

A re-evaluation of the lignocellulolytic *Agaricomycetes* from the Brazilian semi-arid region

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Abstract — A checklist of the lignocellulolytic *Agaricomycetes* from the Brazilian semi-arid region is provided. It presents data on the distribution of 37 species, 10 families, and six orders (*Agaricales*, *Auriculariales*, *Gloeophyllales*, *Hymenochaetales*, *Polyporales*, and *Russulales*). Twenty-eight taxa previously recorded from the studied region are excluded. The full checklist is available at www.mycotaxon.com/resources/weblists.html.

Key words: Caatinga, *Basidiomycetes*, *Aphyllophorales*

Introduction

Agaricomycetes (sensu Hibbett et al. 2007) or *Basidiomycetes* (sensu Kirk et al. 2001) comprises almost 21,000 species of *Basidiomycota* (Kirk et al. 2008) and includes wood-decomposing, parasitic, and ectomycorrhizal fungi (Hibbett 2006). The wood-decomposing fungi are termed lignocellulolytic because their enzymes are able to degrade wood hemi-cellulose, cellulose, and/or lignin, thus causing white and brown rots in plant species (Holf et al. 2004). Northeastern Brazil's semi-arid region (3–7° S and 35–45°W, 955.000 Km²) encompasses parts of nine States (FIG. 1). The Köppen classification of the climate is 'Bsh' (hot and dry), with an annual mean temperature 25.5°C and characterized by a short rainy (3–5 mos) and long dry (7–9 mos) season; the annual mean precipitation is 600 to 1045 mm (Moura & Ramos 2004). The area is dominated by Caatinga (seasonally dry tropical forest sensu Pennington et al. 2000), composed of typically tropophilous and thorny medium to low xerophytes, where succulent species of the plant families *Cactaceae*, *Euphorbiaceae*, and *Bromeliaceae* stand out in the landscape (Andrade-Lima 1981). Father Camille Torrend was the first researcher to collect and study lignocellulolytic *Agaricomycetes* in this Brazilian biome (Torrend 1940). The 18 *Agaricomycetes* species taxonomically and nomenclaturally revised by Drechsler-Santos et al. (2008a) are deposited in URM, as cited by Maia & Gibertoni (2002). Other works that cover *Agaricomycetes* from this semi-arid region include Góes-Neto et al. (2003), Góes-Neto & Baseia (2006), and Drechsler-Santos et al. (2007). Considering the paucity of information on lignocellulolytic *Agaricomycetes* of Brazil's

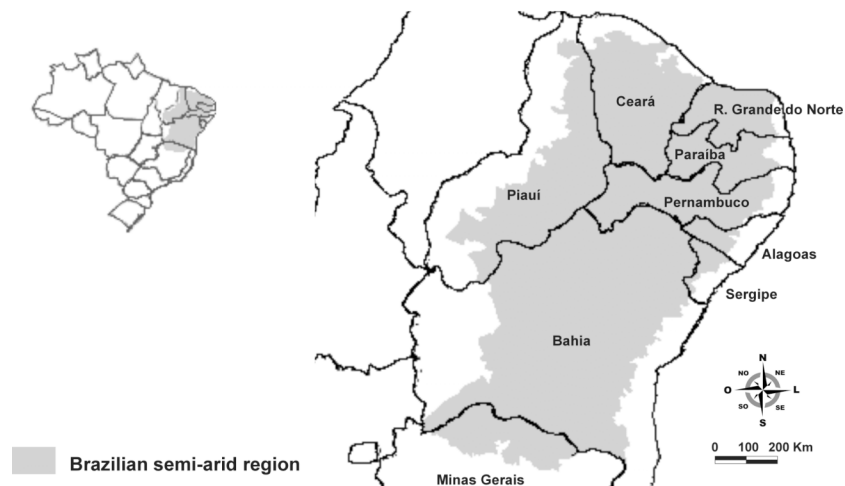


Figure 1. Brazilian semi-arid region (modified from: SPR/MI, www.mi.gov.br)

semi-arid region, this study represents a first comprehensive analysis of the diversity of lignocellulolytic *Agaricomycetes* in this unique biome.

Material and methods

This study was based on bibliographic research (Torrend 1940, Maia 1960, Góes-Neto 1999, Maia & Gibertoni 2002, Góes-Neto et al. 2003, Góes-Neto & Baseia 2006, Drechsler-Santos et al. 2007, 2008a) and revision of fungi exsiccata now curated in ALCB, CEPEC, HUEFS, and URM (Holmgren et al. 1990). The distribution of the species is provided according to occurrence in the States. Nomenclature and classification systems follow those of Hibbett et al. (2007), Index Fungorum (www.indexfungorum.org), and Centraalbureau voor Schimmelcultures (www.cbs.knaw.nl).

Results and discussion

The 37 lignocellulolytic *Agaricomycetes* species reported from Northeastern Brazil's Caatinga region represent 10 families and six orders. *Polyporales* is represented by 23 (62.2%) species, followed by eight (21.6%) species in the *Hymenochaetales*. The higher diversity of *Polyporales* agrees with results of other basidiomycete inventories in both Southern Brazilian subtropical (Drechsler-Santos et al. 2008b) and tropical Northeastern Brazilian Atlantic forests (Gibertoni et al. 2004). *Polyporaceae* Fr. ex Corda is represented by the highest number of species (17, or 45.9% of the total), followed by 8

species in *Hymenochaetaceae* Imazeki & Toki. The genus with the highest number of species represented is *Phellinus* Quél. s.l. (six, 16.2%). Bahia is the State with highest number of species (33, 89.2%), of which 29 (78.4%) were recorded exclusively in the Bahian semi-arid. Pernambuco is represented by five (13.5%) species, of which *Ganoderma stipitatum* (Murrill) Murrill, *Gloeophyllum striatum* (Sw.) Murrill, and *Phylloporia chrysites* (Berk.) Ryvarden are reported only in this State. *Fomes fasciatus* (Sw.) Cooke was recorded only in Piauí. Only one species each is recorded for the Ceará and Paraíba semi-arid regions: *Favolus tenuiculus* P. Beauv. and *Pycnoporus sanguineus* (L.) Murrill, respectively. No representatives of lignocellulolytic *Agaricomycetes* have been reported from the semi-arid regions of Minas Gerais, Sergipe, Alagoas, or Rio Grande do Norte. Among the species identified thus far, only *Gloeophyllum striatum* causes brown rot; as observed in other tropical and subtropical areas (Nakasone 1996), all other (97.3%) species cause white-rot. We have excluded 28 taxa reported earlier because their exsiccata were not found or are in very poor condition (Drechsler-Santos et al. 2008a). The 37 species of this checklist represent our current knowledge of the diversity and distribution of lignocellulolytic *Agaricomycetes* in Northeastern Brazil's semi-arid region. Further investigations, however, will certainly increase the number fungal records and expand the reported species ranges throughout the area.

**Checklist for lignocellulolytic *Agaricomycetes* species from
Brazilian semi-arid region:**

AGARICALES

***Schizophyllaceae* Quél.**

Schizophyllum commune Fr.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61518), as *S. commune* (L.) Fr.; Góes-Neto & Baseia (2006, HUEFS61518)].

AURICULARIALES

***Auriculariaceae* Fr.**

Auricularia mesenterica (Dicks.) Pers.

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006, ALCB30231).

Auricularia delicata (Fr.) Henn.

DISTRIBUTION: Bahia [Góes-Neto & Baseia (2006, ALCB30361), as *A. reticulata* Fr.].

GLOEOPHYLLALES

Gloeophyllaceae Jülich

Gloeophyllum striatum (Sw.) Murrill

DISTRIBUTION: Pernambuco [Maia & Gibertoni (2002, URM47805) and Góes-Neto & Baseia (2006, URM47805), as *Lenzites cinnamonea* Fr.; Drechsler-Santos et al. (2008a, URM47805)].

HYMENOGYSALES

Hymenochaetaceae Imazeki & Toki

Hymenochaete rheicolor (Mont.) Lév.

DISTRIBUTION: Bahia [Góes-Neto & Baseia (2006, ALCB30078), as *Hymenochaete pallida* Cooke & Masee].

Phellinus baccharidis (Pat.) Pat.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61517) and Góes-Neto & Baseia (2006, HUEFS61517), as *P. piptadeniae* Teixeira].

Phellinus extensus (Lév.) Pat.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61534) and Góes-Neto & Baseia (2006, HUEFS61534), as *P. portoricensis* (Overh.) O. Fidalgo].

Phellinus gilvus (Schwein.) Pat.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61515), Góes-Neto & Baseia (2006, HUEFS61515)].

Phellinus merrillii (Murrill) Ryvarden

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61552) and Góes-Neto & Baseia (2006, HUEFS61552), as *P. rimosus* (Berk.) Pilát].

Phellinus piptadeniae Teixeira

DISTRIBUTION: Bahia [Góes-Neto & Baseia (2006, HUEFS133884), as *P. grenadensis* (Murrill) Ryvarden].

Phellinus umbrinellus (Bres.) S. Herrera & Bondartseva

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61540) and Góes-Neto & Baseia (2006, HUEFS61540), as *P. melleoporus* (Murrill) Ryvarden].

Phylloporia chrysites (Berk.) Ryvarden

DISTRIBUTION: Pernambuco [Maia & Gibertoni (2002, URM72582) and Góes-Neto & Baseia (2006, URM72582), as *Inonotus corrosus* Murrill; Drechsler-Santos et al. (2008a, URM72582)].

POLYPORALES

Ganodermataceae Donk

Amauroderma camerarium (Berk.) J.S. Furtado

DISTRIBUTION: Bahia [Maia (1960, URM16247) and Góes-Neto & Baseia (2006, URM16247), as *A. trulliforme* Lloyd].

Amauroderma praetervisum (Pat.) Torrend

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61521) and Góes-Neto & Baseia (2006, HUEFS61521), as *A. omphalodes* (Berk.) Imazeki].

Ganoderma australe (Fr.) Pat.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61533) and Góes-Neto & Baseia (2006, HUEFS61533)] and Pernambuco [Maia & Gibertoni (2002, URM47803), as *G. applanata* (Pers.) Pat.; Góes-Neto & Baseia (2006, URM47803), as *G. applanatum* (Pers.) Pat.; Drechsler-Santos et al. (2008a, URM47803)].

Ganoderma stipitatum (Murrill) Murrill

DISTRIBUTION: Pernambuco [Maia & Gibertoni (2002, URM2334) and Góes-Neto & Baseia (2006, URM2334), as *G. lucidum* Leys; Drechsler-Santos et al. (2008a, URM2334)].

Meripilaceae Jülich

Rigidoporus microporus (Sw.) Overeem

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61547) and Góes-Neto & Baseia (2006, HUEFS61547)].

Meruliaceae P. Karst.

Cymatoderma caperatum (Berk. & Mont.) D.A. Reid

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61530) and Góes-Neto & Baseia (2006, HUEFS61530)].

Polyporaceae Fr. ex Corda

Abundisporus subflexibilis (Berk. & M.A. Curtis) Parmasto

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61537) and Góes-Neto & Baseia (2006, HUEFS61537), as *Fomitella supina* (Sw.) Murrill].

Coriolopsis caperata (Berk.) Murrill

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61532) and Góes-Neto & Baseia (2006, HUEFS61532), as *D. caperata* (Berk.) Ryvarden].

Coriolopsis floccosa (Jungh.) Ryvarden

DISTRIBUTION: Bahia [Maia & Gibertoni (2002, URM7450, 1242, and 7697), as *Polystictus membranaceus*, *Polystictus pinsitus* Fr., and *Trametes rigida* Berk. & Mont.; Góes-Neto & Baseia (2006, URM7450, 1242 and 7697), as *Polystictus membranaceus* (Sw.) Berk., *Polyporus pinsitus* Fr., and *Trametes rigida* Berk. & Mont.; Drechsler-Santos et al. (2008a, URM7450, 1242, and 7697)].

Earliella scabrosa (Pers.) Gilb. & Ryvarden

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61523) and Góes-Neto & Baseia (2006, HUEFS61523)].

Favolus tenuiculus P. Beauv.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61519) and Góes-Neto & Baseia (2006, HUEFS61519), as *Polyporus tenuiculus* (Beauvais) Fr.] and Ceará [Maia & Gibertoni (2002, URM7425), as *Favolus maxonii* Murr.; Góes-Neto & Baseia (2006, URM7425), as *F. maxonii* (Murrill) Sacc. & Trotter; Drechsler-Santos et al. (2008a, URM7425)].

Fomes fasciatus (Sw.) Cooke

DISTRIBUTION: Piauí [Maia & Gibertoni (2002, URM681) and Góes-Neto & Baseia (2006, URM681), as *F. squarrosus* Lloyd; Drechsler-Santos et al. (2008a, URM681)].

Hexagonia hydroides (Sw.) M. Fidalgo

DISTRIBUTION: Bahia [Góes-Neto (1999, ALCB86122), as *H. hydroides* (Fr.) Fidalgo; Góes-Neto et al. (2003, HUEFS61550); Góes-Neto & Baseia (2006, ALCB86122 and HUEFS61550), as *Trametes hydroides* (Sw.) M. Fidalgo and *H. hydroides* (Schwartz) M. Fidalgo].

Lentinus crinitus (L.) Fr.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61514) and Góes-Neto & Baseia (2006, HUEFS61514)].

Lenzites elegans (Spreng.) Pat.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61526), as *Trametes elegans* (Spreng.) Fr.; Góes-Neto & Baseia (2006, HUEFS61526)].

Navisporus terrestris Gibertoni & Ryvarden

DISTRIBUTION: Bahia (Drechsler-Santos et al. 2007, HUEFS105829).

Polyporus dictyopus Mont.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61543) and Góes-Neto & Baseia (2006, HUEFS61543)].

Polyporus gramocephalus Berk.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61546) and Góes-Neto & Baseia (2006, HUEFS61546)].

Pycnoporus sanguineus (L.) Murrill

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61520) and Góes-Neto & Baseia (2006, HUEFS61520) and Paraíba [Maia & Gibertoni (2002, URM444) and Góes-Neto & Baseia (2006, URM444), as *Polystictus cinnabarinus* (Jacq.) Fr.; Drechsler-Santos et al. (2008a, URM444)].

Note: Drechsler-Santos et al. (2008a) referred this taxon as URM2334, while the correct record is URM444.

Trametes versicolor (L.) Lloyd

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61524) and Góes-Neto & Baseia (2006, HUEFS61524)].

Trametes villosa (Sw.) Kreisel

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61522), Góes-Neto & Baseia (2006, HUEFS61522)].

Trichaptum biforme (Fr.) Ryvarden

DISTRIBUTION: Bahia [Maia & Gibertoni (2002, URM9731), as *Polystictus pallido-mollis* Lloyd; Góes-Neto et al. (2003, HUEFS61555), as *Gloeophyllum trabeum* (Pers.) Murrill; Góes-Neto & Baseia (2006, URM9731 and HUEFS61555), as *Polystictus pallido-mollis* Lloyd and *Gloeophyllum trabeum* (Pers.) Murrill; Drechsler-Santos et al. (2008a, URM9731)].

Tyromyces leucomallus (Berk. & M.A. Curtis) Murrill

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61513) and Góes-Neto & Baseia (2006, HUEFS61513)].

RUSSULALES

Bondarzewiaceae Kotl. & Pouzar

Wrightoporia sp.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61531) and Góes-Neto & Baseia (2006, HUEFS61531), as *Tyromyces duracinus* (Pat.) Murrill].

Stereaceae Pilát

Stereum ostrea (Blume & T. Nees) Fr.

DISTRIBUTION: Bahia [Góes-Neto et al. (2003, HUEFS61539) and Góes-Neto & Baseia (2006), as *S. ostrea* Nees] and Pernambuco [Maia & Gibertoni (2002, URM47780) and Góes-Neto & Baseia (2006, URM47780), as *S. glabrensis* Berk. & M. A. Curtis; Drechsler-Santos et al. (2008a, URM47780)].

Previously reported taxa excluded from the checklist:

Datronia caperata (Berk.) Ryvarden (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto 1999).

Notes: the exsiccatum ALCB was not found.

Favolus giganteus Mont. (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Fomes pectinatus Klotz. (*Polyporaceae*)

DISTRIBUTION: Bahia (Torrend 1940).

Notes: the exsiccatum ALCB was not found.

Ganoderma lucidum (Curtis) P. Karst. (*Ganodermataceae*)

DISTRIBUTION: Pernambuco (Góes-Neto & Baseia 2006).

Notes: the exsiccatum URM 14857 was not found.

Hexagonia capillacea Pat. & Gaill. (*Polyporaceae*)

DISTRIBUTION: Bahia (Torrend 1940, Góes-Neto 1999).

Notes: the exsiccatum ALCB was not found.

Hexagonia papyraceae Berk. (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto 1999, Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Hexagonia tenuis Kunth (*Polyporaceae*)

DISTRIBUTION: Bahia [Torrend (1940); Góes-Neto (1999) and Góes-Neto & Baseia (2006), as *Hexagonia tenuis* (Hook) Fr.].

Notes: the exsiccatum ALCB was not found.

Hexagonia variegata Berk. (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum (ALCB) was not found.

Hymenochaete ceratophora Job (*Hymenochaetaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum HUEFS was not found.

Koleroga noseia Donk (*Corticaceae* Herter)

DISTRIBUTION: Bahia [Maia & Gibertoni (2002); Góes-Neto & Baseia (2006), as *Koleroga noxia* Donk; Drechsler-Santos et al. (2008a), as *Corticium koleroga* (Cooke) Höhn.] and Pernambuco [Maia & Gibertoni (2002); Góes-Neto & Baseia (2006), as *Koleroga noxia* Donk; Drechsler-Santos et al. (2008a), as *Corticium koleroga* (Cooke) Höhn.]

Notes: the exsiccata URM 1297 and URM 1298 were not found (Drechsler-Santos et al. 2008a).

Lentinus blepharodes Berk. & M.A. Curtis (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Phellinus rimosus (Berk.) Pilát. (*Hymenochaetaceae*)

DISTRIBUTION: Bahia [Torrend (1940), as *Fomes rimosus* Berk.; Góes-Neto (1999); Góes-Neto & Baseia (2006), as *Fomes rimosus* (Berk.) Cooke and *Phellinus rimosus* (Berk.) Pilát].

Notes: the exsiccata ALCB were not found.

Phellinus gilvus (Schwein.) Pat. (*Hymenochaetaceae*)

DISTRIBUTION: Bahia (Góes-Neto 1999).

Notes: the exsiccatum ALCB was not found.

Polyporus caperatus Berk. (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Polyporus cinnabarinus Jacq. & Fr. (*Polyporaceae*)

DISTRIBUTION: Bahia [Maia & Gibertoni (2002), Góes-Neto & Baseia (2006), and Drechsler-Santos et al. (2008a)].

Notes: the exsiccatum URM 11449 was not found (Drechsler-Santos et al. 2008a).

Polyporus gilvus (Schwein.) Pat. (*Polyporaceae*)

DISTRIBUTION: Bahia [Góes-Neto (1999), as *Phellinus gilvus* (Schw.: Fr.) Pat.; Góes-Neto & Baseia (2006)].

Notes: the exsiccatum ALCB was not found.

Polyporus globocephalus Lloyd (*Polyporaceae*)

DISTRIBUTION: Bahia (Torrend 1940, Góes-Neto 1999).

Notes: the exsiccatum ALCB was not found.

Polyporus lignicola Murrill (*Polyporaceae*)

DISTRIBUTION: Bahia [Torrend (1940), as *Polyporus lignicola* Lloyd; Góes-Neto (1999), as *Amauroderma* sp.; Góes-Neto & Baseia (2006)].

Notes: the exsiccatum ALCB was not found.

Polyporus megaloporus Mont. (*Polyporaceae*)

DISTRIBUTION: Bahia [Maia & Gibertoni (2002), Góes-Neto & Baseia (2006), and Drechsler-Santos et al. (2008a)].

Notes: the exsiccatum URM 7355 was in poor condition and was discarded on 08.XI.2000 (Drechsler-Santos et al. 2008a).

Polyporus pargamenus Fr. (*Polyporaceae*)

DISTRIBUTION: Pernambuco (Góes-Neto & Baseia 2006).

Notes: the exsiccata URM 31054, URM 10511, and URM 13641 corresponding some materials collected in other countries. The exsiccate URM for Pernambuco State was not found.

Polyporus tenuiculus (Beauv.) Fr. (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto 1999, Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Pseudofavolus cucullatus (Mont.) Pat. (*Polyporaceae*)

DISTRIBUTION: Bahia [Torrend (1940), as *Hexagonia cucullata* Mont.; Góes-Neto (1999)].

Notes: the exsiccatum ALCB was not found.

Schizophyllum commune Fr. (*Schizophyllaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum CEPEC was not found.

Skeletocutis amorphia (Fr.) Kotl. & Pouzar (*Polyporaceae*)

DISTRIBUTION: Bahia [Torrend (1940), as *Polyporus sublilacinus* Ell.; Góes-Neto (1999), as *Skeletocutis amorphus* (Pers. Fr) Donk; Góes-Neto & Baseia (2006)].

Notes: the exsiccatum ALCB was not found.

Stereum floriforme Lloyd (*Stereaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Stereum lobatum (Kunze) Fr. (*Stereaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum ALCB was not found.

Trametes cubensis (Mont.) Sacc. (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto & Baseia 2006).

Notes: the exsiccatum HUEFS was not found.

Trametes villosa (Fr.) Kreisel (*Polyporaceae*)

DISTRIBUTION: Bahia (Góes-Neto 1999).

Notes: the exsiccatum ALCB was not found.

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