.s.l., 22-I-2013, H.A. Ogasawara et al. 316 (ALCB); Xaxá, path to Cachoeirão, 14°41'11.7" S, 042°32'59.8" W, 1006 m a.s.l., 23-I-2013, H.A. Ogasawara et al. 320 (ALCB).

Mikania obtusata DC.

This species is characterized by its shrubby and erect habit, laminas oblong, apex obtuse, shortly petiolate (up to 2 cm long), bracteole linear, bracts with apex obtuse and cypselae pilose with glandular hairs. This species is endemic to Brazil with records in the States of Minas Gerais and São Paulo. In the SGLA, *M. obtusata* was collected in Wooded Savanna. (Figure 2c).

MATERIAL EXAMINED: BRAZIL. Bahia: Licínio de Almeida, path to Cachoeirão, following the railroad, 14°41'41.4" S, 042°33'07.1" W, 895 m a.s.l., 11-V-2012, F.A. Santana et al. 152 (HUEFS); path to Cachoeirão, 14°41'25.6" S, 042°32'28.3" W, 824 m a.s.l., 20-VII-2012, F.A. Santana et al. 188 (HUEFS).

Proteopsis argentea Mart. & Zucc. ex Sch. Bip.

Proteopsis argentea can be recognized by its silver branches and leaves, leaves whorled, head forming glomerulus disposed at the apex of scapes, involucre bracts with apex acuminate, pungent, corolla lilac and pappus lacking. It was regarded as endemic to Espinhaço Range in Minas Gerais, where its populations are fragmented (Jesus et al. 2001). In the SGLA this species was collected in Campo Rupestre, in grass on sandy soils (Figure 2f).

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, at the top of Cachoeirão, behind the mud house, 14°41'45.8" S, 042°33'30.1" W, 26-II-2012, F.A. Santana et al. 133 (HUEFS), 14°41'52.7" S, 042°33'29.9" W, 959 m a.s.l., 11-V-2012, F.A. Santana et al. 155 (HUEFS).

Riencourtia oblongifolia Gardner

Riencourtia oblongifolia differs from other species in the genus by its laminas with (4) 7–16 mm wide, elliptic, margin plane and three conspicuous veins. This species is recorded in Bolivia, North, Midwest and Southeast Brazil in Cerrado *sensu stricto* (Bringel Jr. and Cavalcanti 2009). Within the SGLA, it was collected in Steppe Savanna.

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, Lameirão, 14°41'33" S, 042°31'52" W, 783 m a.s.l., 26-II-2012, M. Alves et al. 97 (ALCB).

Trichogonia hirtiflora (DC.) Sch. Bip. ex Baker

This species is recognized by its lamina ovate to triangular, margin crenate, base cordate to truncate and abaxial surface with prominent veins, bullate. *Trichogonia hirtiflora* was

considered restricted to state of Minas Gerais, where it occurs in areas of Cerrado and Campo Rupestre vegetation (Roque et al. 2012). In the SGLA, it was collected in Campo Rupestre vegetation on grass with sandy soils (Figure 2e).

SPECIMENS EXAMINED: BRAZIL. Bahia: Licínio de Almeida, at the top of Cachoeirão, 14°41'52.7" S, 042°33'29.9" W, 959 m a.s.l., 11-V-2012, F.A. Santana et al. 157 (HUEFS).

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LITERATURE CITED

- Bringel Jr., J.B.A. and T.B. Cavalcanti. 2009. Heliantheae (Asteraceae) na Bacia do Rio Paran  (Goi s, Tocantins), Brasil. *Rodrigu sia*. 60 (3): 551-580. (doi: 10.2307/23500288)
- ESRI (Environmental Systems Research Institute). 2010. *ArcGIS, version 9.3.1*. Redlands, CA: Environmental Systems Research Institute, Inc.
- Harley, R.M. 1995. Introduction; pp. 1-40, in: B.L. Stannard (ed). *Flora of the Pico das Almas, Chapada Diamantina, Bahia*. Kew, UK: Royal Botanic Gardens, Kew.
- IBGE. 2012. *Manual T cnico da Vegeta o Brasileira. 2  Edi o Revista e Ampliada*. Electronic database accessible at <http://www.ibge.gov.br>. Captured on 21 December 2014.
- Giulietti, A.M., J.R. Pirani and R.M. Harley. 1997. Espinha o Range region; pp. 397-404, in: S. Davis, V.H. Heywood, O. Herrera MacBryde, J. Villa-Lobos, and A.C. Hamilton (eds). *Centers of Plant Diversity: a Guide and Strategy for their Conservation*. Volume III. Cambridge, UK: Cambridge University Press..
- Jesus, F.F., V.N. Solferini, J. Semir and P.I. Prado. 2001. Local genetic differentiation in *Proteopsis argentea* (Asteraceae), a perennial herb endemic in Brazil. *Plant Systematics and Evolution* 226: 5968. (doi: 10.2307/23644099).
- MacLeish, N.F.F. 1987. Revision of *Eremanthus* (Compositae: Vernoniaeae). *Annals of the Missouri Botanical Garden* 74(2): 265-290 (doi: 10.2307/2399398).
- Nakajima, J., B. Loeuille, G. Heiden, M. Dematteis, E.K.O. Hattori, M.A.G. Magenta, M.R. Ritter, C.A. Mondin, N. Roque, S.C. Ferreira, R.A.X. Borges, P.N. Soares, G. Almeida, A. Schneider, G. Sancho, M.M. Saavedra, R.M. Liro, A.C.M. Pereira, M.D. Moraes, G.A.R. Silva, J.D. Medeiros, T.S. Lorencini, A.M. Teles, M. Monge, C.M. Siniscalchi, F.O. Souza-Buturi, J.B.A. Bringel Jr., C.R. Carneiro, E. Pasini, and C.T. Oliveira. 2014. Asteraceae; in: *Lista de Esp cies da Flora do Brasil. Jardim Bot nico do Rio de Janeiro*. Electronic database accessible at <http://reflora.jbrj.gov.br/jabot/floradobrasil/FB55>. Captured on 21 December 2014.
- Oliveira-Filho, A.T., J.A. Jarenkow and M.J.N. Rodal. 2006. Floristic relationships of seasonally dry forests of eastern South America based on tree species distribution patterns; pp. 151-184, in: Pennington, R.T., G.P. Lewis and J.A. Ratter (orgs.). *Neotropical Savannas and Seasonally Dry Forests: Plant Diversity, Biogeography, and Conservation. Systematics Association Special Volume 69*. Boca Raton: CRC Press.. (<http://prof.icb.ufmg.br/treetatlan/Downloads/lo5.pdf>).
- Roque, N., H.P. Bautista and A.C. Mota. 2012. Taxonomic revision of *Trichogonia* (Eupatorieae, Asteraceae): a South American genus. *Systematic Botany* 37(2): 525-553. (doi: 10.1600/036364412X635575).
- Santos, J.U.M. 2001. *O g nero Aspilia Thouars (Asteraceae-Heliantheae) no Brasil*. Bel m, PA: Museu Paraense Em lio Goeldi.
- Silva, J.A., R.B. Machado, A.A. Azevedo, G.M. Drummond, R.L. Fonseca, M.F. Goulart, E.A. Moraes j nior, C.S. Martins and M.B. Ramos Neto. 2008. Identifica o de  reas insubstitu veis para conserva o da Cadeia do Espinha o, estados de Minas Gerais e Bahia, Brasil. *Megadiversidade* 4(1-2): 272-309.
- Thiers, B. 2014 [continuously updated]. *Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff*. *New York Botanical Garden's Virtual Herbarium*. Electronic database accessible at <http://sweetgum.nybg.org/ih/>. Captured on 21 December 2014.
- Tropicos. 2014. *Tropicos.org*. Missouri Botanical Garden. Electronic database accessible at <http://www.tropicos.org>. Captured on 21 December 2014.
- Zappi, D.C. 2008. Fitofisionomia da Caatinga associada   Cadeia do Espinha o. *Megadiversidade* 4: 34-38. (http://www.conservation.org.br/publicacoes/files_mega4/04_fitofisionomia_da_caatinga_associada_a_cadeia_do_espinhaco.pdf).

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