

Checklist of *Russulaceae* from Brazil

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ABSTRACT — A checklist of species belonging to the family *Russulaceae* in Brazil is provided. The list, which includes all species recorded in Brazil up to 2013, cites 3 genera and 41 species covering 21 *Lactarius*, 17 *Russula*, and 3 *Lactifluus* species. Brief descriptions, distribution notes, and references are provided.

KEY WORDS — distribution, tropical fungi, habitat

Introduction

Russulaceae Lotsy is mostly characterized by the presence of ballistosporic, amyloid, ornamented basidiospores, heteromerous trama with sphaerocysts and laticifers (Pegler & Young 1979; Buyck 1993; Moncalvo et al. 2000; Miller et al. 2006). This family has gasteroid, pleurotoid and agaricoid basidiomes and most of them have ectomycorrhizal associations (Buyck 1993; Henkel et al. 2000; Smith & Read 2008).

Studies of *Russulaceae* in Brazil began with *Panus reticulatus* Berk [= *Lentinus reticulatus* (Berk.) Singer] (Berkeley, 1856). Rick (1906) worked in Rio Grande do Sul, south Brazil, and later, Singer (1953) performed type studies of the Rick species. Singer et al. (1983) published a book with several *Russulaceae* taxa from Neotropical lowlands (mostly Central Amazonia) and Singer (1984) published more species from Amazonia. Pegler (1997) published species from São Paulo state, Buyck & de Meijer (1999) and de Meijer (2001, 2006, 2008) from Paraná, and Giachini et al. (2000) from Santa Catarina. More recently Wartchow & Cavalcanti (2010), Sá et al. (2013) and Wartchow et al. (2013) published species from Northeast and Sá & Wartchow (2013) from South Brazil.

In this paper we present a checklist of *Russulaceae* reported from Brazil, providing respective references and provide data on basidiospores and habitat.

Materials & methods

The checklist was based on a survey of scientific papers and books that cite species of *Russulaceae* from Brazil. The information retrieved from the literature includes the following: distribution records per state, notes about general habitat and substrates, basidiospore measurements and shapes, and size of the basidiospore ornamentation. For the distribution data, the Brazilian state is listed first followed by the city or other locality information.

Genera and species are listed alphabetically according to MycoBank (<http://www.mycobank.org/MycoTaxo.aspx>) and Index Fungorum (<http://www.indexfungorum.org/names/names.asp>) database. The authorities for the binomials are based on databases.

Checklist for *Russulaceae* cited from Brazil

Lactifluus (Pers.) Roussel

Lactifluus aurantiorugasus Sá & Wartchow

DISTRIBUTION: Rio Grande do Sul: Morrinhos do Sul

NOTES: According to Sá et al. (2013) this species occurs widespread on humus soil near to roots of *Ficus* sp. (*Moraceae*) in Atlantic Forest. Basidiospores: (7-)7.5-10.5 × (4.7-)6-8 µm, broadly ellipsoid to ellipsoid, ornamentation amyloid, finely verrucose with each wart ranging to 0.7 µm high, interconnected by fine lines, but very infrequently forming a complete reticulum.

LITERATURE: Sá & Wartchow 2013.

Lactifluus batistae Wartchow, J.L. Bezerra & M. Cavalc.

DISTRIBUTION: Bahia: Ilhéus.

NOTES: According to Wartchow et al. (2013) this species occurs on sandy soil near members of *Leguminosae* subfam. *Caesalpinioideae* and other in Atlantic Forest fragment. Basidiospores: (6.5-)6.7-8.3(-8.5) × (5.2-)5.5-6.5(-7) µm, broadly ellipsoid to ellipsoid, occasionally subglobose, with ornamentation amyloid, finely verrucose, isolated with each wart ranging from 0.5-0.7 (- 1.4) µm high.

LITERATURE: Wartchow et al. 2013.

Lactifluus dunensis Sá & Wartchow

DISTRIBUTION: Rio Grande do Norte: Natal.

NOTES: According to Sá et al. (2013), this species is gregarious on sandy soil in dune vegetation. Basidiospores: (6.1-)6.6-8.2(-8.7) × (5.6-)6.1-7.1(-7.7) µm, subglobose to ellipsoid, occasionally globose, with ornamentations forming a complete reticulum up to 0.8 µm.

LITERATURE: Sá et al. 2013.

Lactarius Pers.

Lactarius amazonensis Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs on raw humus in campinarana vegetation in Amazonia, associated with *Leguminosae* and *Sapotaceae*. Basidiospores: $8.5\text{--}11 \times 7\text{--}8.5 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations forming a partial reticulum projecting $0.2\text{--}0.6 \mu\text{m}$.

LITERATURE: Singer & Araujo 1979; Singer et al. 1983.

Lactarius annulifer Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs under leguminous trees and *Sapotaceae* in campinarana-type vegetation on sandy soil and debris. Basidiospores: $8.8\text{--}13 \times 8\text{--}10 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations forming a complete reticulum, projecting $0.5\text{--}0.7 \mu\text{m}$.

LITERATURE: Singer & Araujo 1979; Singer et al. 1983.

Lactarius argillaceifolius Hesler & A.H. Sm. var. *argillaceifolius*

DISTRIBUTION: Santa Catarina: Joinville and Rio Vermelho.

NOTES: According to Hesler & Smith (1979) this species occurs common and scattered to gregarious in low hardwood forests especially with oak in the United States. In Brazil these species occur on soil of plantations of *Pinus*. Basidiospores: $(7\text{--})8\text{--}10(\text{--}11) \times 7\text{--}8 \mu\text{m}$, subglobose to broadly ellipsoid, ornamentation isolated forming at most a broken reticulum, projecting $0.5\text{--}1 \mu\text{m}$.

LITERATURE: Giachini et al. 2000; Sulzbacher et al. 2013.

Lactarius brasiliensis Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs in campina and campinarana vegetation on humus mixed with rotten pieces of wood, gregarious, associated with *Leguminosae* and *Sapotaceae*. Basidiospores: $7.5\text{--}11 \times 7\text{--}8 \mu\text{m}$, subglobose, with ornamentations forming a partial reticulum sometimes isolated, projecting $0.3\text{--}0.6 (\text{--}1) \mu\text{m}$.

LITERATURE: Singer & Araujo 1979; Singer et al. 1983.

Lactarius braunii Rick

DISTRIBUTION: Rio Grande do Sul: Porto Alegre and São Leopoldo. São Paulo: Campos do Jordão.

NOTES: According to Rick (1938) and Sulzbacher et al. (2013) this species occurs on soil. According to Singer (1953b) the basidiospores: $7\text{--}8.2 \times 5.5\text{--}7 \mu\text{m}$, with ornamentation forming a complete reticulum, projecting $0.2\text{--}0.5 \mu\text{m}$.

LITERATURE: Rick 1938; Singer 1953b; Rick 1961; Singer et al. 1983; Raithelhuber 1991; Sulzbacher et al. 2013.

Lactarius deliciosus (Fr.) Gray

DISTRIBUTION: Paraná: Colombo. Rio Grande do Sul: in the “highlands” as Sobestiansky (2005) referred. Santa Catarina: Correia Pinto.

NOTES: According to Sulzbacher et al. (2013) the habitat of this species is soil close to *Pinus* plantations, including *P. taeda* L. According to Hesler & Smith (1979) the basidiospores: $8\text{--}10\text{--}(11) \times 7\text{--}9\text{--}(9) \mu\text{m}$, ellipsoid, with ornamentations forming an incomplete reticulum, up to $0.3\text{--}0.5 \mu\text{m}$ high.

LITERATURE: Guerrero & Homrich 1999; Giachini et al. 2000; Sobestiansky 2005; de Meijer 2006; Sulzbacher et al. 2013.

Lactarius fragilis (Burl.) Hesler & A. H. Sm. var. *fragilis*

DISTRIBUTION: Santa Catarina: Correia Pinto, Joinville and Três Barras.

NOTES: According to Hesler & Smith (1979) the habitat is soil. Basidiospores: $6\text{--}7.5 \mu\text{m}$, globose to subglobose, with ornamentation forming an incomplete reticulum, up to $0.5\text{--}1 \mu\text{m}$ high. In Brazil, these species occur on soil in *P. elliottii* and *P. taeda* plantations (Sulzbacher et al. 2013).

LITERATURE: Giachini et al. 2000; Karstedt & Stürmer (2008 as *Lactarius cf. fragilis*), Sulzbacher et al. 2013.

Lactarius gigasporus Singer

DISTRIBUTION: Amazonas: Ponta Negra.

NOTES: According to Singer et al. (1983) this species occurs on the ground in igapó vegetation, gregarious near leguminous trees. Basidiospores: $14\text{--}16 \times 14\text{--}15 \mu\text{m}$ (without ornamentation $10\text{--}11 \times 9.8\text{--}11 \mu\text{m}$), globose to subglobose, with ornamentations forming a complete reticulum, projecting $2\text{--}3.3 \mu\text{m}$.

LITERATURE: Singer et al. 1983; Singer & Aguiar 1986.

Lactarius igapoensis Singer

DISTRIBUTION: Amazonas: Igarapé de Tarumãzinho.

NOTES: According to Singer (1984) this species occurs on common subiculum covering the base of living tree and the slit above living creeping rootlets of dicotyledonous trees, parasitic. Basidiospores: $7.3\text{--}9.3$

× 6.8–7.8 µm, globose to short ellipsoid, with ornamentations forming a partial reticulum, projecting 0.4–0.5 (–0.6) µm.

LITERATURE: Singer et al. 1983; Singer 1984; Singer & Aguiar 1986.

Lactarius mamorensis Singer

DISTRIBUTION: Amazonas: Igarapé de Tarumãzinho.

NOTES: According to Singer et al. (1983) this species occurs along riverside, mostly on detritus or dead wood over sandy soil, but also on soil poorer in sandy matter, in dense tropical rain forest along the rivers. Basidiospores: 6.7–10.7 (–11.2) × 5.8–9.3 (–10) µm, globose to subglobose, with ornamentations forming a complete reticulum, projecting 0.5–1 µm.

LITERATURE: Singer et al. 1983; Singer & Aguiar 1986.

Lactarius pallidipes Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 125.

NOTES: According to Singer et al. 1983 this species occurs on rotten wood at the base of trees, associated with leguminous trees of campinarana type vegetation. Basidiospores: 8.7–13.5 × 7.5–11.5 µm, subglobose to short ellipsoid, with ornamentations forming a partial reticulum, projecting 0.2–0.6 (–0.8) µm, but mostly about 0.5 µm.

LITERATURE: Singer et al. 1983.

Lactarius panuoides Singer

DISTRIBUTION: Amazonas: Reserva Egler.

NOTES: According to Henkel et al. (2000) this species occurs in campinarana vegetation of Amazonia, on raw humus, associated with *Laguminosae* and *Sapotaceae*. Basidiospores: 7.5–9.5 × 7–8 µm, subglobose, hyaline with amyloid ornamentation forming an almost complete reticulum with small mesh, 0.5–1 µm high.

LITERATURE: Sousa & Aguiar 2004.

Lactarius paulensis Singer

DISTRIBUTION: Paraná: locality unknown. São Paulo: Serra da Cantareira.

NOTES: According to Singer et al. (1983) this species occurs in the margin of the forest, on soil, solitary. Basidiospores: 8.5–10 × 7–9 µm, with ornamentation forming a complete reticulum, projecting 0.5–1 µm.

LITERATURE: Singer et al. 1983; de Meijer 2001; Sulzbacher et al. 2013.

Lactarius reticulatus (Berk.) Singer

DISTRIBUTION: Amazonas: São Jerônimo (=Panuré).

NOTES: According to Berkeley (1856) this species occurs on the ground among the leaves. According to Pegler & Fiard (1979) and Singer et al.

(1983) the basidiospores: $7\text{--}9.5 \times 6.5\text{--}8.5 \mu\text{m}$, with ornamentation forming a complete reticulum, $0.5\text{--}1 \mu\text{m}$ high.

LITERATURE: Berkeley (1856 as *Panus reticulatus* Berk.); Pegler & Fiard 1979; Singer et al. 1983.

Lactarius rufus (Scop.) Fr. var. *rufus*

DISTRIBUTION: Paraná: Mandirituba and Piraquara. Rio Grande do Sul: Nova Petrópolis. Santa Catarina: Correia Pinto and Três Barras.

NOTES: According to Hesler & Smith (1979) this species occurs gregarious in *Sphagnum* mats spruce. Basidiospores: $7.5\text{--}10 \times 6\text{--}7.5 \mu\text{m}$, ellipsoid, with ornamentation isolated forming a partial reticulum, up to $0.3\text{--}0.5 \mu\text{m}$ high. In Brazil it occurs on soil and dead wood, close to *Pinus taeda* in dense ombrophilous forest.

LITERATURE: Giachini et al. 2000; de Meijer 2001; Sobestiansky 2005; Sulzbacher et al. 2013.

Lactarius rufus var. *parvus* Hesler & A.H. Sm.

DISTRIBUTION: Santa Catarina: Correia Pinto and Três Barras.

NOTES: According Hesler & Smith (1979) in the United States this species occurs gregarious on a decaying log of *Thuja plicata* Donn ex D. Don. partly covered with moss. Basidiospores: $(7\text{--})7.5\text{--}9 \times 5.5\text{--}6.5 \mu\text{m}$, with ornamentations in the form of a partial reticulum, up to $0.5\text{--}0.8 \mu\text{m}$. In Brazil these species occur on soil in plantations of *Pinus taeda* (Sulzbacher et al. 2013).

LITERATURE: Giachini et al. 2000; Sulzbacher et al. 2013.

Lactarius rupestris Wartchow

DISTRIBUTION: Pernambuco: Buíque and Catimbau.

NOTES: According to Wartchow & Cavalcanti (2010) the species is buried with up to $2/3$ of the stipe in sandy soil near several shrubs (Fabaceae subfam. Mimosoideae and others) in a semi-arid region, after heavy precipitation. Basidiospores: $(6.5\text{--})7\text{--}8.5(\text{--}9) \times (5.5\text{--})6\text{--}7(\text{--}7.5) \mu\text{m}$, broadly ellipsoid to ellipsoid, occasionally subglobose, occasionally globose, with ornamentations forming a complete reticulum, $0.5\text{--}0.7 \mu\text{m}$.

LITERATURE: Wartchow & Cavalcanti 2010.

Lactarius russula Rick

DISTRIBUTION: Rio Grande do Sul – Porto Alegre and São Leopoldo.

NOTES: According to Singer (1953b) the basidiospores: $8.5\text{--}10.5 \times 6.5\text{--}8.3 \mu\text{m}$, subglobose to subellipsoid, with ornamentation forming a partial reticulum, projecting $0.3\text{--}0.8 \mu\text{m}$.

LITERATURE: Rick 1907; Singer 1953b.

Lactarius subpallipides Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs in campinarana vegetation of Amazonas, on raw humus, associated with Leguminosae and Sapotaceae. Basidiospores: $7.5\text{--}9 \times 7\text{--}8 \mu\text{m}$, with ornamentation forming a complete reticulum, projecting about $0.5 \mu\text{m}$.

LITERATURE: Singer et al. 1983.

Lactarius subreticulatus Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs on sandy soil as well as humus and rotting dicotyledonous wood, solitary and in very small groups. Basidiospores: $8\text{--}8.8 \times 7\text{--}8 \mu\text{m}$, subglobose, with ornamentation forming a partial reticulum, projecting $0.6\text{--}1.3 \mu\text{m}$.

LITERATURE: Singer et al. 1983.

Lactarius venezuelanus Dennis

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45. Paraná: Antonina, Campina Grande do Sul, Morretes and Quatro Barras.

NOTES: According to Buyck & de Meijer (1999) this species occurs on decaying woody dicotyledonous twigs or raw humus, under leguminous trees of campinarana vegetation. Sulzbacher et al. (2013) reported that this species occurs on soil in dense ombrophilous forest, mixed ombrophilous forest, on dead wood in South Brazil. Basidiospores: $6.3\text{--}7.8\text{--}(8.1) \times 7\text{--}8.8\text{--}(9.1) \mu\text{m}$, subglobose to ellipsoid, with ornamentation forming a weakly amyloid network, up to $1 \mu\text{m}$ (Buyck & de Meijer 1999).

LITERATURE: Singer & Araujo 1979; Singer et al. 1983, as *Russula heterochroa* Singer, nom. inval. non Kühner; Buyck 1989, as *Russula obtusopunctata* Buyck; Buyck & de Meijer 1999; de Meijer 2001, 2006, 2008; Sulzbacher et al. 2013.

Russula Pers.

Russula amnicola Singer

DISTRIBUTION: Amazonas: Ponta Negra and Igarapé do Tarumãzinho.

NOTES: According to Singer et al. (1983) this species occurs on sandy soil in igapó forest, associated with rootlets of leguminous trees, in small groups. Basidiospores: $7.5\text{--}8.5 \times 6\text{--}6.8 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations isolated, projecting about $0.5 \mu\text{m}$.

LITERATURE: Singer et al. 1983; Singer & Aguiar 1986.

Russula batistae Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45. Pernambuco: Recife.

NOTES: According to Singer et al. (1983) this species occurs on the ground mostly on sandy soil or in raw humus in campina and campinarana vegetation, usually gregarious. Basidiospores: $7.3\text{--}12 \times 5.5\text{--}11.5 \mu\text{m}$, short ellipsoid, with ornamentations forming a complete reticulum, projecting $1\text{--}1.5 \mu\text{m}$.

LITERATURE: Singer 1955; Singer et al. 1983.

Russula campinensis (Singer) T.W. Henkel, Aime & S.L. Mill.

Distribution: Amazonas: Estrada Manaus-Caracará km 45.

Notes: According to Singer (1984) this species occurs gregarious but not cespitose or imbricate on dead trunks and stumps of dicotyledonous tree in campinarana vegetation, not parasitic, not lichenized. Basidiospores: $8\text{--}10.7 \times 8\text{--}9.7 \mu\text{m}$, subglobose, with ornamentations forming by fine lines, projecting $1.3\text{--}2 \mu\text{m}$.

Literature: Singer et al. 1983 as *Lactarius campinensis* Singer; Henkel et al. 2000.

Russula consobrina (Fr.) Fr.

DISTRIBUTION: Paraná: São José dos Pinhais. Rio Grande do Sul: Nova Petrópolis. São Paulo: Campos do Jordão.

NOTES: According to Sulzbacher et al. (2013) this species occurs on soil and at *Pinus* plantations. According to Pegler (1997) basidiospores: $8.5\text{--}10 \times 7.5\text{--}9 \mu\text{m}$, subglobose to ellipsoid, with ornamentations verrucose with a little or no connectives.

LITERATURE: Pegler 1997; de Meijer 2001, 2006; Sobestiansky 2005; Sulzbacher et al. 2013.

Russula epitheliosa Singer

DISTRIBUTION: Amazonas: 30 km N of Manaus.

NOTES: According to Singer et al. (1983) this species is lignicolous on a tree trunk in terra firme forest. Basidiospores: $9\text{--}11.5 \times 8\text{--}10 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations forming a complete reticulum, projecting $1\text{--}1.6 \mu\text{m}$.

LITERATURE: Singer et al. 1983.

Russula leguminosarum Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs on raw humus and dead superficial rootlets of leguminous trees in campinarana and

campina vegetation. Basidiospores: 9–10.7 × 8.5–9.9 μm, subglobose, with ornamentations isolated, projecting 1–1.5 μm.

LITERATURE: Singer et al. 1983; Buyck 1999.

Russula metachromatica Singer ssp. *metachromatica*

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs on the ground, mostly on sandy earth and litter but also on rotting trunks and fallen branches in very wet as well as relatively dry forests, in campina and campinarana vegetation associated with sapotaceus and leguminous trees.

Basidiospores: 6.7–12.3 × 6–11.3 μm, subglobose to broadly ellipsoid, with ornamentations forming a complete reticulum, projecting 0.7–1.5 μm.

LITERATURE: Singer et al. 1983 as *R. metachromatica* ssp. '*metachamatica*' [sic].

Russula metachromatica ssp. *notoleuca* Singer nom. inval.

DISTRIBUTION: Pernambuco: Paulista.

NOTES: According to Singer et al. (1983) this species occurs on secondary stand of latosol tropical rain forest, solitary. Basidiospores: 6.5–8 × 5.5–7.5 μm, subglobose, with ornamentations with ornamentations forming a complete reticulum, projecting 0.6–1.2 μm.

LITERATURE: Singer et al. 1983.

Russula metachromatica ssp. *tarumaensis* Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45 and km 125.

NOTES: According to Singer et al. (1983) this species occurs on the ground among litter, solitary, only igapó forest during low-water level, associated with leguminous trees. Basidiospores: 6.7–10 × 6.8–8.7 μm, with ornamentations forming a complete reticulum, projecting 0.7–1.5 μm.

LITERATURE: Singer et al. 1983; Singer & Aguiar 1986.

Russula nanella Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 106.

NOTES: According with Singer et al. (1983) this species occurs on dead dicotyledonous wood in campinarana vegetation, gregarious. Basidiospores: 7.7–8(–8.5) × 6–7.2 (–7.8) μm, with ornamentations isolated sometimes with fine lines, projecting 0.5–1 μm [without ornamentation 5.5–7(–7.7) × 5–6.2 (–7.3) μm].

LITERATURE: Singer & Araujo 1979; Singer et al. 1983.

Russula pachycystis Singer

DISTRIBUTION: Amazonas: Estrada Manaus-Caracará km 45.

NOTES: According to Singer et al. (1983) this species occurs on rotten dicotyledonous, raw humus and sandy soil in campinarana vegetation near *Sapotaceae* and *Leguminosae*, often near roots of these trees or of *Chrysobalanaceae*. Basidiospores: $8\text{--}11.7 \times 7.5\text{--}10.8 \mu\text{m}$ (without ornamentation $7.5\text{--}8.7 \times 6.5\text{--}7.8 \mu\text{m}$), with ornamentations isolated sometimes with fine lines, projecting $1\text{--}1.7 \mu\text{m}$.

LITERATURE: Singer & Araujo 1979; Singer et al. 1983.

Russula pluvialis Singer

DISTRIBUTION: Amazonas: Igarapé de Tarumãzinho and Manaus. Pernambuco: Camaragibe.

NOTES: According to Singer et al. (1983) this species occurs in secondary forest and primary igapó forest as well as in coastal rain forests of northeastern Brazil, on lotosol and sandy soil, on wood and fallen leaves dicotyledonous tree. Basidiospores: $7\text{--}8.2\text{--}(9.5) \times 6\text{--}7\text{--}(8.5) \mu\text{m}$, subglobose to short ellipsoid, with ornamentations isolated, projecting $0.4\text{--}1 \mu\text{m}$.

LITERATURE: Singer et al. 1983; Singer & Aguiar 1986; Buyck 1999.

Russula puiggarii (Speg.) Singer

DISTRIBUTION: Amazonas: Igarapé de Tarumãzinho, Manaus and Ponta Negra. Paraná: Antonina. Rio Grande do Sul: São Leopoldo. Rondônia: Jaru. São Paulo: Apiaí.

NOTES: According to Singer et al. (1983) this species occurs on the ground and rotten tree, solitary or gregarious. Basidiospores: $(8.5\text{--})10.2\text{--}11 \times (8\text{--})9.8\text{--}10.7 \mu\text{m}$, subglobose, with ornamentations forming a complete reticulum, projecting $1\text{--}2 \mu\text{m}$. According to Sulzbacher et al. (2013) this species occur in South Brazil in dense ombrophilous forest, mixed ombrophilous forest, on sandy soil, occurring on dead or rotten wood.

LITERATURE: Singer & Digilio 1951; Singer 1953a as *R. pectinata* (Bull.) Fr.; Singer et al. 1983, Singer & Aguiar 1986; Capelari & Maziero 1988, as *R. hygrophytica* Pegler; de Meijer 2001, 2006, 2008; Rick 1961, as *R. pectinata* (Bull.) Fr.; Sulzbacher et al. 2013.

Russula riograndensis Singer

DISTRIBUTION: Rio Grande do Sul – São Leopoldo and Porto Alegre.

NOTES: According to Sulzbacher et al. (2013) this species occurs on soil. According to Singer (1953) the basidiospores: $8.3\text{--}9 \times 7\text{--}7.5 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations crested, projecting $1\text{--}1.6 \mu\text{m}$.

LITERATURE: Singer 1953b; Rick 1961, as *R. subfragilis*; Singer 1983, as *R. subfragilis*; Sulzbacher et al. 2013.

Russula sororiicolor Singer

DISTRIBUTION: Amazonas: Igarapé de Tarumãzinho.

NOTES: According to Singer et al. (1983) this species occurs on leaf mold in small groups, in igapó vegetation. Basidiospores: $8\text{--}9.2 \times 7\text{--}7.5 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations forming a partial reticulum, projecting $0.3\text{--}0.7 \mu\text{m}$.

LITERATURE: Singer 1983.

Russula theissenii Rick

DISTRIBUTION: Rio Grande do Sul: São Leopoldo.

NOTES: According to Singer et al. (1983) this species occurs on soil in the forest. Basidiospores: $8.5\text{--}10.5 \times 6.5\text{--}9.5 \mu\text{m}$, with ornamentations forming a complete reticulum, projecting $0.2\text{--}0.9 \mu\text{m}$.

LITERATURE: Singer 1953a; Rick 1961; Singer et al. 1983; de Meijer 2001, 2006, 2008, all as ***Russula aff. theissenii*** Rick; Sulzbacher et al. 2013.

Russula verna Singer

DISTRIBUTION: Amazonas: 30 km N of Manaus.

NOTES: According to Singer et al. (1983) this species occurs on soil in primary of terra firme forest, on latosol, solitary, rare. Basidiospores: $6.8\text{--}8.5 \times 6\text{--}6.5 \mu\text{m}$, subglobose to short ellipsoid, with ornamentations isolated, projecting $0.3\text{--}1 \mu\text{m}$.

LITERATURE: Singer et al. 1983; Singer 1985.

Doubtful and undescribed taxa cited from Southern Brazil

Rick (1906, 1907, 1938) published these species from Southern Brazil, but Singer's (1953) review and didn't report them. Since these exsiccates were not analyzed by Singer or any other researcher, we cannot yet confirm that they occur in Brazil based on literature.

Lactarius distans Peck

DISTRIBUTION: Rio Grande de Sul: locality unknown.

NOTES: According to Rick (1938) the basidiospores: $6 \times 8 \mu\text{m}$.

LITERATURE: Rick 1938.

Lactarius fuliginosus (Krapf) Fr.

DISTRIBUTION: Rio Grande do Sul: locality unknown.

NOTES: According with Rick (1938) this species occurs in the forest, the basidiospores measure is $6\text{--}7.5 \mu\text{m}$. According with Hesler & Smith (1979) the basidiospores: $7.5\text{--}10 \times 6\text{--}8.7 \mu\text{m}$, often subglobose.

LITERATURE: Rick 1938.

Lactarius helvus (Fr.) Fr.

DISTRIBUTION: Rio Grande do Sul: locality unknown.

NOTES: According with Rick (1938) the species from Brazil are much smaller than the European species.

LITERATURE: Rick 1907, 1938.

Russula cf. dennisii Singer ex Buyck

DISTRIBUTION: Paraná: Antonina.

NOTES: According to de Meijer (2006) and Sulzbacher et al. (2013) this species occurs on dense ombrophilous forest, unknown substrate.

According to Buyck & de Meijer (1999) the basidiospores: (6.7–)6.9–9.1 × 5.2–7.2(–7.3) μm, ellipsoid, with ornamentation up to 1 μm high.

LITERATURE: de Meijer 2006; Sulzbacher et al. 2013.

Lactarius aff. necator (Bull.) Pers.

DISTRIBUTION: Rio Grande do Sul: locality unknown.

NOTES: According to Sulzbacher et al. (2013) this species occurs on soil in the forest.

LITERATURE: Rick 1961, as *L. adustus* Rick; Singer 1953, as *L. aductus*; Sulzbacher et al. 2013.

Russula cf. nitida (Pers.) Fr.

Distribution: Paraná: locality unknown.

Notes: According with de Meijer (2006) and Sulzbacher et al. (2013) this species occurs on soil close to planted *Castanea sativa* Mill.

Literature: de Meijer 2001, 2006, as *R. velenovskyi* Melzer & Zvára, 2010; Sulzbacher et al. 2013.

Conclusion

The total species of *Russulaceae* reported from Brazil is 39, occurring in the states of Amazonas, Bahia, Pernambuco, Paraná, Santa Catarina, São Paulo, Rio Grande do Norte and Rio Grande do Sul, However, the names cited here need to be reviewed to confirm their generic placement.

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