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-ASCOMYCOTA IN THE SHALLOW ECOREGION OF CATARINA, CAATINGA, BRAZIL: PART 1

Nadja Santos Vitória[1]
Mabel Sherlla Rozendo Campos da Silva[2]
Maiara Araújo Lima dos Santos[3]
Marcela Eugenia da Silva Cáceres[4]
André Aptroot[5]
José Luiz Bezerra[6]

ABSTRACT

Objective: Inventories of fungi are essential, but they are rarely carried out, especially in areas of the Caatinga biome. It is therefore important to carry out surveys and mapping to make knowledge more accessible. In this context, the aim of this work was to organize and discuss the information and data related to the fungi of Raso da Catarina, cataloguing and presenting the first checklist of Ascomycota in an insufficiently researched locality, adding knowledge from scientific collections, publications, and field expeditions.

Method: Literature searches were carried out on the Ascomycota of the Raso da Catarina Ecoregion; consultations of the Fungal Databases, U.S. National Fungus Collections, the EMBRAPA database (Fungi Reported on Plants in Brazil) and the Mycology Collections Portal; consultations of the speciesLink networks that integrate data from scientific collections; consultations of the Reflora Virtual Herbarium and the INCT-Herbário Virtual da Flora e dos Fungos. In addition to field expeditions in areas of the Raso da Catarina in the municipalities of Paulo Afonso, Jeremoabo and Glória.

Results and conclusion: A total of 243 taxa comprising 75 asexual fungi, 85 lichenized sexual fungi and 73 non-lichenized sexual fungi, distributed in 148 genera, were catalogued. This work represents an initiative to systematize research carried out in Raso da Catarina, with the aim of adding knowledge to the estimate of Ascomycota species in the Caatinga.

Originality/value: Work on fungi in areas of the Raso da Catarina is still incipient. Some data is scattered in a few publications and many taxa are in scientific collections without being published. This is therefore the first checklist of Ascomycota for the Ecoregion and provides relevant information.

Keywords: Northeastern Semi-Arid Region, Fungi, Taxonomy, Checklist.

[1]Universidade do Estado da Bahia-UNEB, Paulo Afonso, Bahia, Brazil. E-mail: nadjasv@hotmail.com
Orcid: https://orcid.org/0000-0003-4269-7582
[2] Universidade do Estado da Bahia-UNEB, Paulo Afonso, Bahia, Brazil. E-mail: mabel_sherlla@hotmail.com
Orcid: https://orcid.org/0000-0002-2336-7951
[3] Universidade do Estado da Bahia-UNEB, Paulo Afonso, Bahia, Brazil. E-mail: maiara.als2015@gmail.com
Orcid: https://orcid.org/0000-0002-7470-9405
[4] Universidade Federal de Sergipe, Itabaiana, Sergipe, Brazil. E-mail: mscaceres@academico.ufs.br
Orcid: https://orcid.org/0000-0002-5612-1309
[5] Universidade Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil.
E-mail: andreaptroot@gmail.com Orcid: https://orcid.org/0000-0001-7949-2594
[6] Universidade Federal de Pernambuco, Recife, Pernambuco, Brazil. E-mail: jlulabezerra@hotmail.com
Orcid: https://orcid.org/0000-0002-7917-3400

ASCOMYCOTA NA ECORREGIÃO RASO DA CATARINA, CAATINGA, BRASIL: PARTE 1

RESUMO

Objetivo: Inventário de fungos é um trabalho imprescindível, mas pouco realizado, especialmente em áreas do bioma Caatinga. Por isso, é importante a realização de levantamentos e mapeamentos para tornar mais acessível o conhecimento. Nesse contexto, este trabalho teve por objetivo organizar e discutir as informações e dados relacionados aos fungos no Raso da Catarina, catalogando e apresentando o primeiro checklist de Ascomycota em uma localidade insuficientemente pesquisada, agregando o conhecimento de coleções científicas, publicações e expedições à campo.

Método: Foram realizadas pesquisas de literatura sobre Ascomycota da Ecorregião Raso da Catarina; consultas às listas da Fungal Databases, U.S. National Fungus Collections, ao banco de dados da EMBRAPA (Fungos Relatados em Plantas no Brasil) e ao Mycology Collections Portal; consultas às redes speciesLink que integram dados de coleções científicas; consultas ao Herbário Virtual Reflora e ao INCT-Herbário Virtual da Flora e dos Fungos. Além de expedições à campo em áreas do Raso da Catarina nos municípios de Paulo Afonso, Jeremoabo e Glória.

Resultados e Conclusão: Um total de 243 táxons compreendendo 75 fungos assexuais 85 fungos sexuais liquenizados e 73 fungos sexuais não liquenizados, distribuídos em 148 gêneros foram catalogados. Este trabalho representa uma iniciativa de sistematização de pesquisas desenvolvidas no Raso da Catarina, com intuito de agregar conhecimento à estimativa de espécies de Ascomycota na Caatinga.

Originalidade/valor: Trabalhos sobre fungos em áreas do Raso da Catarina ainda são incipientes. Alguns dados encontram-se dispersos em poucas publicações e muitos táxons estão em coleções científicas sem serem publicados. Este é, portanto, o primeiro checklist de Ascomycota para a Ecorregião e disponibiliza informações relevantes.

Palavras-chave: Semiárido Nordestino, Fungos, Taxonomia, Checklist.

ASCOMICOTA EN LA ECORREGIÓN SUPERFICIAL DE CATARINA, CAATINGA, BRASIL: PARTE 1

RESUMEN

Objetivo: Los inventarios de hongos son esenciales, pero rara vez se llevan a cabo, especialmente en áreas del bioma de Caatinga. Por lo tanto, es importante llevar a cabo encuestas y cartografía para que el conocimiento sea más accesible. En este contexto, el objetivo de este trabajo fue organizar y discutir la información y los datos relacionados con los hongos de Raso da Catarina, catalogando y presentando la primera lista de verificación de Ascomycota en una localidad insuficientemente investigada, agregando conocimientos de colecciones científicas, publicaciones y expediciones de campo.

Método: Se realizaron búsquedas bibliográficas en la Ascomycota de la Ecorregión Raso da Catarina; consultas de las Bases de Datos de Hongos, Colecciones Nacionales de Hongos de los EE. UU., la base de datos EMBRAPA (Fungi Reported on Plants in Brazil) y el Portal de Colecciones de Micología; consultas de las redes de especiesLink que integran datos de colecciones científicas; consultas del Herbario Virtual Reflora y el INCT-Herbário Virtual da Flora e dos Fungos. Además de expediciones de campo en áreas de la Raso da Catarina en los municipios de Paulo Afonso, Jeremobo y Glória.

Resultados y conclusión: Se catalogaron un total de 243 taxones que comprenden 75 hongos asexuales, 85 hongos sexuales liquenizados y 73 hongos sexuales no liquenizados, distribuidos en 148 géneros. Este trabajo representa una iniciativa para sistematizar la investigación llevada a cabo en Raso da Catarina, con el objetivo de agregar conocimiento a la estimación de especies de Ascomycota en la Catinga.

Originalidad/valor: El trabajo sobre hongos en áreas de la Raso da Catarina todavía es incipiente. Algunos datos están dispersos en algunas publicaciones y muchos taxones están en colecciones científicas sin ser publicados. Por lo tanto, esta es la primera lista de comprobación de Ascomycota para la ecorregión y proporciona información relevante.

Palabras clave: Región Semiárida Nororiental, Hongos, Taxonomía, Lista de verificación.

1 INTRODUCTION

Fungi are indispensable organisms for ecosystems, because among other actions, they maintain the process of recycling macro and micronutrients (Pansera et al., *2023; De Matoset al., 2023).* The number of described species exceeds 200,000, however, currently considered accepted 150,000 (Wijayawarden, 2022). In Brazil, 5,719 fungal taxa have been listed, of which 1881 belong to the phylum Ascomycota (Maia *et al*. 2015). An updated new list indicates that 6466 species of fungi are registered in the country (Flora do Brasil, 2023).

Ascomycota is the largest group in the Fungi Kingdom with about 110,000 species (Wijayawarden *et al*., 2021) and approximately 9,000 genera organized into different taxonomic categories (Wijayawarden *et al*., 2020), comprising more than 60% of all known fungi (KirkCorn et al., 2008). Threats to global biodiversity have motivated the task of cataloging species in a race against time. The task is more challenging in little known localities, like the areas inserted into the Caatinga.

The Caatinga biome is characterized, for the most part, by a hot and semi-arid climate, presenting a high diversity of environments brought about by a mosaic of types of vegetation. In the challenge of understanding how all these mosaics are organized, it was proposed to divide them into eight Ecoregions (Velloso *et al*., 2002). Amongst them, the Raso da Catarina, which extends through the states of Pernambuco and Bahia, circumscribing a narrow and elongated strip in the north-south direction in the central-eastern part of the Caatinga. It has 30,800 km^2 in length and vegetation of the caatinga type, predominantly shrub and dense, less thorny than the caatinga on crystalline soils (Velloso *et al., 2002; Amorim & Bautista, 2016).* In this Ecoregion, there are several conservation units: Ecological Station - ESEC Raso da Catarina/BA; Environmental Protection Area - APA Serra Branca/BA; Canudos State Park/BA; Canudos Biological Station/BA; Private National Heritage Reserve - RPPN Fazenda Flor de Lis/BA and Biological Reserve - REBIO de Serra Negra/PE (Velloso *et al*., 2002; Amorim & Bautista, 2016). In spite of being a semi-arid region, the Caatinga is heterogeneous, with mountainous refuges, temporary humid areas and permanent rivers like the São Francisco River.

In areas of Raso da Catarina, in the state of Bahia, studies of conidial fungi associated with the decomposition of plant substrates were carried out by Da Cruz *et al*. (2007, 2008) and Cruz & Gusmão (2009a, b). As of 2012, research on Ascomycota (non-lichenized sexual, lichenized sexual and asexual) has been intensified with taxonomic studies carried out in areas referring to the southern part of this Ecoregion (Silva & Vitória, 2023; Fortes & Vitoria, 2022; Fortes et al., 2020; Vitória *et al*., 2022, 2020, 2016; Rocha & Vitória; Rocha et al., 2023; Barbosa & Vitória, 2019; Souzaet alWN., 2021; Santos et al., 2023, 2020 a,b, 2019, 2017). In the territorial portion of Pernambuco, studies with lichenized Ascomycota were carried out by Sobreira (2015), Santos (2015) and Dos Santos *et al*. (2016) which are part of the group coordinated by M. Cáceres, specialist in Liquenology. The works published in Raso da Catarina are important, contributing to the expansion of knowledge about the distribution of fungi in the Caatinga, including new occurrence records and species new to science.

Many species collected in the Raso da Catarina Ecoregion are found in scientific collections that act as information banks, revealing the mycodiversity. Even so, not all of the country's herbariums, like small collections, have their collections registered in the Brazilian Herbarium Network of the Brazilian Botanical Society and/or in the Index Herbariorum and made available on virtual platforms, like those of the Herbarium Virtual Reflora, the National Science and Technology Institute (INCT) Virtual Herbarium of Flora and Fungi, and in the SibBr (Systems of Information on Biodiversity), a platform of the federal government, amongst others.

The inventory of fungal species is a necessary step that remains to be achieved in most countries (Lopes *et al*., 2014). Therefore, it is important to carry out surveys and mappings to make it possible to know and characterize diversity, proposing conservation strategies. In this context, this work aimed to organize and discuss the information and data related to the fungi in the Raso da Catarina, cataloging and presenting the first checklist of Ascomycota in an insufficiently researched locality, adding knowledge of scientific collections, publications and field expeditions.

2 METHODOLOGY

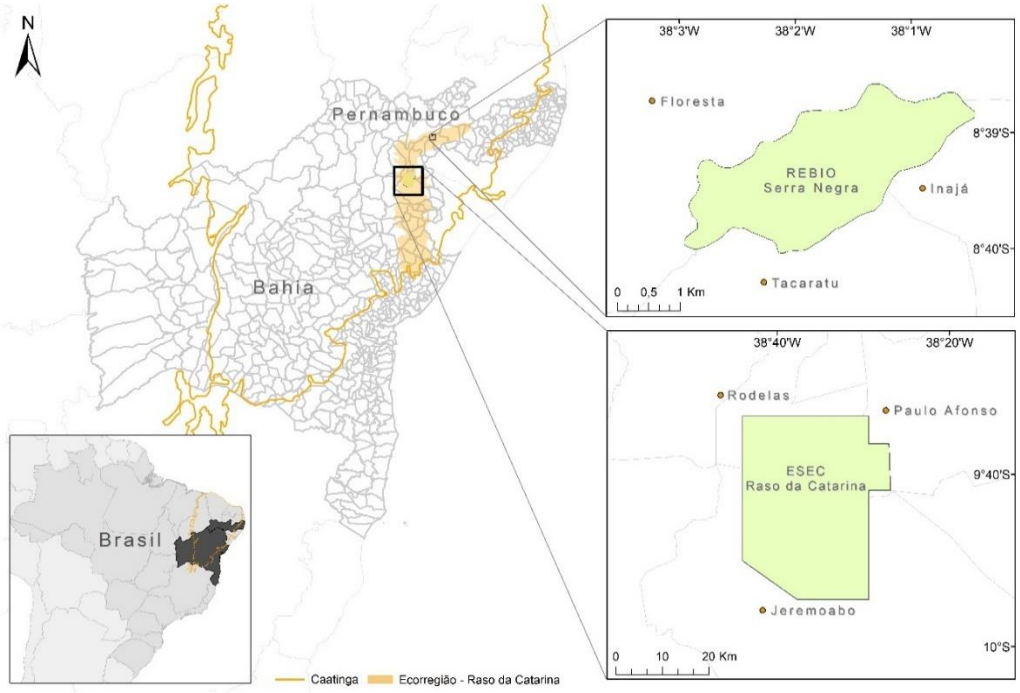
The data survey was based on: 1) exhaustive literature searches on Ascomycota from the Raso Ecoregion of Catarina; 2) queries to the lists of Fungal Databases, U.S. National Fungus Collections (Farr & Rossman, 2021) and the EMBRAPA/Fungos database Reported on Plants in Brazil (Mendes & Urben, 2023) and Mycology Collections Portal (MyCoPortal,

2023); 3) queries to the species networksLink (2023), integrates data from scientific collections, the Herbarium Virtual Reflora and the INCT-Herbarium Virtual of Flora and Fungi. In addition, in the state of Bahia, expeditions were made in areas of the Raso da Catarina in the municipalities of Paulo Afonso, Jeremoabo and Glória, as well as in the Raso Ecological Station of Catarina (Figure 1). In Pernambuco, research with liquefied ascomycetes conducted by M. Cáceres in REBIO de Serra Negra, located in the municipalities of Floresta and Inajá, were also considered in the sampling, since it is one of the conservation units in the Ecoregion. According to the Instituto Socioambiental (https://uc.socioambiental.org/arp/989), in REBIO of Serra Negra, 40% of the vegetation is typical of the Caatinga and the rest shows predominant vegetation of Brejo de Altitude (Figure 1), that is, dense montana ombrophile forest, also called serrana forest (Pereira *et al.*, 2010).

The genera and species are listed alphabetically. The scientific names were checked in the following databases: Species Fungorum (http://www.speciesfungorum.org), Index Fungorum (http://www.indexfungorum.org/) and Mycobank (https://www.mycobank.org/).

Figure 1

Geographical location of areas with Ascomycota species records in the Raso da Catarina Ecoregion, Caatinga, Brazil.



3 RESULTS AND DISCUSSION

A total of 243 Ascomycota taxa distributed in 148 genera were recorded in the survey. Among the ascomycetes listed, 75 are asexual fungi, 85 are lichenized sexual, and 73 are non-lichenised sexual (Table 1). Of these, 24 species are in synonymy: *Anthostomella palmaria* B.S. Lu & K.D. Hyde, *Arthonia cinnabarina* (DC.) Wallr., *Caryospora callicarpa* (Curr.) Nitschke ex Fuckel, Chaetomium indicum *Corda, Dictyochaeta britannica (M.B.Ellis) Whitton, McKenzie & K.D.Hyde*, Dischloridium laeense (Matsush.) B.Sutton, Graphisrustica & Curt., *Helicosporium pallidum* Ces., SERVICE Sivan., *Latorua grootfonteinensis* Crous, *Memnoniella echinata (Rivolta) Galloway*, Munkovalsaria donacina(Niessl) Aptroot, Myrothecium gramineumLib., *Myrothecium verrucaria*(Alb. Ditmar, *Neocosmospora vasinfecta* E.F. Sm., *Pithomyces chartarum(Berk. & M.A.A.)* Tul. & C. Tul., *Pleospora herbarum* (Pers.) Rabenh., *Porina alba* (R. Sant.) Lücking, *Porina mastoidea* Arg., *Porina octomera* (Müll. Arg.) F. Schill., Porina rubentior (Stirt.) Arg. and *Volutella minimum* Höhn.

Table 1

Ascomycetes recorded in the Raso ecoregion of Catarina identified in their sexual and asexual reproductive phases.

ASSEXUAIS	SEXUAIS LIQUENIZADOS	SEXUAIS NÃO LIQUENIZADOS
Acremonium sp.	*Arthonia cinnabarina* (DC.) Wallr.	*Arcopilus cupreus* (L.M. Ames) X.Wei Wang & Samson
Acrogenospora sphaerocephala (Berk. & Broome) M.B.Ellis	*Arthonia* sp.	*Anteaglonium* sp.
Alternaria sp.	*Asterothyrium microsporum* R. Sant.	*Anteaglonium parvulum* (W.R. Gerard) Mugambi & Huhndorf
Aplosporella sp.	*Buellia multispora* Kalb & Vězda	*Anthostomella caricis* S.M. Francis
Apoharknessia eucalypti Crous & Crous & M. J. Wingf.	*Buellia* sp.	*Anthostomella leptospora* (Sacc.) S.M. Francis
Aspergillus flavus Link	*Calopadia foliicola* (Fée) Vězda	*Anthostomella palmaria* B.S. Lu & K. D. Hyde
Aspergillus sp.	*Calopadia fusca* (Müll. Arg.) Vězda	*Anthostomella* sp.
Atrosetaphiale flagelliformis Matsush.	*Calopadia phyllogena* (Müll. Arg.) Vězda	*Apiosordaria nigeriensis* Stchigel & Guarro

Beltraniella portoricensis (F.Stevens) Piroz. & S.D.Patil	*Calopadia puiggarii* (Müll. Arg.) Vězda	*Apiosordaria* sp.
Beltrania rhombica Penz.	*Calopadia subcoerulescens* (Zahlbr.) Vězda	*Astrosphaeriella* sp.
Beltrania sp.	*Caloplaca crocina* (Kremp.) Marcelli	*Aulographum* sp.
Bipolaris sp.	*Caloplaca* sp.	*Bertia rasocatarinensis* M.A.L. dos Santos, R.J.V. Oliveira, N.S. Vitória & J.L. Bezerra
Chaetopsina fulva Rambelli	*Cryptothecia* sp.	*Capronia pilosella* (P. Karst.) E. Müll., Petrini, P.J. Fisher, Samuels & Rossman
Chalara alabamensis Morgan-Jones & E.G.Ingram	*Chrysothrix xanthina* (Vain.) Kalb.	*Botryosphaeria* sp.
Chlamydomyces palmarum (Cooke) E.W. Mason	*Cladonia* sp.	*Camarotella acrocomiae* (Mont.) K.D. Hyde & P.F. Cannon
Cryptophiale kakombensis Piroz.	*Coenogonium strigosum* Rivas Plata, Lücking & Chaves	*Camarotella torrendiella* (Bat.) J.L. Bezerra & Vitória
Curvularia sp.	*Coniocarpon cinnabarinum* DC.	*Capsulospora brunneispora* K.D. Hyde
Curvularia eragrostidis (Henn.) J.A.Mey	*Dictyomeridium proponens* (Nyl.) Aptroot, M.P. Nelsen & Lücking	*Caryospora* aff. *callicarpa* (Curr.) Nitschke ex Fuckel
Darkera sp.	*Dirinaria applanata* (Fée) D.D. Awasthi	*Caryospora putaminum* (Schwein.) De Not.
Dictyochaeta britannica (M.B.Ellis) Whitton, McKenzie & K.D.Hyde	*Dirinaria confusa* D.D. Awasthi	*Caryospora* sp.
Dictyochaeta simplex (S.Hughes & W.B.Kendr.) Hol.-Jech.	*Dirinaria melanocarpa* (*Müll. Arg.*) *C.W. Dodge*	*Chaetomium convolutum* Chivers

Digitodesmium sp.	*Dirinaria purpurascens (Vain.) B.J. Moore*	*Chaetomium* sp.
Diplodia euterpes Syd.	*Enterographa pallidella (Nyl.) Redinger*	*Chaetomium globosum* Kunze
Diplodia galiicola Dissan., Camporesi & K.D. Hyde	*Fissurina incrustans* Fée	*Chaetomium indicum Corda*
Dischloridium laeense (Matsush.) B.Sutton	*Graphis dupaxana* Vain.	*Chaetomium subaffine* Sergeeva
Endocalyx melanoxanthus (Berk. & Broome) Petch	*Graphis lineola* Ach.	*Chaetomium* sp.
Fusariella obstipa (Pollack) S.Hughes	*Graphis* aff. *rustica* Kremp	*Delitschia* sp.
Fusarium sp.	*Gyalectidium areolatum* L.I. Ferraro & Lücking	*Diatrypella heveae* Senwanna, Phookamsak & K.D. Hyde
Gyrothrix microsperma (Höhn.) Piroz.	*Gyalectidium caucasicum* (Elenkin & Woron.) Vezda	*Diatrype* aff. *bermudensis* Rappaz
Gyrothrix sp.	*Gyalectidium denticulatum* Lücking	*Diatrypella caryotae* R.K. Verma
Helicoma microscopicum (Ellis) Linder	*Gyalectidium filicinum* Müll. Arg.	*Diatrypella persicae* Rick
Helicoma sp.	*Haematomma persoonii* (Fée) A. Massal.	*Dichotomopilus funicola* (Cooke) X.Wei Wang & Samson
Helicosporium griseum Berk. & Curt.	*Haematomma* sp.	*Dichotomopillus indicus* (Corda) X.Wei Wang & Samson
Helicosporium pallidum Ces.	*Lecanora achroa* Nyl.	*Didymosphaeria massarioides* Sacc. & Brunaud
Helicosporium panacheum R.T.Moore	*Lecanora argentata* (Ach.) Malme	*Didymosphaeria* sp.
Helicosporium virescens (Pers.) Sivan.	*Lecanactis elaeocarpa* (Nyl.) Tehler	*Echidnodes glonioides* (Rehm) Syd. & P. Syd.
Heliocephala zimbabweensis Decock, V. Robert & Masuka	*Lecanora helva* Stizenb.	*Emericella* sp.
Henicospora coronata B. Sutton & P.M. Kirk.	*Lecanora leprosa* Fée	*Eurotium* sp.
Idriella setiformis R.F.Castañeda & G.R.W.Arnold	*Lecanora tropica* Zahlbr.	*Eutypella* aff. *fraxinicola* (Cooke & Peck) Sacc.
Kionochaeta ramifera (Matsush.) P.M.Kirk & B.Sutton	*Lecanora subimmersa* (Fée) Vain.	*Fasciatispora petrakii* (Mhaskar & V.G. Rao) K.D. Hyde

Lasiodiplodia theobromae (Pat.) Griffon & Maubl.	*Letrouitia domingensis* (Pers.) Hafellner & Bellem.	*Gloniopsis* sp.
Latorua caligans (Bat. & H.P. Upadhyay) Crous	*Leucodecton occultum* (Eschw.) Frisch	*Gloniopsis praelonga* (Schwein.) Underw. & Earle
Latorua aff. *grootfonteinensis* Corus	*Malmidea leptoloma* (Müll. Arg.) Cáceres & Lücking	*Glonium* sp.
Memnoniella echinata (Rivolta) Galloway	*Malmidea vinosa* (Eschw.) Kalb & Lücking	*Hypoxylon* sp.
Menisporopsis theobromae S.Hughes	*Mazosia melanophthalma* (Müll. Arg.) R. Sant.	*Hysterium angustatum* Alb. & Schwein.
Myrmecridium schulzeri var. *schulzeri* (Sacc.) Arzanlou, W. Gams & Crous	*Ocellularia papillata* (Leight.) Zahlbr.	*Hysterobrevium mori* (Schwein.) E. Boehm & C.L. Schoch
Myrothecium gramineum Lib.	*Opegrapha* sp.	*Javaria* aff. *samuelsii* Boise
Myrothecium leucotrichum (Peck) M.C.Tulloch	*Parmelia bangii* Vain.	*Leptosphaeria* sp.
Myrothecium verrucaria (Alb. & Schwein.) Ditmar	*Parmotrema bangii* (Vain.) Hale.	*Linocapon* sp.
Neojohnstonia minima Gusmão & Grandi	*Parmotrema mesotropum* (*Müll.Arg.*) *Hale*	*Lophiotrema nucula* (Fr.) Sacc.
Nigrospora sp.	*Parmotrema* sp.	*Macrovalsaria megalospora* (Mont.) Sivan.
Oidium bixae Viégas	*Pertusaria carneola* (Eschw.) Müll. Arg.	*Massarina* sp.
Penicillium sp.	*Pertusaria* cf. *dehiscens* Müll. Arg.	*Melanospora zamiae* Corda
Periconia byssoides Pers.	*Pertusaria flavens* Nyl.	*Microascus macrosporus* (G.F. Orr) Sand.-Den.
Periconia cookei E.W.Mason & M.B.Ellis	*Phaeographis dendritica* (Ach.) Müll. Arg.	*Microascus* sp.
Pestalotiopsis sp.	*Polymeridium julelloides* E.L. Lima, M. Cáceres & Aptroot	*Munkovalsaria donacina* (Niessl) Aptroot

Phaeoisaria aff. *pseudoclematidis* D.Q. Dai & K.D. Hyde	*Polymeridium* sp.	*Neocosmospora* aff. *vasinfecta* E.F. Sm.
Phialocephala humicola S.C.Jong & E.E.Davis	*Porina africana* Müll. Arg.	*Neolinocarpon attaleae* N.S. Vitoria & J.L. Bezerra.
Pithomyces chartarum (Berk. & M.A.Curtis) M.B.Ellis	*Porina alba* (R. Sant.) Lücking	*Oedohysterium sinense* (Teng) E. Boehm & C.L. Schoch
Seimatosporium corni Wijayaw.	*Porina conspersa* Malme	*Oxydothis daemonoropsicola* J. Fröhl. & K.D. Hyde
Spegazzinia sp.	*Porina cryptostoma* Malme	*Oxydothis* sp.
Stachybotrys echinatus (Rivolta) G. Sm.	*Porina fulvella* Müll. Arg.	*Phaeosphaeriopsis amblyospora* A.W. Ramaley
Stachybotrys globosus P.C. Misra & S.K. Srivast.	*Porina mastoidea* (Ach.) Müll. Arg.	*Phaeosphaeria* sp.
Stachybotrys kampalensis Hansf.	*Porina nucula* Ach.	*Phaeoseptum aquaticum* Ying Zhang, J. Fourn. & K.D. Hyde
Stachybotrys nephrospora Hansf.	*Porina octomera* (Müll. Arg.) F. Schill.	*Pleoseptum* sp.
Stachybotrys parvispora S.Hughes	*Porina rubentior* (Stirt.) Müll. Arg.	*Pleospora* aff. *herbarum* (Pers.) Rabenh.
Stachybotrys sp.	*Porina rufula* (Kremp.) Vain.	*Pleospora calvescens* (Fr. Ex Desm.) Tul. & C. Tul.
Stilbella fimetaria (Pers.) Lindau.	*Porina tetracerae* (Afz. in Ach.) Müll. Arg.	*Pleospora* sp.
Tetraploa aristata Berk. & Broome	*Pyrenula infraleucotrypa* Aptroot & M. Cáceres	*Rhytidhysteron brasiliense* Spreg.
Tiarosporella sp.	*Pyrenula mamillana* (Ach.) Trevis.	*Saccardoella macrasca* (Sacc.) M.E. Barr
Torula herbarum (Pers.) Link	*Pyrenula quassiicola* Fée	*Sporormiella* sp.
Vermiculariopsiella immersa (Desm.) Bender	*Pyrenula ochraceoflava* (Nyl.) R.C. Harris	*Terriera pandani* (Tehon.) P.R. Johnst.
Verticicladium trifidum Preuss	*Pyxine cocoes* (Sw.) Nyl.	*Xylaria arbuscula* Sacc.
Volutella minima Höhn.	*Pyxine* cf. *subcinerea* Stirt.	

Wojnowiciella viburni (Wijayaw., Yong Wang bis & K.D. Hyde) Crous, M. Hern.-R.	*Ramboldia haematites* (Fée) Kalb, Lumbsch & Elix
	Sclerophyton elegans Eschw.
	Strigula antillarum (Fée) R. Sant.
	Strigula maculata (Cooke & Massee) R. Sant.
	Strigula smaragdula Fr.
	Strigula subtilissima (Fée) Müll. Arg.
	Tricharia carnea (Müll. Arg.) R. Sant.
	Tricharia paraguayensis (L.I. Ferraro & Lücking) Lücking
	Tricharia urceolata (Müll. Arg.) R. Sant.
	Tricharia vainioi R. Sant.
	Xanthoparmelia plittii (Gyeln.) Hale

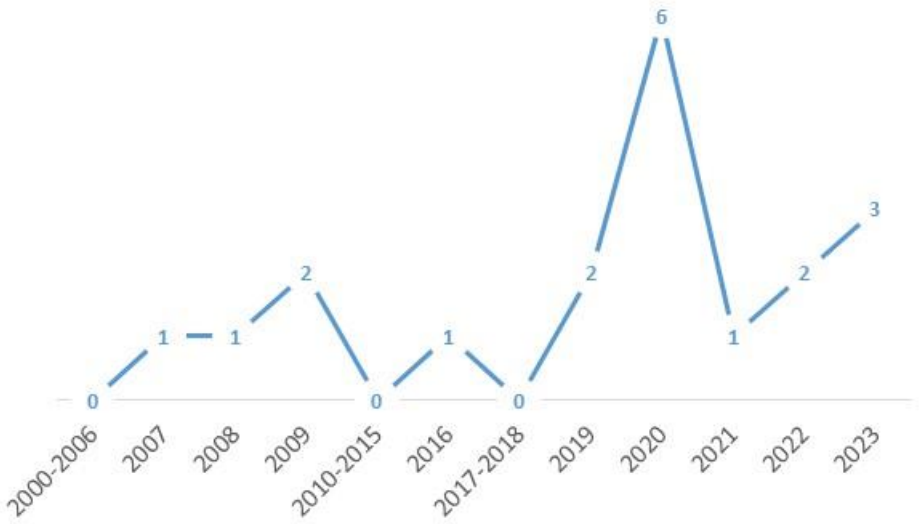
Source: authors 2023

The cataloged species are deposited in the following scientific collections: Herbarium of the State University of Feira de Santana-HUEFS, Herbarium of the Federal University of Sergipe *CampusUniversityProf. Alberto Carvalho, Itabaiana/Sergipe-ISE, Herbarium Fr.* Camille Torrend from the Federal University of Pernambuco-URM, Recife, at the Mycology Laboratory of the State University of Bahia, *Campus* VIII, Paulo Afonso-Bahia, at the Arizona State University Lichen Herbarium-ASU-Lichen and at the Wisconsin State Herbarium-WIS-L.

The number of articles published on Ascomycota in the Raso region of Catarina in the last two decades has been small and inconstant (Figure 2).

Figure 2

Articles published on Ascomycota in areas of the Raso Ecoregion of Catarina, Brazil in the last two decades.



Generally speaking, the survey of fungi registered for the Caatinga biome is restricted to the work of Maia *et al*. (2015) which listed 999 species. At present, knowledge about the occurrence of ascomycetes for this biome remains scarce. Data from Flora e Funga do Brasil (2023) lists 1088 species of fungi for the Caatinga. However, a lot of data has not yet been included. In addition, several herbariums do not have online collection of fungal records or organize plant and fungal families together, making data analysis difficult. Northeastern Brazil has 37 herbariums, but only 14 of these have fungi in the collections (Maia *et al*., 2019).

The Raso da Catarina, which is one of the Caatinga ecoregions, has extreme biological importance. Nonetheless, mycological studies are scarce and, as a result, the mycota of many localities is insufficiently known.

In the state of Bahia, the studies carried out covered only three municipalities in the Ecorregion (Paulo Afonso, Jeremoabo and Glória). In areas that include the other municipalities of Raso da Catarina, such as Canudos, Macururé, Santa Brigida, Ribeira do Pombal and Rodela, among others, there is no systematic research with fungi. Mycological excursions were made only at the Raso da Catarina Ecological Station (ESEC Raso da Catarina). Research should be expanded to other Ecoregion Conservation Units such as Canudos State Park, Canudos Biological Station, RPPN Fazenda Flor de Lis and APA Serra Branca because of the biological and historical importance of these units.

In the north of Bahia, the University of the State of Bahia, *Campus* VIII, Paulo Afonso, houses a small scientific and didactic collection at the Mycology Laboratory, with representatives of over 250 identified and preserved taxons, originating from collections carried out in the period from 2012 to 2022. Many specimens collected in these areas were also incorporated into the URM Herbarium of the Federal University of Pernambuco, in Recife. The researches carried out at UNEB *Campus* VIII are taxonomic and ecological on ascomycetes in botanical substrates and the works published for this area have revealed a significant mycological diversity.

At the State University of Feira de Santana, studies conducted from 2005 to 2009 with asexual fungi associated with the decomposition of plant substrates in various vegetational types were conducted in areas of Raso da Catarina in the municipalities of Paulo Afonso/BA and Jeremoabo/BA. The specimens are found in the HUEFS Herbarium.

In the territorial portion of Pernambuco, there is the REBIO of Serra Negra, one of the Conservation Units of the Raso da Catarina Ecoregion, covering part of the municipalities of Floresta, Inajá and Tacaratu. Characterized as an Altitude Brejo surrounded by Caatinga, in the area were recorded Cladonia sp., in 1951, P. *bangii* and *P.bangii in 1971, P.bangii in 1971, and ArbusculaEMx. in 2014.* These specimens are preserved in the Herbariums URM, ASU-Lichen and WIS-L. Santos (2015), Dos Santos *et al*. (2016) and Sobreira (2015) carried out the first systematized research, identifying and registering the lichenized mycota of this area. The works of Santos (2015) and Dos Santos *et al*. (2016) have documented a total of 25 lichenized ascomycetes of foliage habit.

Although the REBIO of Serra Negra is in the territorial portion of the Raso da Catarina Ecoregion, it presents 60% of the predominant vegetation of Brejos de Altitudes. These Brejos are surrounded by Caatinga vegetation (Santos, 2015). All material examined by Santos (2015), Dos Santos *et al*. (2016) and Sobreira (2015) is preserved in the ISE, herbarium created to serve exclusively as depositary of lichenized fungi.

Cataloging the ascomycetes that occur in the Raso da Catarina Ecoregion, organizing the information and related data in order to make this knowledge available is important, because it makes it possible to think and propose means for preserving fungi in the region. Data not yet published or in the process of being published could not be incorporated at this time. Thus, this can be considered a preliminary list with information from 1951 to 2023, representing an initiative to systematize research developed in the Raso da Catarina, with the aim of adding knowledge to the estimate of Ascomycota species in the Caatinga.

4 CONCLUSION

The data presented in this work highlight the need to expand efforts on fungi in areas of the Raso da Catarina Ecoregion, still little known, to improve the representativeness of Ascomycota in the Caatinga biome, reducing the lack of information. The few existing publications provide data that reveal taxonomic novelties. Thus, the continuity of research is the basis for the increase of knowledge and works like this are motivating.

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