Universidade Federal do Rio Grande do Sul
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ERICACEAE: TAXONOMIA E DISTRIBUIÇÃO GEOGRÁFICA NO RIO GRANDE DO SUL

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"Os que vivem no conforto querem apenas rostos com cara de cera, sem poros, nem pelos, inexpressivos. Estamos vivendo num tempo em que as flores tentam viver de flores, e não com a boa chuva e o húmus preto. Mesmo os fogos de artifício, apesar de toda a sua beleza, derivam de produtos químicos da terra. No entanto, de algum modo, achamos que podemos crescer alimentando-nos de flores e fogos de artifício, sem completar o ciclo de volta à realidade."

(**Fehrenheit 451,** Ray Bradbury, 1953)

SUMÁRIO

APRESENTAÇÃO

Esta dissertação é composta de dois capítulos, cada um correspondente a um manuscrito a ser submetido para publicação na forma de artigo científico em periódico indexado:

Capítulo 1:

- **Flora of Ericaceae in Rio Grande do Sul, Brazil**

Capítulo 2:

- **Typification of five names in *Agarista* (Ericaceae, Vaccionoideae, Lyoneae)**

A formatação do Capítulo 1 é baseada no modelo exigido para submissão ao periódico *Rodriguésia* (https://rodriguesia.jbrj.gov.br/ <acessado em 14 de dezembro de 2019).

A formatação do Capítulo 2 é baseada no modelo exigido para submissão ao periódico *Phytotaxa* (http://www.mapress.com/phytotaxa/author.htm <acessado em 10 de janeiro de 2019>).

RESUMO

Ericaceae ocorre em regiões temperadas, subtropicais e nas cadeias montanhosas dos trópicos. Compreende 124 gêneros e cerca de 4.100 espécies, em maioria ocorrentes na Região Neotropical. No Brasil, a família ocorre principalmente nas Regiões Sudeste e Sul, frequentemente em campos de altitude, e é representada por 12 gêneros e 103 espécies (71 endêmicas). Apesar da alta diversidade no país, há poucos trabalhos florísticos a nível estadual e local, sendo que o Rio Grande do Sul não dispõe de um tratamento taxonômico. Esse trabalho teve por objetivo fazer o estudo taxonômico das espécies de Ericaceae nativas do Rio Grande do Sul, fornecendo chaves taxonômicas, descrições morfológicas, fotos de campo e de material herborizado e mapas de distribuição geográfica visando auxiliar na identificação e conservação das espécies ocorrentes no estado. Foram realizadas revisão de literatura, expedições de coleta e revisão presencial de 14 herbários do Brasil, além de 17 herbário virtuais. Foram confirmados três gêneros, nove espécies e 10 táxons ocorrentes no Rio Grande do Sul. Todas as espécies de Ericaceae nativas no estado são registradas para os campos subtropicais de altitude (campos de cima da serra) da Mata Atlântica. Nos afloramentos rochosos e campos temperados de terras baixas do Pampa foram confirmadas cinco espécies, sendo *Agarista eucalyptoides* e *A. chlorantha* ocorrências conhecidas e *A. minensis*, *A. nummularia* e *Gaylussacia brasiliensis* novos registros no domínio. *Agarista eucalyptoides* e *Gaylussacia brasiliensis* são as espécies mais amplamente distribuídas no estado. *Agarista nummularia* e *Gaylussacia brasiliensis* são as únicas espécies registradas nas planícies. Cinco espécies foram categorizadas como ameaçadas de extinção no estado: *Agarista chlorantha* (EN), *A. minensis* (VU), *A. niederleinii* (VU), *Gaultheria itatiaiae* (EN) e *Gaylussacia pseudogaultheria* (EN). *Agarista minenis*, até então considerada extinta no Rio Grande do Sul, foi redescoberta. Destaca-se a morfologia das sementes como uma característica distintiva para a diferenciação das espécies de *Agarista*. Adicionalmente, cinco lectótipos e três epítipos são designados para nomes publicados em *Agarista*.

Palvras-chave: *Agarista*, Campos de Altitude, *Gaultheria*, *Gaylussacia*, lectotipificação, Mata Atlântica, Pampa.

ABSTRACT

Ericaceae occurs mainly in temperate or subtropical regions and along tropic mountain chains. Comprises 124 genera and about 4,100 species, occurring mostly in the Neotropics. In Brazil, the family occurs mainly in Southeast and South Regions, frequently in highlands, and is represented by 12 genera and 103 species (71 endemic). Besides the high diversity of the family in Brazil, there are only few floristic studies at state and local levels and Rio Grande do Sul state does not have a taxonomic treatment for its flora. This study aimed to carry out a taxonomic survey of native Ericaceae in Rio Grande do Sul, providing identification keys, morphological descriptions, fieldwork and herbaria specimens plates, and maps of geographic distribution in order to assist in the identification and conservarion of the species. I performed literature review, fieldwork expeditions and review of 14 Brazilian herbaria plus 17 on line herbaria. The occurrence of three genera, nine species and 10 taxa are confirmed in Rio Grande do Sul. All Ericaceae species occurring in Rio Grande do Sul are registered to the Highland Subtropical Grasslands (*Campos de Cima da Serra*) from the Atlantic Forest. In the rocky outcrops and temperate fields of the lowlands of the Pampa, five species were confirmed. From that, *Agarista eucalyptoides* and *A. chlorantha* are known occurrences and *A. minensis*, *A. nummularia* and *Gaylussacia brasiliensis* new records in this domain. *Agarista eucalyptoides* and *Gaylussacia brasiliensis* are the most widely distributed species in the state. *Agarista nummularia* and *Gaylussacia brasiliensis* are the only species registered to the plains. Five species are categorized as endangered in the state flora: *Agarista chlorantha* (EN), *A. minensis* (VU), *A. niederleinii* (VU), *Gaultheria itatiaiae* (EN) e *Gaylussacia pseudogaultheria* (EN). *Agarista minenis*, formearly considered extint in Rio Grande do Sul, was rediscovered. Seed shape is highlighted as a distinctive trait do differentiate species within *Agarista*. Additionally, five lectotypes and three epytipes are designated for names published in *Agarista*.

Key words: *Agarista*, Atlantic Rainforest, *Gaultheria*, *Gaylussacia*, lectotypification, Pampas, Subtropical Highland Grasslands.

INTRODUÇÃO GERAL

Ericaceae Juss. é uma família de distribuição cosmopolita e muito diversificada. Ocorre principalmente nas regiões temperadas e subtropicais e abrange 124 gêneros e cerca de 4.100 espécies, variando desde subarbustos a árvores, algumas vezes lianas e epífitas ou até ervas aclorofiladas e micotróficas (LUTEYN et. *al.* 1995). A família pertence a ordem Ericales, juntamente com outras 24 famílias e, dentro das Ericales nucleares, tem como grupos-irmãos Cyrillaceae Lindl. e Clethraceae Klotzsch, respectivamente (ANDERBERG *et al.*, 2002; SCHÖNENBERGER *et al.*, 2005; FREUDENSTEIN *et al.*, 2016).

A maior diversidade do grupo está concentrada nas regiões montanhosas neotropicais (JUDD *et al.* 2009), onde são comumente encontradas em solos ácidos e associadas a fungos micorrízicos (KRON & LUTEYN, 2005). Luteyn (2002) reconheceu cinco regiões biogeográficas de maior diversidade para as ericáceas neotropicais: México e Norte da América Central, Índias Ocidentais, Escudo das Guianas, Andes Tropicais e Sudeste do Brasil, sendo os Andes Temperados menos representativos (Figura 1). A maior diversidade de espécies é encontrada na região Andina do noroeste da América do Sul, onde ocorrem 46 gêneros (70% endêmicos) e mais de 800 espécies (94% endêmicas).

Exibindo uma variação anormalmente grande tanto na morfologia da associação micorrízica como na identidade dos fungos envolvidos, a associação de alguns grupos de fungos é exclusiva de táxons da família (por exemplo Ericoideae). Essas associações são tão importantes na família que Freudenstein *et al.* (2016) propôs uma nova circunscrição para as subfamílias basais em Ericaceae tendo como sinapomorfia para sustentação dos clados as variações nos tipos de fungos micorrízicos e nas formas de associação destes com as respectivas subfamílias (agora monofiléticas). Adicionalmente, as assembleias de fungos associados podem variar de acordo com as regiões de ocorrência das espécies de Ericaceae hospedeiras (HAMIM *et al.*, 2017), favorecendo a ocupação de ambientes inóspitos e propiciando uma ampla distribuição geográfica.

Figura 1. Regiões biogeográficas das Ericaceae neotropicais destacadas por Luteyn (2002) (adaptado). México e Norte da América Central, Índias Ocidentais, Escudo das Guianas, Andes Tropicais e Sudeste do Brasil compõesm as cinco regiões de maior diversidade, sendo os Andes Temperados menos representativos.

As espécies da família são caracterizadas, de forma geral, pelo hábito arbustivo ou arbóreo; folhas simples, alternas e espiraladas, algumas vezes subopostas ou verticiladas; inflorescências racemosas, paniculadas ou unifloras, axilares ou terminais; flores bissexuadas, diclamídeas, actinomorfas ou zigomorfas, geralmente pêndulas; cálice

gamossépalo, muitas vezes persistente no fruto; corola gamopétala, urceolada a campanulada; androceu diplostêmone ou isostêmone, estames geralmente livres ou ligeiramente epipétalos, filetes geniculados ou subulados, anteras bífidas, poricidas, pólen em tétrades; ovário súpero ou ínfero, com 4-5 lóculos multiovulados ou 10 lóculos uniovulados, estilete terminal inteiro, estigma capitado; fruto do tipo cápsula loculicida, baga ou nuculânio e sementes com endosperma carnoso (JUDD *et al.*, 2009).

Kron *et al.* (2002) classificaram a família em oito subfamílias divididas em 20 tribos: Enkianthoideae Kron, Judd & Anderb (monogenérica e grupo irmão do restante de Ericaceae), Monotropoide Arn., Arbutoide Nied., Cassiopoideae (monogenérica), Harrimanelloideae Kron & Judd (monogenérica), Styphelioideae Sweet, Ericoideae Link e Vaccinioideae Arn (KRON *et al.*, 2002). Freudenstein *et al.* (2016) proporam uma nova classificação baseada em caracteres macromoleculares e caracteres micorrízicos, onde Monotropoideae s.l. é dividida nas subfamílias Monotropoideae e Pyroloideae, sendo reconhecidas então nove subfamílias na circunscrição atual. No Brasil estão representadas as subfamílias Ericoideae (com apenas dois gêneros exclusivos do domínio da Amazônia) e Vaccinioideae com ocorrência nos domínios da Amazônia, Caatinga, Cerrado e Mata Atlântica (Flora do Brasil 2020, em construção 2020).

A subfamília Vaccinioideae é composta por cinco tribos de acordo com Kron *et al.* 2002: Andromedeae Klotzsch, Gaultheriae Nied., Lyonieae Kron & Judd, Oxydendreae Cox. e Vaccineae Rchb. Esta subfamília é muito heterogênea, compreendendo, por exemplo, espécies com ovário súpero ou ínfero e frutos dos tipos cápsula, baga ou drupa. Ainda, corresponde a um dos clados mais diversificados da família (Andromedeae Klotzsch + Gaultheriae Nied. + Lyonieae Kron & Judd + Vaccineae Rchb.) (Figura 2), diagnosticado pelas inflorescências inicialmente axilares, desenvolvendo-se em brotações da temporada anterior e portando flores com pedicelos articulados (KRON *et al.*, 2002).

No Brasil é registrada a ocorrência de 12 gêneros, 103 espécies (71 endêmicas) e 52 variedades da família, sendo *Agarista* G.Don ex G.Don e *Gaylussacia* Kunth os gêneros com maior número de espécies (21 e 43 respectivamente) (Flora do Brasil 2020 em construção, 2019). A maior diversidade do grupo no Brasil está concentrada em *Gaylussacia* (Vaccinieae), *Agarista* (Lyonieae) e *Gaultheria* L. (Gaultheriae), com distribuição mais concentrada nos campos de altitude das regiões Sudeste e Sul (Figura 2), sendo a Cadeia do Espinhaço (Minas Gerais e Bahia) o centro de diversidade dos dois

primeiros (KINOSHITA-GOUVÊA, 1980). Esses três gêneros são os únicos com ocorrência registrada para o Rio Grande do Sul (Figura 2).

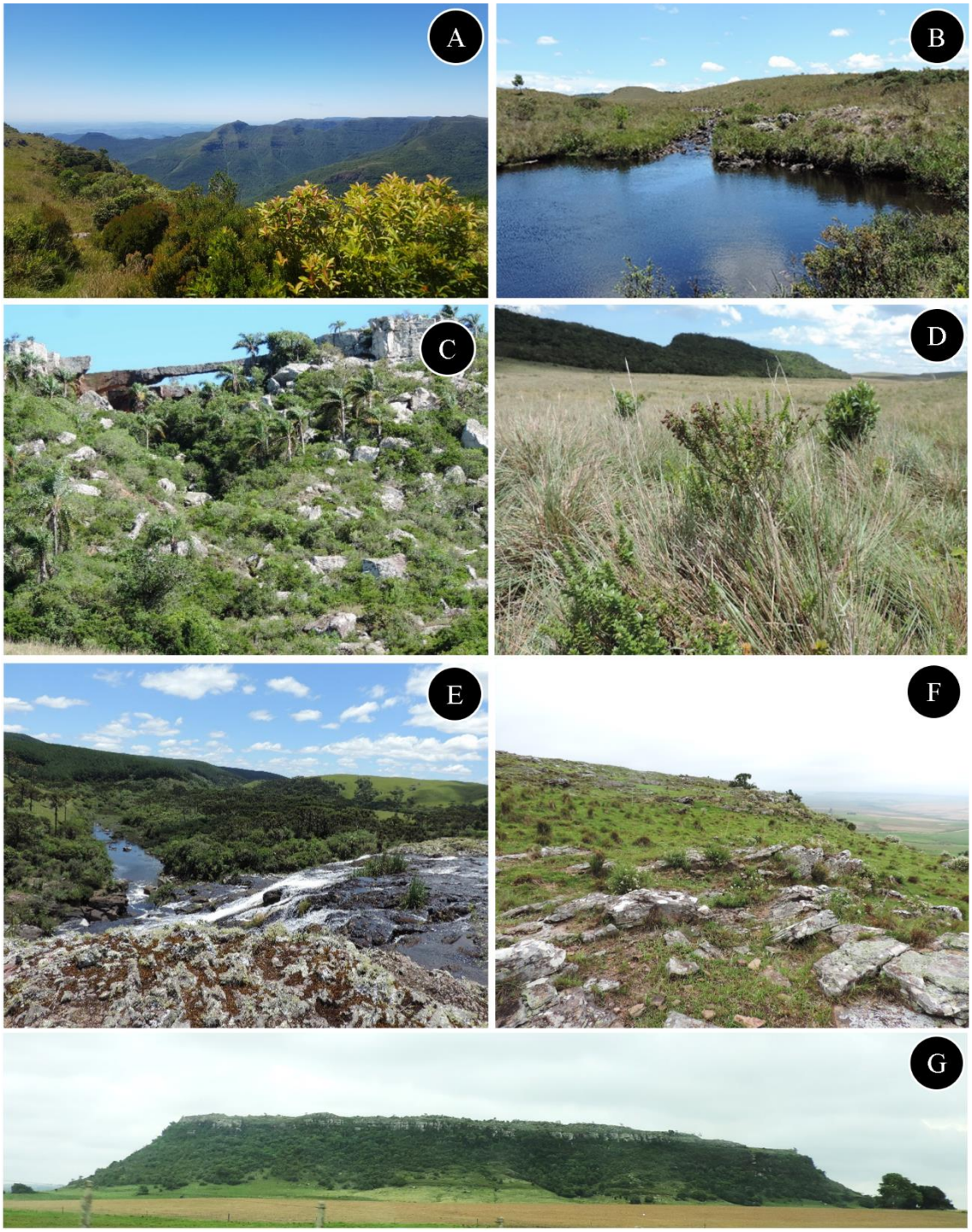

Figura 2. Exemplos de locais de ocorrência de Ericaceae no Rio Grande do Sul. **A**) Serra da Rocinha, São José dos Ausentes; **B**) Cambará do Sul; **C**); Cerro do Tigre, Alegrete **D**) Cânion Fortaleza, Cambará do Sul; **E**) Passo do S, Jaquirana; **F-G**); Serro Munhoz, Santana do Livramento.

Agarista D.Don ex G.Don. (Vaccinoideae, Lyonieae) compreende 32 espécies (JUDD, 1984; JUDD & LUTEYN, 2006; LUTEYN *et al.*, 1995) que se se distribuem em uma ampla variedade de habitats; no entanto, a maioria das espécies prefere solos ácidos e são plantas heliófilas de comunidades abertas. O gênero é caracterizado principalmente pelas gemas protegidas por mais de duas escamas, folhas com nervação reticulada densa, inflorescências racemosas (ou paniculares), flores pentâmeras e pêndulas, corola gamopétala cilíndrica a urceolada, lobos do cálice imbricados, estames com filetes geniculados e frutos secos do tipo cápsula (JUDD, 1984). O gênero pode ser dividido em dois grupos morfologicamente distintos e, atualmente, esses dois grupos são reconhecidos como duas seções (JUDD, 1984). *Agarista* sect. *Agauria* (DC.) Judd inclui uma única espécie (*Agarista salicifolia* G.Don) variável e amplamente distribuída em áreas montanhosas da África central, ilhas Reunião e Maurício, mas atinge maior diversidade morfológica em Madagascar (SLEUMER, 1938). *Agarista* sect. *Agarista* inclui 31 espécies distribuídas nas Américas, sendo a Cadeia do Espinhaço, no leste brasileiro, o centro de diversidade do grupo.

Gaultheria L (Vaccinioideae, Gaultheriae) é caracterizado pelos frutos do tipo cápsula loculicida envolvidos por um cálice acrescente e carnoso e pelos estames com filetes retos e anteras 4-aristadas. Middleton (1991) classificou infragenericamente dois grupos principais: 1) espécies com flores solitárias e 2) espécies com inflorescências racemosas. Dentro do primeiro grupo foram reconhecidas sete seções, sendo destas duas neotropicais: *Gaultheria* sect. *Pernettya* (Gaudich.) Middleton (reconhecida como gênero por Luteyn [1995]) e *Gaultheria* sect. *Monoanthemona* Middleton (Séries *Myrtilloideae* Middleton emend. Luteyn, *Antipodeae* Middleton e *Itatiaieae* Luteyn). As espécies racemosas foram separadas em duas seções: *Gaultheria* sect. *Brossae* (L.) Middleton (Séries *Domingenses* Middleton, *Insipideae* Middleton e *Parvifolieae* Middleton) e *Gaultheria* sect. *Reticulateae* Middleton (Série *Tomentoseae* Middleton) (LUTEYN, 1995). No Brasil é citada a ocorrência de 11 espécies (nove endêmicas) e três variedades endêmicas do gênero (Flora do Brasil 2020 em construção, 2019).

Gaylussacia Kunth (Vaccinoideae, Vaccinieae) pode ser diferenciado de *Agarista* e *Gaultheria* principalmente pelo ovário ínfero. Caracteriza-se pelo indumento glabro à pubescente, tomentoso, setoso, viloso ou híspido, apresentando tricomas glandulares ou não, além de glândulas diminutas; folhas cartáceas à rigidamente coriáceas, com uma glândula calosa no ápice do limbo, inflorescências mais comumente racemosas, inúmeras brácteas na base da inflorescência, uma única bráctea na base de cada flor e sempre duas

bractéolas inseridas ao longo do pedicelo; flores gamossépalas à gamopétalas, pentâmeras e diplostêmones no geral, corolas urceoladas a largamente campanuladas, com filetes retos e achatados, anteras com tecas múticas e longo-tubulosas; frutos drupoides (nuculânio), geralmente nigrescentes e globosos. Com base em características como a persistência das folhas, presença de glândulas e tricomas glandulares e tamanho dos estames são reconhecidas três seções para o gênero (SLEUMER, 1967; ROMÃO, 2011): *Gaylussacia* sect. *Gaylussacia*, *Gaylussacia* sect. *Vitis-Ideae* Hook.f. (monoespecífica) e *Gaylussacia* sect. *Decamerium* (Nutt.) Hook.f.. No Brasil é citada a ocorrência de 43 espécies (42 endêmicas) e 13 variedades (12 endêmicas) (Flora do Brasil 2020 em construção, 2020).

Apesar da alta diversidade no Brasil, poucos trabalhos de cunho florístico com Ericaceae foram realizados, compreendendo algumas floras estaduais e regionais (MARQUES, 1975; ROMÃO & SOUZA, 2003, 2014; ROMÃO et al., 2004; SILVA & CERVI, 2006; MARINERO et al., 2007; SILVA et al., 2010; KINOSHITA & ROMÃO, 2011, 2012; DEBLE, et al. 2013; MEZABARBA, et al. 2013; CABRAL et al. 2016 a, b; CABRAL et al., 2017; ROMÃO et al., 2017). Para o estado do Rio Grande do Sul não existe um tratamento florístico-taxonômico recente. O número de espécies citadas na literatura varia de oito a 12 espécies. Destas, 10 registradas para a região dos Aparados da Serra. Para o Pampa são citadas *Agarista eucalyptoides* G.Don e *Agarista chlorantha* (Cham.) G.Don, estendendo-se até o Uruguai (FLORA DO BRASIL 2020, em construção, 2019; GRELA & BRUSSA, 2005; ROLAND & MONDIN, 2009; DEBLE, et al. 2013; CRIA 2019).

Os poucos trabalhos para a família no estado (ROLAND & MONDIN, 2009; DEBLE et al., 2013; Flora do Brasil 2020 em construção, 2019) até o momento apresentam discrepâncias quanto ao número de espécies reconhecidas (11, 12 e oito, respectivamente). Além disso, o limite sul de distribuição de muitas espécies da família no Rio Grande do Sul é desconhecido ou negligenciado, principalmente no Pampa. Enquanto o número de espécies referido na literatura para a Mata Atlântica estadual é em torno de 10, a ocorrência de apenas duas espécies de distribuição ampla é citada para o Pampa (*Agarista eucalyptoides* e *A. chlorantha*), onde ainda não é citada a ocorrência da família para a Flora do Brasil 2020 em construção (2019). Tendo em vista a ocorrência de algumas espécies até o Uruguai, acredita-se que a distribuição e representatividade da família seja mais ampla no Pampa.

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CAPÍTULO 1: **FLORA OF ERICACEAE IN RIO GRANDE DO SUL, BRAZIL**

FLORA OF ERICACEAE IN RIO GRANDE DO SUL, BRAZIL

FLORA DE ERICACEAE NO RIO GRANDE DO SUL, BRASIL

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Ericaceae in Rio Grande do Sul, Brazil

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Abstract

Ericaceae comprises 124 genera and about 4,100 species, mostly Neotropical. In Brazil, the family occurs mainly in Southeast and South Regions, frequently in highlands, and is represented by 12 genera and 103 species (71 endemic). Despite the high diversity of the family in Brazil, there are only few floristic works at state and local level. This study aimed to carry out a taxonomic survey of Ericaceae species native in Rio Grande do Sul, providing dichotomous keys, morphological descriptions, fieldwork and herbaria specimens plates, and maps of geographic distribution in order to assist in the identification and conservation. We did literature review, collect expeditions and review of 14 Brazilian herbaria plus 17 online herbaria. We confirmed the occurrence of three genera, nine species and 10 taxa, all occurring in the Southern Highland Subtropical Grasslands (*Campos de Cima da Serra*) of the Atlantic Rainforest. In the rocky outcrops and temperate fields of the lowlands of the Pampa five species were confirmed. From that, *Agarista eucalyptoides* and *A. chlorantha* are known occurrences and *A. minensis*, *A. nummularia* and *Gaylussacia brasiliensis* new records in this domain. *Agarista eucalyptoides* and *Gaylussacia brasiliensis* are the most widely distributed species in the state. *Agarista nummularia* and *Gaylussacia brasiliensis* are the only species registered to the plains. Five species are categorized as endangered in the state flora: *Agarista chlorantha* (EN), *A. minensis* (VU), *A. niederleinii* (VU), *Gaultheria itatiaiae* (EN) and *Gaylussacia pseudogaultheria* (EN). Additionally, we highlight seed shape as a distinctive trait to separate species within *Agarista*.

Key words: *Agarista*, Atlatic Rainforest, *Gaultheria*, *Gaylussacia*, Pampas, Subtropical Highland Grasslands.

Resumo

Ericaceae compreende 124 gêneros e ca. 4.100 espécies, a maioria na Região Neotropical. No Brasil, ocorre principalmente nas Regiões Sudeste e Sul, frequentemente em campos de altitude, e é representada por 12 gêneros e 103 espécies (71 endêmicas). Apesar da alta diversidade no país, há apenas alguns trabalhos florísticos a nível estadual e local e o Rio Grande do Sul não dispõe de um tratamento taxômico. Este trabalho tem por objetivo fazer um estudo taxonômico das espécies de Ericaceae nativas deste estado, fornecendo chaves, descrições morfológicas, pranchas de campo e de material herborizado, e mapas de distribuição geográfica visando auxiliar na identificação e conservação das espécies. Foram realizadas revisão de literatura, expedições de coleta e revisão presencial de 14 herbários brasileiros e 17 herbários virtuais. Foram confirmados três gêneros, nove espécies e 10 taxons, todos ocorrentes nos campos subtropicais de altitude (Campos de cima da Serra) da Mata Atlântica. Nos afloramentos rochosos e campos temperados de terras baixas do Pampa foram confirmadas cinco espécies, sendo *Agarista eucalyptoides* e *A. chlorantha* ocorrências conhecidas e *A. minensis*, *A. nummularia* e *Gaylussacia brasiliensis* novos registros no domínio. *Agarista eucalyptoides* e *Gaylussacia brasiliensis* são as espécies mais amplamente distribuídas. *Agarista nummularia* e *Gaylussacia brasiliensis* são as únicas espécies registradas nas planícies. Cinco espécies foram categorizadas como ameaçadas de extinção: *Agarista chlorantha* (EN), *A. minensis* (VU), *A. niederleinii* (VU), *Gaultheria itatiaiae* (EN) e *Gaylussacia pseudogaultheria* (EN). Por fim, destaca-se a morfologia das sementes como característica distintiva para diferenciação das espécies de *Agarista*.

Palavras-chave: *Agarista*, Campos de Cima da Serra, *Gaultheria*, *Gaylussacia*, Mata Atlântica, Pampas.

Introduction

Ericaceae Juss. is a cosmopolitan family comprising 124 genera and about 4,100 species (Stevens 2001, Judd *et al.*2009). It is placed in Ericales along with Cyrillaceae and Clethraceae (Kron *et al.*1999, Stevens 2001) as sister groups. The current circumscription encompasses nine subfamilies and 20 tribes (Kron *et al.* 2002, Freudestein *et al.* 2016). The family is mostly distributed in temperate and subtropical regions or along tropical mountain chains. The higher diversity is found in Neotropical mountains (Luteyn 2002, Judd *et al.* 2009), where they are commonly found associated with mycorrhizal fungi (Kron & Luteyn 2005).

In Brazil, Ericaceae is distributed in the Amazon Tropical Rainforest (nine exclusive genera), Caatinga Seasonally Dry Tropical Forests, Cerrado Tropical Savannas, Atlantic Tropical and Subtropical Rainforests and the Pampas Temperate Grasslands (Kinoshita-Gouvêa 1980) and is recorded the occurrence of 12 genera, 103 species (71 endemics) and 52 varieties (Flora do Brasil 2020 in construction, 2020). The three most diverse genera in the country are *Agarista* D.Don (Lyonieae), G*aultheria* L. (Gaultheriae) and *Gaylussacia* Kunth (Vaccinieae). These genera are concentrated at High Elevation Grasslands in Southern and Southeast Regions, where the Espinhaço Range (Minas Gerais e Bahia) is the center of diversity for the two first genera (Kinoshita-Gouvêa 1980). *Gaultheria* occurs in a circum-Pacific ring in both the northern and southern hemispheres and both in the Old and New World. In Latin America 43 species are found, including seven endemics to Southeastern Brazil (Luteyn *et al.* 1995)

The Southern Brazilian grasslands are distributed into two phytogeographic units: the Tropical Highland Grasslands, situated in the Atlantic Forest Domain, and the Temperate Lowland Grasslands of the Pampas Domain, to the south (Andrade *et al.* 2018). The Highland Grasslands of the Atlantic Rainforest Domain, locally known as

Campos de Cima da Serra, comprises Highland Subtropical Grasslands (altitudes between 800 to 1,000 m.a.s.l, with the highest peaks around 1,800 m a.s.l) which comprises a natural mosaic with *Araucaria* forests (Iganci *et al.* 2011, Andrade *et al.* 2016). The *Campos de Cima da Serra* are related but not included in the high altitude tropical grasslands of Southeastern Brazil (*Campos de Altitude*) and comprises a distinct and highly diverse but usually scientifically neglected vegetation (Overbeck *et al*. 2007, Iganci *et al*. 2011).

Besides the high diversity of Ericaceae in Brazil, few floristic studies are published, comprising some local floras (Marques 1975, Romão & Souza 2003, 2014; Romão *et al.* 2004, Silva & Cervi 2006, Marinero *et al.* 2007, Silva *et al.* 2010, Kinoshita & Romão 2011, 2012, Deble *et al.* 2013, Mezabarba *et al.* 2013, Cabral *et al.* 2016 a, b, Cabral *et al.* 2017, Romão *et al.* 2017). No recent floristic-taxonomic treatment to Ericaceae was published for Rio Grande do Sul and the few studies available (Roland & Mondin 2009, Deble *et al.* 2013, Flora do Brasil 2020 in construction, 2020) do not agree in the number of species recognized for the state (11, 12 and eight species, respectively). In addition, the southern limit of some Ericaceae species distribution is neglected or unknown, mainly regarding to the Pampas. Until now, it is cited the occurrence of two species with wide distribution (*Agarista eucalyptoides* e *A. chlorantha*) (Roland & Mondin 2009, Deble *et al.* 2013, CRIA 2019), but in Flora do Brasil 2020 in construction (2020) the occurrence of the family in the Pampa Domain is completely ommited.

Material and Methods

This study was based in literature and herbaria reviews, fieldwork and analysis and description of herborized specimens. The protologues were obtained in Botanicus

Digital Library (Botanicus 2020) and Biodiversity Heritage Library (BHL 2020). Collections from 14 herbaria (ECT, FLOR, HAS, HBR, HDCF, HUCS, ICN, MBM, MPUC, PACA, PEL, SALLE, SMDB and UPCB) were revised through visits and loans of specimens. The acronyms are according to Thiers (2020, continuously updated). Online collections of the herbaria B, BM, C, E, F, HBG, G, GH, GOET, K, L, M, NY, P, S, US and W besides the *JSTOR Plant Science* (2020) database were also investigated, besides data obtained to the Brazilian herbaria R, RB, SP, SPF and UEC through *speciesLink* (CRIA 2019) and REFLORA (Reflora- Herbário Virtual 2019). Six field expeditions were performed between September 2018 and December 2019, mainly to the temperate grasslands of the Pampas and to the subtropical highland grassland of the Atlantic rainforest.

Herborized material comprising the morphological variation and the geographical range were analyzed to elaborate the morphological descriptions. Exsiccates were analyzed using a stereo microscope and the measurements were took using a digital caliper. Measurements indicated in descriptions match minimum and maximum values of measured characters. The descriptive terminology followed mainly Radford *et al.* (1974), except for surface and leaf shape, that is according to Harris & Harris (2001) and Beentje (2016) to colors and leaf shape. The specimens plates were composed by field and herborized images using the stereo microscope Leica©. The descriptions of family and genera comprises the variations found in the study area.

The maps were prepared using ArcGIS 10.5 (ESRI, 2019) based on compiled locality information and coordinates cited in exsiccates labels and original collections. Information about conservation status, etymology and other relevant observations are also provided based on labels and fieldwork notes. To access the threat risk of Ericaceae species occurring in Rio Grande do Sul we followed the IUCN guidelines (IUCN 2019).

The species are presented in taxonomic treatment according to the alphabetical order and the leaf size in the descriptions are given by the relation length × width.

Results and Discussion

Ten taxa belonging to three genera, nine species and two varieties are recorded to Rio Grande do Sul state: *Agarista chlorantha* G.Don, *A. eucalyptoides* G.Don, *A. minensis* (Glaz. ex Sleumer) Judd, *A. nummularia* G.Don., *A. niederleinii* (Sleumer) Judd var. *acutifolia* Judd, *A. niederleinii* (Sleumer) Judd var. *niederleinii*, *Gaultheria itatiaiae* Wawra, *Gaylussacia brasiliensis* (Spreng.) Meisn., *G. angustifolia* Cham. and *G. pseudogaultheria* Cham. & Schltdl.

The subtropical highland grasslands (*Campos de Cima da Serra*) comprise the highest diversity and abundance of the family in Rio Grande do Sul, being most of the taxa exclusive to this phytogeographic unit. The distribution of *Gaylussacia brasiliensis* (widely distributed in the state and in coastal plains), *Agarista eucalyptoides* (widely distributed in the state, mainly in rock outcrops), *Agarista nummularia* (occurring in humid grasslands at low altitudes) and *Agarista chlorantha* (occurring in sandstone and basalt hills at border regions with Uruguay) extends to the temperate grasslands of the Pampas Domain. *Agarista minensis* has an outlier record to the temperate grasslands of the Pampas, but the species was not found recently in the historically recorded site and the current distribution in other Pampean areas reamins unknown.

Gaylussacia angustifolia was found in the physiographic region *Depressão Central* (Fortes 1959), being an outlier or disjunct occurrence from the core of distribution of the species or is an indicative of poor sampling. This region comprises a transitional mosaic of low altitude areas (less than 100 meters), interspersed by isolated sandstone table mountains, whose maximum elevation lies between 250 and 300 m above sea level.

Climatically, the region is one of the warmest areas in the state and the local of occurrence of the species is a transitional area from the Atlantic Rainforest with several areas floristically associated with the Pampas.

Agarista minensis was treated previously as probably extinct in the state (Roland & Mondin 2009), since the last collection was done more than 60 years ago. However, we found this species in herbaria, in collected material misidentified as *Agarista niederleinii*. These species are similar to each other, and *A. minensis* was already included in *A. niederleinii* circumscription by Sleumer (1959). Although, these species can be distinguished by the inflorescence length and capsule morphology.

Taxonomy

Ericaceae (Jussieu 1789)

Genera Plantarum 159: 1789. 498 p. Type: *Erica* L.

Subshrubs to trees; bark smooth to fissured. **Leaves** simple, papery to coriaceous; alternate to subopposite; verticilate, sometimes imbricate; margin entire to serrate, usually revolute; without stipules. **Inflorescences** racemes or pseudo-racemes, axillary subapically, occasionally solitary flowers; peduncle commonly bracteose; bracts and bracteoles present. **Flowers** bisexual, complete, radial to slightly bilateral; calyx persistent, 5-lobed, aposepalous to gamosepalous basally; corolla 5-merous, gamopetal, cylindrical, campanulate, urceolate, white/greenish/cream, red or reddish. Androecium diplostemonous, introrse; filaments straight or geniculate, distinct to connivent or conate; anther dorsifixed; dehiscence poricidal; nectar disk intra-androecium. Gynoecium syncarpous; ovary superior or inferior, 5-10-locular; ovules 1-per-locule. **Fruit** capsule or drupe; seeds smallish and numerous.

Key to the genera of Ericacea in Rio Grande do Sul, Brazil

1. Leaves with apical callous gland; ovary inferior; fruit drupoid (nuculanium)……
…….... ***Gaylussacia***

1'. Leaves without apical callous gland; ovary superior; fruit capsule

2. Leaf apex mucronulate, venation reticulodromous; filaments geniculate; anthers truncate ……...…… ***Agarista***

2'. Leaf apex acute without mucron or calous gland, venation brochidodromous; filaments erect; anthers bifid ……..... ***Gaultheria***

Agarista (D.Don 1834)

Gen. Syst. 3: 837. 1834 ≡ *Leucothoe* D.Don sect.*Agastia* DC., Prodr. 7: 603. 1839. *Leucothoe* D.Don subg. *Agarista* (D.Don ex G.Don) Drude in Engler & Prantl, Nat. Pflanzenfam. IV. 1: 42. 1889. Lectotype (designated by Judd in J. Arnold Arbor. 65: 255-342. 1984): *Agarista nummularia* (Cham. & Schldl.) G.Don.

Subshrubs to erect trees, branches erect, sometimes tortuous; bark fissured, buds with more than two scales. **Leaves** alternate to subopposite, commonly imbricate, subcoriaceous to coriaceous, lax or conduplicated; petioles short and robust or slender, sometimes flexible; blade glabrous to pubescent, simple or glandular trichomes, with or without foveolate inconspicuous glands in abaxial surface; venation reticulate; margins entire or serrate, commonly revolute; apex mucronnulate. **Inflorescences** racemose, axillary, subapical; glabrous to tomentose; bracteoles 2; floral bracts 1 at pedicel base, commonly multiplous at inflorescence axis base. **Flowers** 5-merous, bisexual, diplostemonous; calyx base conate; corolla gamopetal, cylindrical to urceolate, white,

greenish, cream; stamens 10, filaments geniculate, villose; anthers dorsifixed, deiscense poricidal; ovary superior, 5-loculicidal, locus multiovulate, stigma capitate. **Fruit** loculicidal capsule, globose to ovoid; seeds fusiform.

Key to the species of *Agarista* in Rio Grande do Sul, Brazil

1. Petioles 6.26—15.81(21.43) mm long, flexuous and slender ……...… ***Agarista eucalyptoides***

1'. Petioles 0.97—6.7 mm long, thick and rigid

2. Leaf blade orbicular, surface glabrous or with few gland-headed trichome…….……...***Agarista nummularia***

2'. Leaf blade ovate, lanceolate or ellipitic to oblong

3. Leaf blade ovate, base cordate, margin strongly revolute, surface with densely gland-headed trichomes..……...……...…...…...… ***Agarista chlorantha***

3'. Leaf base rounded to truncate or cuneate, margin slightly revolute, surface without densely gland-headed trichomes

4. Leaf blade lanceolate to oblong; capsule placentae central to subapical; seeds trapezoid…….……... ***Agarista minensis***

4'. Leaf blade ovate to elliptic, rarely oblong; capsule placentae apical; seeds concave-convexe…… ***Agarista niederleinii***

Agarista chlorantha (Cham.) G.Don., Gen. Syst. 3: 838. 1834 ≡ *Andromeda chlorantha* Cham., Linnaea 8: 508. 1833 ≡ *Leucothoe chlorantha* (Cham.) DC., Prodr. 7: 604. 1839.

Type: BRAZIL. *F. Sellow s.n.* (holotype B, destroyed; isotype F 641665 V0055220F [digital image]!, G, GH, L 0006619 [digital image]!, NY 00008200 [digital image]!)

Amechania subcanescens DC., Prodr. 7: 579. 1839 ≡ *Leucothoe subcanescens* (DC.) Meisn., *Fl. Bras.* 7: 163, pl. 62, f. 1. 1863 ≡ *Leucothoe chlorantha* var. *subcanescens* (DC.) Sleumer, Bot. Jahrb. Syst. 78 (4): 454. 1959. Type: BRAZIL. SÃO PAULO: Batatais, Jun. 1834, *P. W. Lund s. n.* (holotype G 00323187 [digital image]!; isotype NY 00008175 [digital image]!!, C 10010916 [digital image]!, L 0006618 [digital image]!, L 0006619 [digital image]!).

Andromeda serrulata Cham., Linnaea 8: 506. 1833 ≡ *Leucothoe serrulata* (Cham.) DC., Prodr. 7: 604. 1839 ≡ *Agarista serrulata* (Cham.) G.Don., Gen. Syst. 3: 838. 1834. Type: BRAZIL. SÃO PAULO, *F. Sellow s.n.* (holotype B, destroyed; isotype F 641699 V0055227F [digital image]!, NY 00008207 [digital image]!, E00326877 [digital image]!, K 000494447 [digital image]!, K 000494448 [digital image]!, L 0006619 [digital image]!, L 0006617 [digital image]!). **Figures 1-3.**

Shrubs 1—1.5 m high, erectly branched, twigs moderately to densely pubescent, clothed by gland-headed trichomes. **Leaves** alternate, spiraled, coriaceous; petioles thick and rigid, 1.63—2.93 mm long; blade coriaceous, ovate, 1.08—1.97 × 0.61—1.08 cm, strongly revolute; base cordate; apex long-mucronulate; margins entire to serrulate; adaxial surface glabrous to puberulent at midvein near the base; abaxial surface glabrescent to sparsely glandular at midvein, often with inconspicuous foveolate glands. **Racemes** axillary, 8-12-flowered, rachis pubescent with gland-headed trichomes, 1.76—3.56 long; bract triangular to linear 1.44—2.29 mm long; bracteoles 1.1—2 mm long. **Flowers** pubescent calyx lobes and gland-headed trichomes, ovate, apex acute, 2.27—3.57 mm long; corolla cillindrical to urceolate, greenish, 7.39—9.15 mm, glabrous;

stamen filament villous, 3.9—6.12 mm long; anther 1.23—1.45 mm long; ovary sparsely to densely pubescent. **Fruit** capsule short-ovoid to subglobose 3,63—4,13 mm diam. × 3,25—5,35 mm high, placentae subapical; seeds botuliform, 0.92—2.06 mm long.

Specimens examined: BRAZIL. RIO GRANDE DO SUL: Cambará do Sul, caminho para o Cânion Fortaleza, -29.0820471290499, -50.0047631375492, 06.III.2012, fr., *P.J.S. Silva-Filho 1538* (ICN). Canela, 15.XI.1958, *E. Richter* (HBR 32821). Esmeralda, 15.XII.1983, fl., *J.A. Jarenkow 125* (ICN). Jaquirana [São Francisco de Paula], Campos de Cima da Serra, Passo do S, Parque Estadual do Tainhas, -29.081944, -50.004722, 06.III.2012, fl., *P.J.S. Silva-Filho 1538* (ICN). Santana do Livramento, Cerro Trindade, próximo ao marco da divisa Brasil-Uruguai, -30.986614, -55.423467, 14.IX.2016, bud, *G.Heiden et al. 2327* (ECT); Cerro dos Munhoz, propriedade de Illaerci Gonçalves, -30.936556, -55.394036, 13.IX.2016, bud, fl., *G. Heiden et al. 2326* (ECT); -30.937459, -55.393611, fl. and fr., *C.H. Dalastra 1* (ICN). São Francisco de Paula, Fazenda Englert, 1.I.1954, fl. and fr., *B. Rambo* 54674 (HBR).

Etymology: From Greek "chloro" = green, "anthos" = flower, due the greenish tonality of the flowers.

Flowering and fruiting: Flowering from September to March and fruiting from October to April. Dry fruits from the previous season may persist in the plant in the following year.

Geographical distribution & habitat: Brazil (GO, DF, MG, SP, PR, SC, RS) (Flora do Brasil 2020, in contruction 2020) and Uruguay (Rivera) (Grela & Brussa 2005). In Rio Grande do Sul, the species occurs in the temperate grasslands, shallow soil areas and basaltic rock outcrops in the Pampas, where it occurs simpatrically with *A. eucalyptoides*.

Agarista chlorantha also occurs in highland grasslands in the Atlantic Forest, sometimes associated with rocky and mainly wet soil.

Conservation status: **EN** to Rio Grande do Sul– *Agarista chlorantha* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO) and B2 (AOO). The extent of occurrence of this species is 44,000.972 km², placing it in the category "Near Threatened" (NT). However, its area of occupancy is 20.000 km² categorizing it a "Endangered" (EN). Despite the large EOO, the occurrence of this species in the state is limited to few records, with less than five locations (subcriterium **a**). Moreover, the area, extent and quality of habitat (subcriterium **biii**) are in continued decline due its habitat specificity, the few individuals found per population and the increasing anthropization of the native grasslands, mostly converted into monocultures and pasture for livestock, especially in the northern part of the state (where the species occur in the highlands). This species is not include in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013) and according to the Red List from CNCFlora (2020) it is classified as "Least Concern" (LC) to Brazil. To Rio Grande do Sul we suggest the inclusion of *Agarista chlorantha* in the state´s red list, in the threat category "Endangered" (EN)

Note: Agarista chlorantha is mainly characterized by the leaf margin revolute and the density of gland-headed trichomes. However, these characteristics are variable and the species can be confused with morphological variations of *Agarista nummularia*. Although, these intermediary morphotypes do not occur together since these species are allopatric. Addicionally, they can be differentiated by seed shape, botuliform in *A. chlorantha* × lunate in *A. nummularia*.

This species have a disjunct distribution in Rio Grande do Sul, with few populations in the Subtropical Highland Grasslands, appearing again in the border region

with Uruguay, occurring simpratically with *Agarista eucalyptoides*. This disjunction can be a result of low sampling, or even the current reduction or absence of favorable habitats in other regions (considering that the species is not collected sympatrically in the other locations where *A. eucalyptoides* occur), added to the natural rarity of the family in more central regions of the state and at lower elevation.

Figure 1. *Agarista chlorantha* (Ericaceae) (A) Habitat and habit at *Cerro dos Munhoz*, Santana do Livramento, RS; (B) Leaf margin with gland-headed trichomes; (C) Blossom; (D) Racemes; (E) Flower detail; (F) Imature fruits; (G) Dry fruits (H) Detail of the loculicidal capsule. Photos (A, B, C, D, E, G, H) G. Heiden; Photos (B, F) C.H. Dalastra;

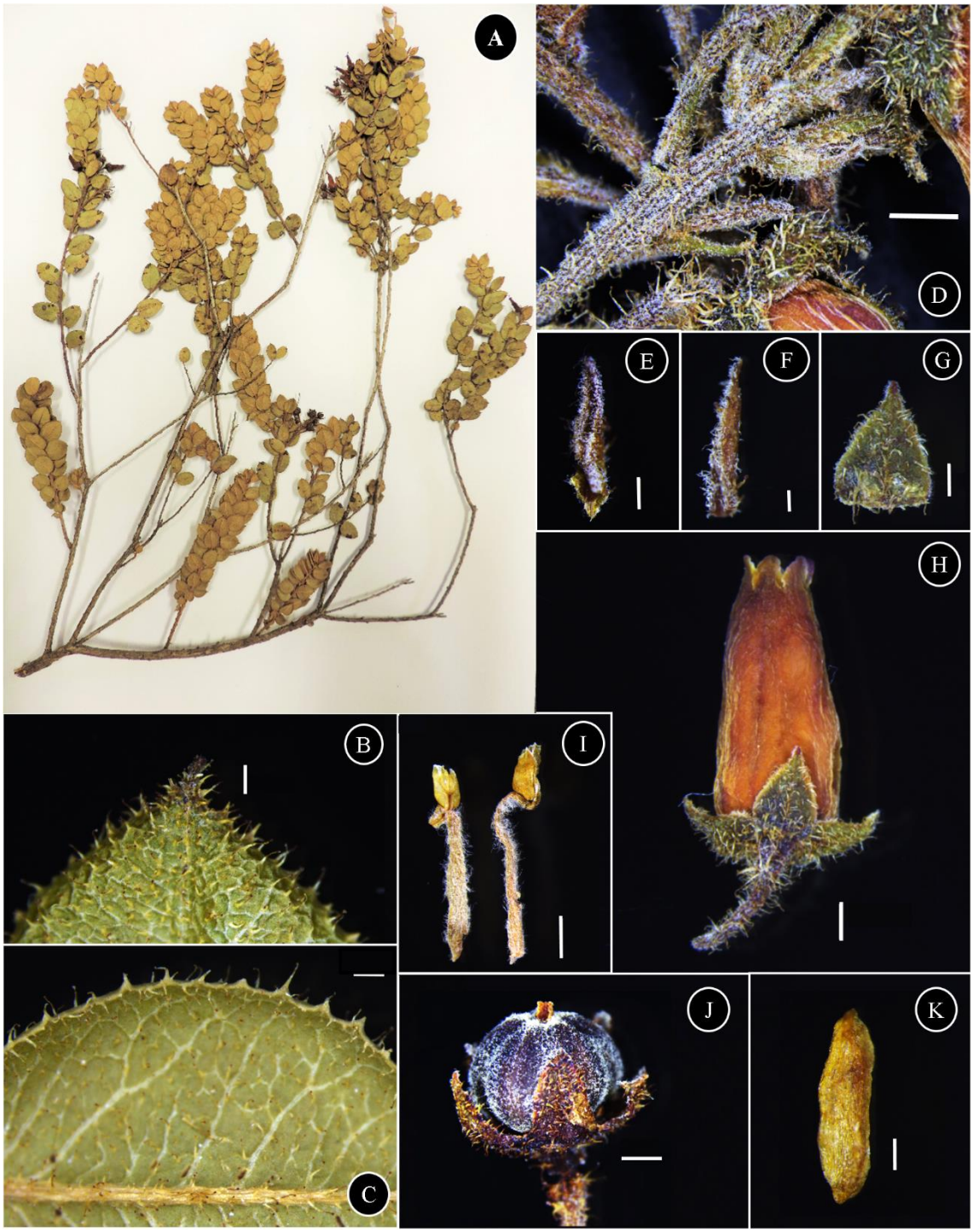

Figure 2. *Agarista chlorantha* (Ericaceae): *Dalastra 1* – ICN. (A) Flowering branch; (B) Apex mucronulate [scale 0.5 mm]; (C) Margin with gland-headed trichomes [scale 0.5 mm]; (D) Inflorescence axis [scale 1 mm]; (E) Bract [scale 0.3 mm]; (F) Bracteole [scale 0.2 mm]; (G) Cylindrical to urceolate flower [scale 1 mm]; (H) Calyx lobe [scale 0.5 mm]; (I) Geniculate stamens [scale 1 mm]; (J) Capsule loculicidal [scale 1 mm]; (K) Seed [scale 0.2 mm].

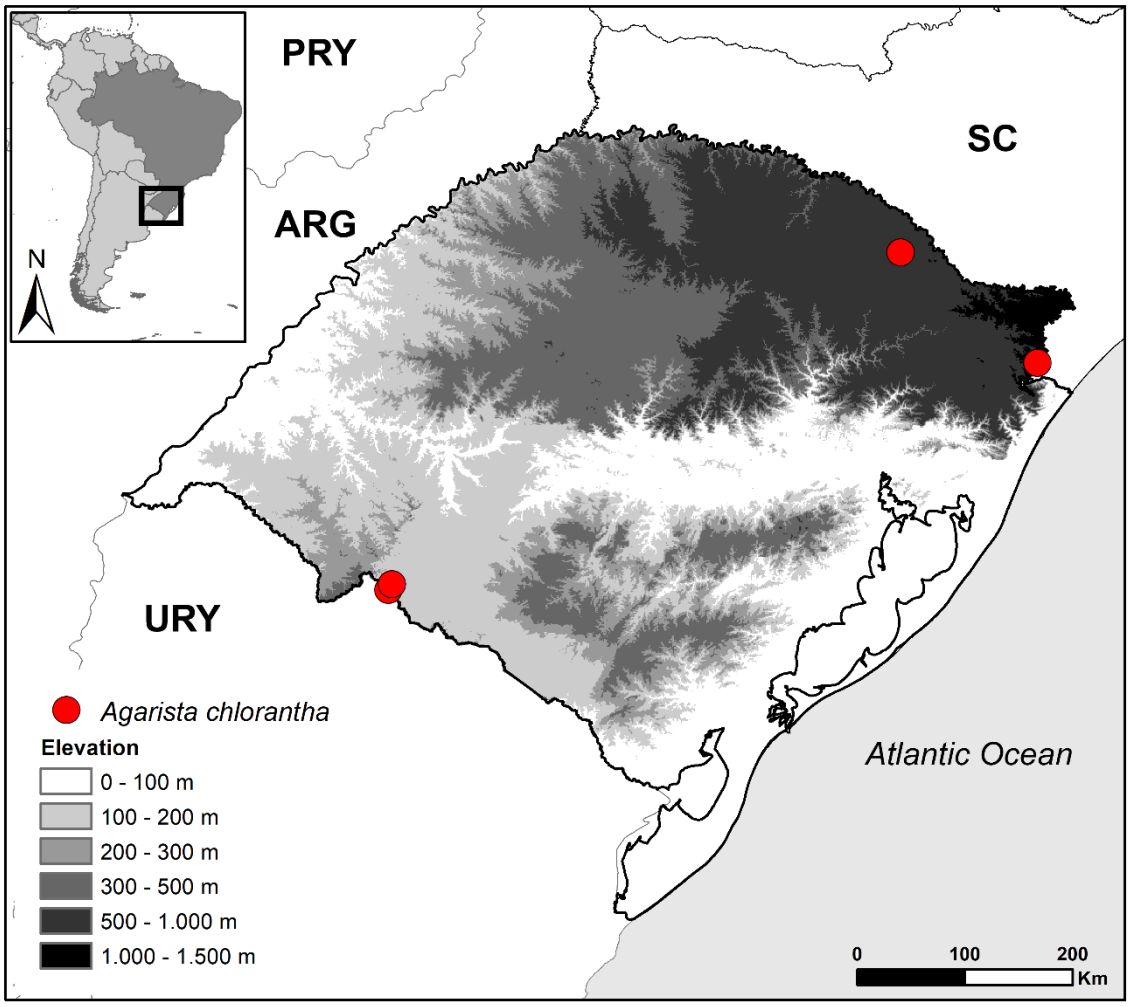

Figure 3. Distribution map of *Agarista chlorantha* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast South America. Continuous lines in grey or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Agarista eucalyptoides (Cham. & Schltdl.) G.Don., Gen. Syst. 3: 837. 1834 ≡ *Andromeda eucalyptoides* Cham. & Schltdl., Linnaea 1: 518. 1826 ≡ *Leucothoe eucalyptoides* (Cham. & Schltdl.) DC., Prodr. 7: 605. 1839 ≡ *Leucothoe multiflora* var. *eucalyptoides* (Cham. & Schltdl.) Meisn., *Fl. bras.* 7: 155. 1863. Type: BRAZIL. RIO GRANDE DO SUL: [Brasiliae Meridionalis] 1814, *F. Sellow s.n.* (holotype B, destroyed; isotype BR 0000006995737 [digital image]!, E 00326891 [digital image]!, G 00342168 [digital image]!, G 00342169 [digital image]!, G 00323842 [digital image]!, HAL 0098440 [digital

image]!, HAL 0098591 [digital image]!, HAL 0107382 [digital image]!, K000494454 [digital image]!,

= *Andromeda lanceolata* Vell., Conc. Fl. Flum. 175. 1825, later homonym of *Andromeda lanceolata* Wallich, Asiatic Res. 12: 391 = *Lyonia ovalifolia* (Wallich) Drude. Type: Tab.97.[a] T. 4.

= *Andromeda multiflora* Pohl, Pl. Bras. Icon. Descr. 2: 33, t. 122. 1828 ≡ *Agarista multiflora* (Pohl) G.Don., Gen. Syst. 3: 837. 1934 ≡ *Leucothoe multiflora* (Pohl) DC., Prodr. 7: 605. 1839 ≡ *Leucothoe multiflora* (Pohl) DC. var. *pohlii* Meisn., *Fl. bras.* 7:155. 1863, nom. superfl.. Type: BRASIL. MINAS GERAIS: Rancho Novo, Serra da Mantiqueira, Sep.- Oct. 1819, *J.B.E. Pohl s.n.* (holotype W lost; isotype BR 0000006996390 [digital image]!, M 0173318 [digital image]!, W 0059389 [digital image]!, W 0059390 [digital image]!, W 0059391 [digital image]!).

= *Andromeda longepetiolata* Fenzl ex Ettingsh., Blatt-Skel. Dikot. 94. 1861. Type: fig. 56!

= *Leucothoe multiflora* var. *brevipes* Meisn., *Fl. bras.* 7: 155. 1863. Type: BRAZIL. MINAS GERAIS: [Diamantina] Tejuca, *C.F.P. von Martius 1337* (holotype M 0173319 [digital image]!; isotype M 00173320 [digital image]!).

= *Leucothoe multiflora* var. *petiolaris* Meisn. in *Fl. bras.* 7: 155. 1863. Type: BRAZIL. MINAS GERAIS: Serra de Cural d'El Rey, ca. 1841-1842, *G. Gardner 4986* (holotype BM; isotype E 00326890 [digital image]!, F V0055445F [digital image]!; G00342170 [digital image]!; GH 00015110 [digital image]!, K000494456 [digital image]!, K 000494455 [digital image]!, NY 10148 [digital image]!, NY 10149 [digital image!], P MNHN-P00715915 [digital image]!, P MNHN-P00715916 [digital image]!, P MNHN-

P-P00715917 [digital image]! US 00116793 [digital image]!, W 0059356 [digital image]!, W 0163521 [digital image]!). **Figures 4-6.**

Shrubs or trees, 2—5 m high, tortuous, sparsely branched; stem with fissured bark, young twigs velutinous; older twigs glabrous to glabrescent. **Leaves** alternate to subopposite ± whorled, often slightly conduplicate; petioles slender and flexuous 6.26—15.81 (-21.43) mm long; blade ovate to oblong, 4.03— 6.7 x 0.87— 1.7 cm; base ovate to truncate, often aequilateral; apex acute to mucronulate; margins entire, sinuate, plane to slightly revolute near the base; adaxial surface glabrous, puberulent at midvein; abaxial surface puberulent at midvein near the base with sepia foveolae along the midvein. **Racemes** axillary, 6-16-flowered; rachis 0.74— 3.4 cm long, glabrescent to ferrugineous-puberulent; pedicel 2.72—7.85 mm long; bracts triangular 1.3—2 mm long; bracteoles narrowly triangular 0.7—1.2 mm long. **Flowers** calyx lobes widely deltate, pubescent in the edge, 1.3—2 mm long; corolla long-urceolate white, white-greenish to cream, glabrous; stamen filament villose, 1.7—5 mm long; anther 1—1.6 mm long; ovary glabrous to puberulous. **Fruit** capsule ovoid to short-ovoid 4.5—5.7 mm diam × 4.4—5.7 mm high, placentae subapical; seeds narrowly obclavate, 2-2.6 mm long.

Specimens examined: BRASIL. RIO GRANDE DO SUL: Alegrete, Cerro do Tigre, -29.658989, -55.395518, 15.XII.2018, fl., *C.H. Dalastra 3 (*ICN). Arroio dos Ratos, Fazenda Faxinal, a cerca de 15 km a sudeste da cidade, IX.1982, *N. Silveira 414* (HAS). Bom Jesus, 14.VI.2009, *M. Molz* (ICN 163715); 14.VI.2009, *M. Molz* (ICN 163715). Caçapava do Sul, a 9 km oeste da cidade, VI.1983, *J. Mattos 27131* (HAS); 8km da rodovia para Bagé, III.1982, *J. Mattos 23632* (HAS). Cambará do Sul, a 5 km da saída do Parque Nacional de Aparados da Serra em direção à Cambará do Sul, XI.1986, fl., *O. Bueno 4648* (HAS); estrada das Mulas, VI.1984, fr., *P. Brack 78* (HAS); Fazenda do

Lobo, 05.III.2007, (MPUC 19419); Cânion Fortaleza, 24.XII.1977, *A. Sehnem 15641* (PACA); 27.XII.1977, *A. Sehnem* (HUCS 2737); III.1987, fr., *J. Mattos 30980* (HAS). Canela, para Passo do Inferno, 09.I.1955, fr., *B. Rambo* (PACA 56563), -29.270564, -50.747046, 14.X.2019, fr., *Dalastra 17* (ICN); Morro Pelado, XI.2006, *M. Molz* (ICN 161862); Parque do Caracol, XII.1986, *J. Mattos 30466* (HAS); Passo do Inferno, 10.III.1941, *B. Rambo* (PACA 4871); III.2001, fr., *C. Mansan & M. Neves 486* (HAS); 27.I.1988, *S. Adamy* (HDCF 3404). Caxias do Sul, Criúva, 03.XII.2004, fl., *M. Rossato 253* (MBM); 02.XII.1998, *A. Kegler 78* (HUCS); 03.XII.2004, *M. Rossato 253* (HUCS); 18.III.2005, *R.A. Wasum 2556* (HUCS); -50.833611, -28.9, 18.XI.2014, *F. Gonzatti 1353* (FLOR); Rincão das Flores, Fazenda Morro do Céu, -50.829722, -28.952778, 17.XI.2008, *R. Schmidt & J. Mahus* (PACA105940); Sta. Lúcia do Piai, Água Azul, 15.VI.2010, *R.A. Wasum 4689* (HUCS); Vila Oliva, 05.I.1946, fr., *B. Rambo* (PACA 31063). Encruzilhada do Sul, Cerro dos Mouras, 07.IX.1995, fr., *J.A. Jarenkow 2713* (MBM); Fazenda XaFri, 07.IX.1995, fr., *J.A. Jarenkow 2713* (FLOR, PEL); Serra das Encantadas, 09.XII.2005, fr., *V.F. Kinupp & H. Lorenzi 3137* (ICN). Guaíba, 15.XI.2003, (MPUC 11087); 20.XI.2004, (MPUC 11088); Fazenda São Maximiano, -51.386111, -30.180833, 18.XI.2008, *G.A. Dettke 135* (ICN). Jaquirana, Caminha paraa Cascata dos Venâncios, -28.90636111, -50.46191667, 21.XII.2019, fl., *C.H. Dalastra 18* (ICN); Campos de Cima da Serra, Passo do S, Parque Estadual do Tainhas, III.2006, R. Schmidt 1342 (HAS); perto de Tainhas, XI.1984, J. Mattos 26422 (HAS); Júlio de Castilhos, Quebra Dentes, -54.016275, -29.402986, XII.2014, fl., *M. Molz* (HAS 91589). Montenegro, p. Zimmersberg, XI.1941, fr., *B. Rambo* (PACA 8309). Pelotas, Parque Municipal Farroupilha, Colônia Santa Helena, arroio Caneleiras, III.2003, *E. Salazar* (HAS 42461). Porto Alegre, 29.XI.1932, *B. Rambo* (SMDB 28); Bairro Espírito Santo, 24.XII.1948, fr., *B. Rambo* (PACA 39161); Morro Agudo, no campo, 09.IV.1994, *C.*

Mondin (ICN 184648); Morro da Polícia, 21.XI.1832, fl., *B. Rambo* (PACA 132); X.1944, fl., *B. Rambo* (PACA 27043); 16.VII.1948, fr., *B. Rambo* (PACA 33725); Morro das Abertas, 09.I.1949, fr., *B. Rambo* (PACA 39655); VIII.1979, fr., *Z. Soares 108* (HAS); Morro do osso, 24.I.1996, fr., *R.S. Rodrigues 68* (ICN); Morro Santana, 09.V.2014, bud & fr., *C. Rabuske 311* (ICN); V.1955, *J. Mattos 2975* (HAS); XI.1956, *J. Mattos 3765* (HAS); Morro São Pedro, acesso pelo Jockey Clube, lado oeste, V.1980, fr., *J. Mariath* (HAS 12206); Parque Estadual de Itapuã, 08.VII.1980, fr., *J.N.C. Marchiori & S.J. Longhi* (HDCF 40); 22.XI.1956, *J. Mattos 2765* (MBM); Vila Manresa, 15.XI.1945, fl., *B. Rambo* (PACA 29424); 22.I.1949, fr., *B. Rambo* (PACA 40072). Santa Maria, distrito de Santo Antão, Pedra do Lagarto, -53.873889, -29.627778, 07.I.2013, fl., *M. Figueira et al. 145* (HDCF). Santana do Livramento, Cerro Armour, 02.III.2002, *C. Mondin 2564* (PACA); Cerro Munhoz, 13.XI.2018, bud and fr., bl. and fr., *C.H. Dalastra 2* (ICN). São Francisco de Paula, IV.1944, *R. Gliesch* (PACA 27427); arredores da UHE Passo do Inferno, Fazenda 3 Cachoeiras, 26.IX.1958, *R.D. Ramos 478-A* (HAS); Barragem do Blang, 26.IX.1958, *O.R. Camargo 95* (PACA-AGP); CPCN Pró-Mata, -50.5755555556, -29.4205555556, 19.III.2000 (MPUC 7719); *G. Pontes* (MPUC 8653); -50.1744444, -29.4808333, 27.I.2001 (MPUC 10557); 29.IX.1995, *C.S.A. Martins* (MPUC 11144); Parque Municipal da Ronda, -50.55, -29.433333, 06.V.2007, *L. Cappelatti 117* (PACA); -50.445578, -29.448672, 06.V.2007, *L. Cappelatti 44* (PACA); Perau São Xico, IX.1989, *P.F.S. Machado* (HDCF 4063); Pró-Mata, 2.XII.2004, *M.R. Ritter 1456* (ICN). São Francisco de Assis, RST 377 Km 320, -55.131944, -29.594444, 11.I.2009, *E. Freitas 639* (ICN). São Gabriel, Cerro do Ouro, 15.I.1986, *J.N.C. Marchiori 279* (HDCF). São Vicente do Sul, Cerro Loreto, 22.III.2019, *C.L. Ribeiro & I. Heglund 319* (ICN); 26.XII.1985, *J.N.C. Marchiori 89* (HDCF); 04.X.1986, *J.N.C. Marchiori 584* (HDCF). Vacaria, Passo do Socorro, 27.XII.1951, *B. Rambo 52626* (HBR, UPCB);

27.XII.1951, fr., *B. Rambo* (PACA 51626); 28.I.1951, *A. Sehnem 5780* (PACA-AGP); 27.XII.1951, fr., B. Rambo 4954 (MBM). Viamão, Itapuã, 20.XI.1979, fl., *M. Sobral 3556* (MBM); Morro da Grota, I.1975, *M.L. Porto et al.* (HAS 1174); Morro Araçá, XI.1979, fr., *L. Aguiar 197* (HAS); XI.1979, fr., *L. Aguiar 200* (HAS); XI.1979, fr., *L. Aguiar 211* (HAS); 20.XI.1979, bud., *L. Aguiar 212* (HAS, MBM); 08.XII.2002, *M. Pinheiro 427* (ICN); trilha para a Pedra da Visão, 18.V.2004, fl., *M.B. Wiesbauer 70* (PACA); 11.VI.1989, fr., *M. Haussen* (PACA 92892); 18.V.2004, fr., *M.B. Wiesbauer 70* (ICN); 18.V.2004, fr., *M.B. Wiesbauer 70* (HUCS).

Etymology: similar to *Eucalyptus* L'Hér. (Myrtaceae).

Flowering and fruiting: Buds from May, flowering from September to January and fruiting from November to April. Dry fruits from the previous season may persist in the plant in the following year.

Geographical distribution & habitat: Brazil (BA, MG, SP, RJ, SC, RS) (Flora do Brasil 2020) and Uruguay (Rivera) (Grela & Brussa 2005). In Rio Grande do Sul state, the species is widely distributed, occuring at high elevations, in rocky basaltic soil within the subtropical highland grasslands and steep areas at the edge of riverside forests. In the Pampas, occurs in basaltic and sandstone rock outcrops distributed along several non-protected primary areas.

Conservation status: **LC** to Rio Grande do Sul– *Agarista eucalyptoides* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO). The extent of occurrence of this species is 96,904,202 km^2, placing it in the category "Least Concern" (LC) (IUCN 2019). The species is not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013), neither in the CNC Flora Red List to Brazil (CNCFlora 2020). According to the guidelines of IUCN (2019)

the threatened risk of *Agarista eucalyptoides* is “Least Concern” (LC) to Rio Grande do Sul due its extent of occurrence (EOO).

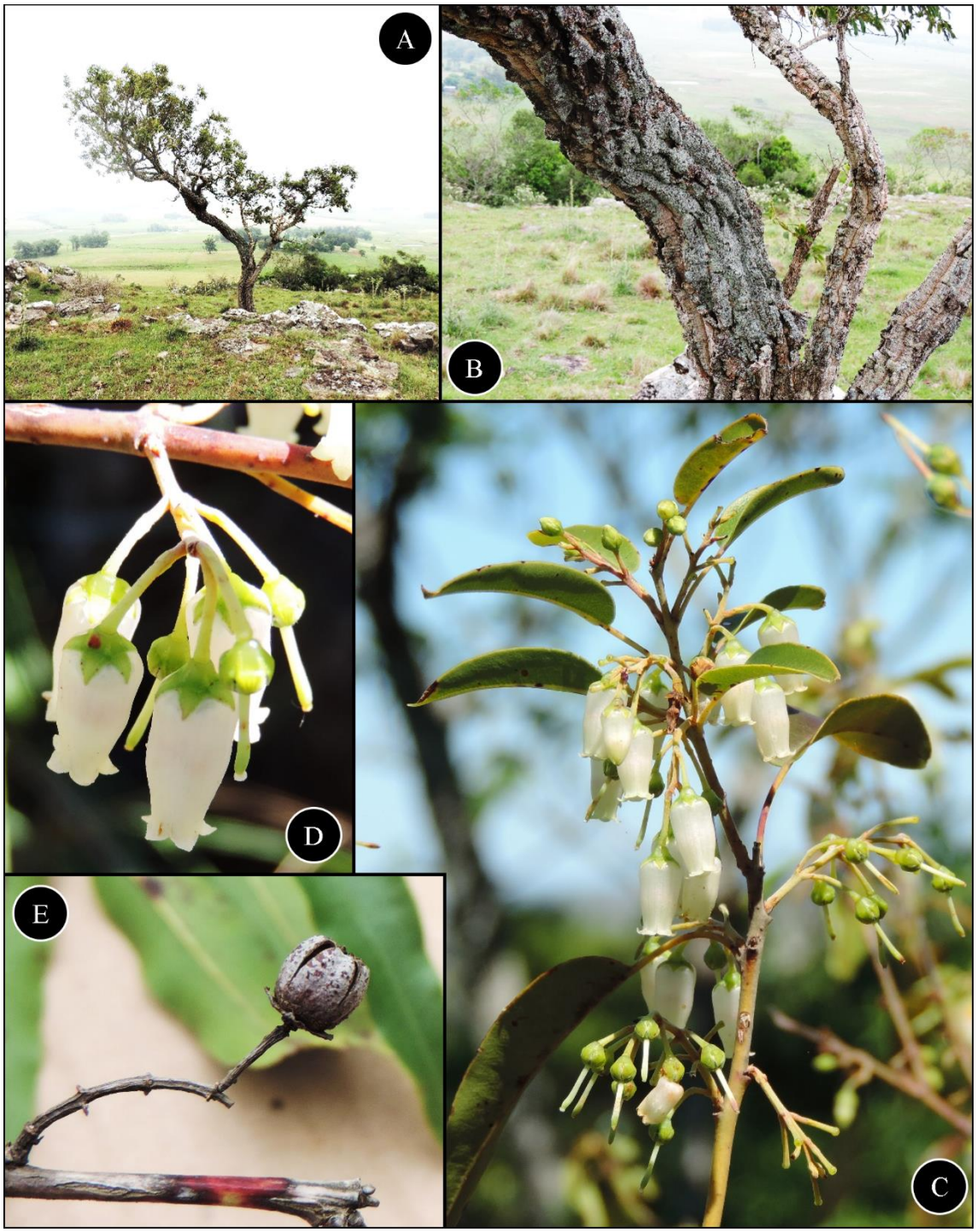

Figure 4. *Agarista eucalyptoides* (Ericaceae) (A) Habitat and habit at *Cerro dos Munhoz*, Santana do Livramento, RS, Brazil; (B) Stem bark fissured; (C) Flowering twig; (D) Raceme and flower; (E) Loculicidal capsule. Photos (A, B, C, D, E) C.H. Dalastra;

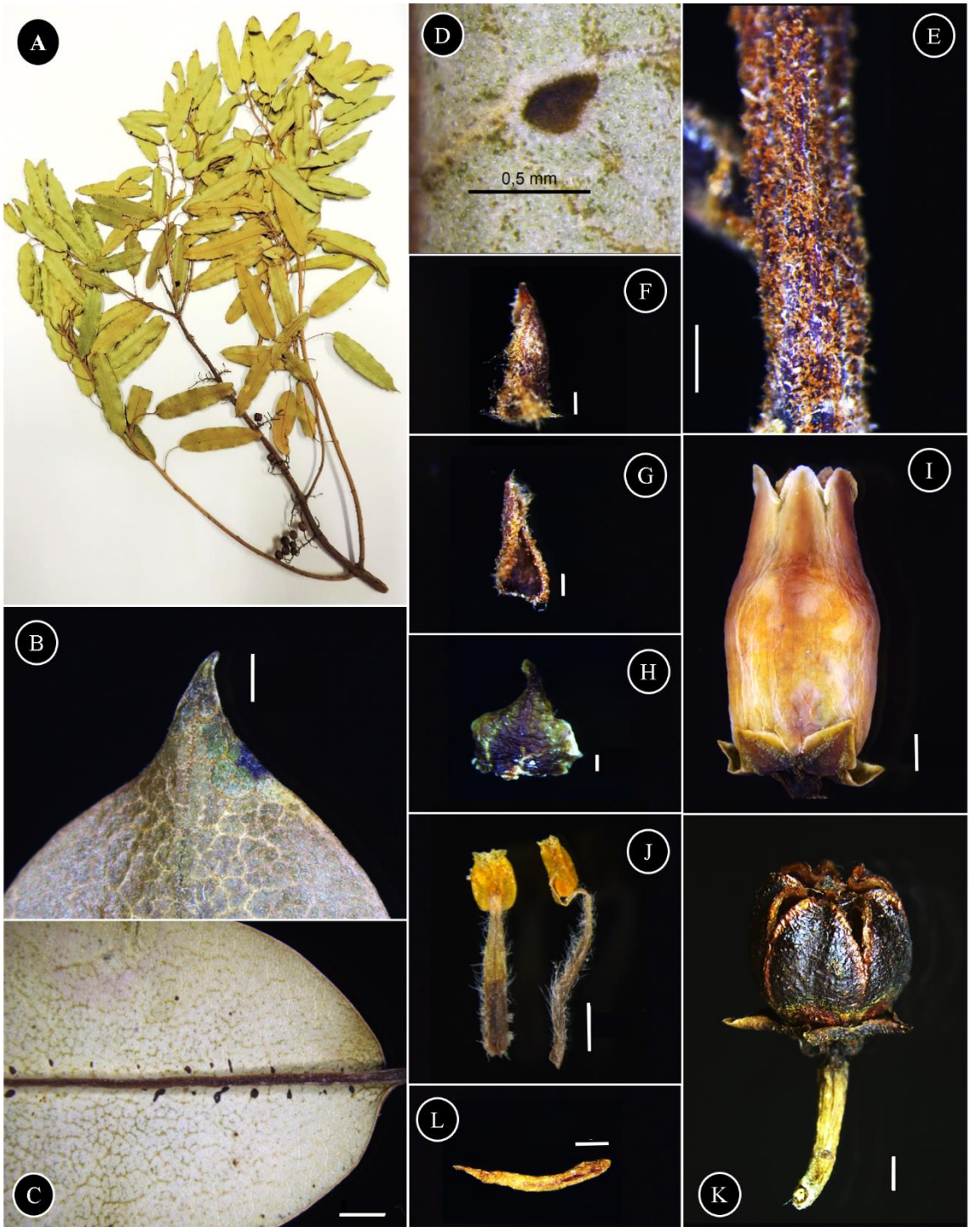

Figure 5. *Agarista eucalyptoides* (Ericaceae): *Dalastra 3* - ICN. (A) Fruiting branch; (B) Mucronulate apex [scale 1 mm]; (C) Foveolate glands associated with midvein [scale 2 mm]; (D) Detail of the foveolate gland [scale 0.5 mm]; (E) Rachis indumentum [scale 0.5 mm]; (F) Bract [scale 0.2 mm]; (G) Bracteole [scale 0.2 mm]; (H) Calyx lobe [scale 0.2 mm]; (I) Urceolate flower [scale 1 mm]; (J) Geniculate stamens; [scale 1 mm] (K) Capsule loculicidal [scale 1 mm]; (L) Seed [scale 0.5 mm].

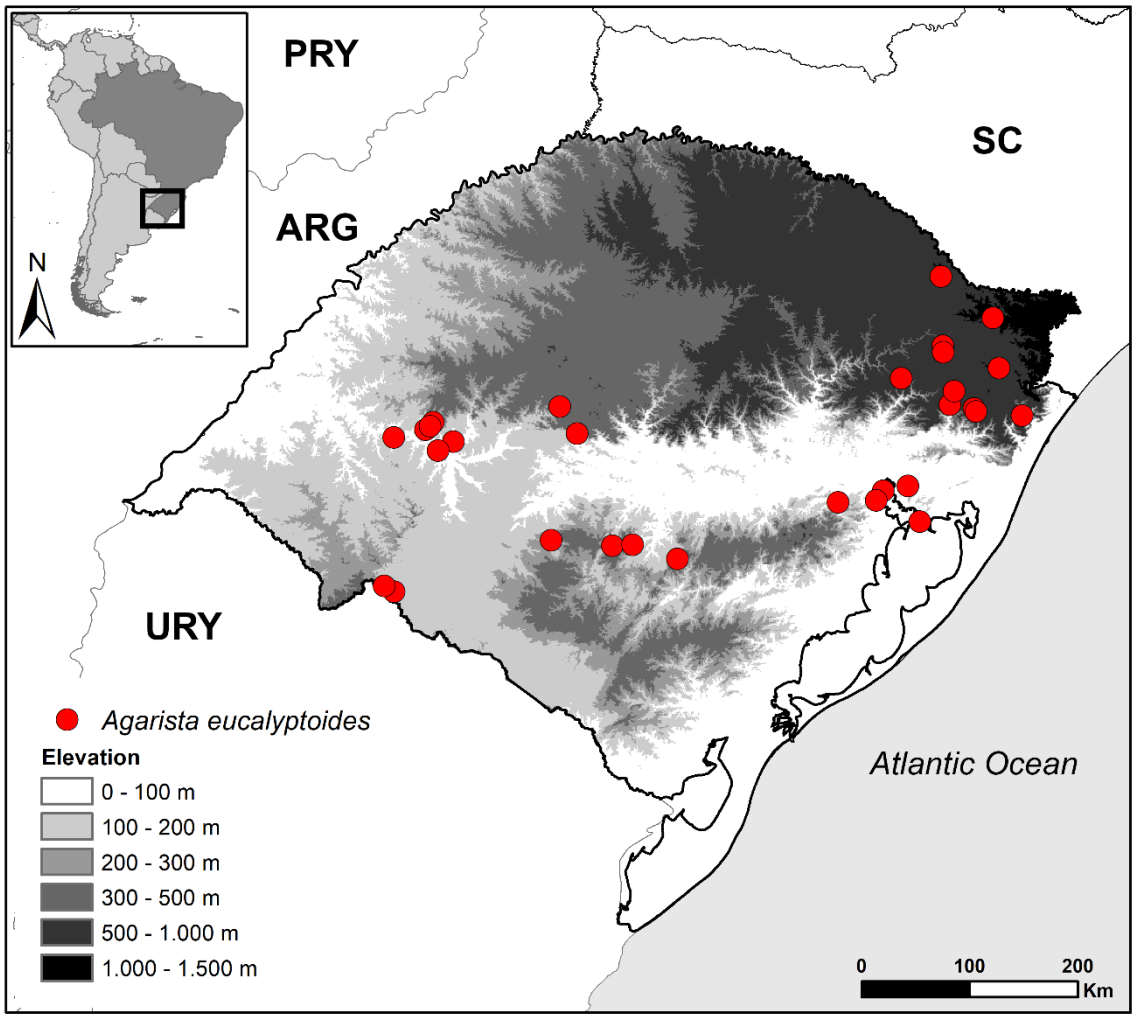

Figure 6. Distribution map of *Agarista eucalyptoides* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in gray or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Agarista minensis (Glaz. ex Sleumer) Judd., J. Arnold Arbor. 65: 313. 1984 ≡ *Leucothoe minensis* (Glaz. ex Sleumer) Glaz., Notizbl. Bot. Gart. Berlin-Dahlem 12: 480. 1935. Type: BRAZIL. MINAS GERAIS: Biribiry, Mocoto, near Diamantina, 28 Mar. 1892, *A.F.M. Glaziou 19572* (lectotype [designated by Judd in J. Arnold Arbor. 65: 255-342. 1984]: K 000494446 [digital image]!; isolectotype P MNHN-P-P00715920 [digital image]!). **Figures 7-9.**

Shrubs to small trees, 1-3 m high; twigs glabrescent. **Leaves** alternate, flat, coriaceous; petiole thick and rigid, 2.85—6.7 mm long; blade lanceolate to oblong, 2.7—5.4 × 0.46—1.09, base rounded to truncate; apex acute to rounded, mucronulate; margin entire and slightly revolute near the base; adaxial surface glabrous, rarely puberulent at midvein near the base; abaxial surface glabrous to puberulent at midvein. **Racemes** axillary (fascicle-like) 2-6-flowered; rachis 0.28—1.67 cm long, pubescent; pedicel 3.15—10.28 mm long; bracts linear, 0.6—0.88 mm long; bracteoles narrowly triangular to linear, 0.97—1.92 mm long. **Flowers** calyx glabrescent to pubescent; lobes triangular with acute to acuminate apex, pubescent edge, 1.24—2.6 mm; corolla cylindrical-urceolate white to red, glabrous, 7.91—12 mm long; stamen filament villose, 2.19 —7.27 mm long; anther 1— 1.6 mm long; ovary glabrous to puberulent. **Fruit** capsule, short-ovoid to subglobose 3.17—5.35 mm diam. × 3.9—4.42 mm high, placentae ± central; seeds trapezoid, 0.97—1.71 mm long.

Specimens examined: BRAZIL. RIO GRANDE DO SUL: BR-101, 13.I.1942, *B. Rambo* (PACA 8537). Amaral Ferrador, X.1995, *M. Sobral 8037* (ICN). Bom Jesus, Distrito das Silveiras, margem do rio Silveiras; fazenda de Valdemor Boeiro, 2.I.1976, *O.R. Camargo* 664 (HAS); Potreirinhos, 4º distrito, 20.VII.1975, *O.R. Camargo* (HAS 81157); 2.I.1976, *O.R. Camargo* (HAS 81156). Cambará do Sul; Ponte Ponte de Ferro, lado esquerdo, em direção à São José dos Ausentes, -28.869959, -50.020709, 22.XII.2019, fl., *C.H. Dalastra 21* (ICN); Trilha da Cachoeira do Tigre Preto, 16.I.1942, *B. Rambo* (PACA 9048). Canela, Cascata do Caracol, 30.III.1982, *J. Mattos & N. Silveira 24092* (HAS); Parque do Caracol, 3.XII.1986, fr., *J. Mattos & N. Silveira 30466* (HAS). Caxias do Sul, Criúva, Ilheus, 30.X.1988, fr., *R.A. Wasum et al.* (HUCS 4773); Palanquinhos, 08.XII.2014, fl., F. *Gonzatti 1353* (HUCS); Vila dos Dalanhos, -50.929722, -28,9642, 3.II.2012, *M.*

Grizzon 60 (HUCS); Vila Seca, 1.II.2000, *A. Kegler 587* (HUCS). Jaquirana, Passo do S, -29.083979, -50.367401, 21.XII.2019, fl., *C.H. Dalastra 19* (ICN). São Francisco de Paula, *L.R.M. Baptista* (ICN 088699); 21.III.2014, fr., *G. Felitto et al. 837* (ICN); 10.II.1941, fs., *B. Rambo* (PACA 4750); Banhado Amarelo, 02.I.1946, fl., *B. Rambo* (PACA 30902); 12.II.1946, fr., *B. Rambo* (PACA 32150); 08.I.1947, fl., *B. Rambo* (PACA 34939); 16.II.1954, *B. Rambo* (PACA 32262); 17.II.1946, fr., *K. Emrich* (PACA 33326); II.1948, *B. Rambo* 36728 (ICN, PACA); Fazenda Invernadinha, S 29°19'10.8", W 50°42'26.8", 15.I.1953, fl., *K. Emrich* (PACA 52847); Floresta Nacional, lageado, 06.XII.2008, fl., *G.D.S. Seger 649* (ICN); 17.XII.2006, fr., *G.D.S Seger 335* (ICN). Sapucaia do Sul, Morro Sapucaia, 03.XII.1971, fl., *J.C. Lindeman et al.* (ICN 009351); 23.I.1948.

Etymology: the epithet alludes to the locality of the type specimen in Minas Gerais state.

Flowering and fruiting: flowering from November to February; immature fruits from January to April. Dry fruits from the previous season may persist in the plant in the following year.

Geographical distribution & habitat: Brazil (MG, SC, PR, RS) (Flora do Brasil 2020, in contruction 2020). In Rio Grande do Sul the species occurs in Subtropical Highland Grasslands, in the understory of riparian forest. This species was registered also to the Pampas Domain due one collection (*M. Sobral 8037*) to Amaral Ferrador in the *Serra do Sudeste*. Howerer, the exsiccate label do not comprise further information about the habitat of the specimen and this ecord was not found at fieldwork.

Conservation status: **VU** to Rio Grande do Sul– *Agarista minensis* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO). The extent of occurrence of this species is 7,285.886 km^2, placing it in the category

"Vulnerable" (VU) (IUCN 2019). The distribution is severely fragmented (subcriterium **a**) due its specificity of habitat in the riparian forest understory. Moreover, the continuous decline in the area and quality of habitat (subcriterium **biii**); which are being progressively converted into arable land and/or reduced by the pressure of implantation of a large number of hydroelectric power plant, mainly in *Campos de Cima da Serra*, where is the largest portion of the species distribution. This species was considered extinct in the state because it has not been recorded since 1948. However, *Agarista mienensis* has been mistakenly identified mostly as *Agarista niederleinii*. This species is not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013), neither in the CNC Flora Red List (CNCFlora 2020) to Brazil. To Rio Grande do Sul we suggest the inclusion of *Agarista minensis* in the state´s red list, in the threat category "Vulnerable" (VU).

Note: The epithet *minensis* refers to the type specimen locality in Minas Gerais state. However, this collection is the only one disjunct from the main species distribution (Santa Catarina and Rio Grande do Sul). The origin of the type is unclear and this material (*Glaziou 19572*) is identical to *Ule 1840* (L2602871, L2602872), collected in Santa Catarina in 1890. Wurdack (1970) cited that, as well to Melastomataceae, for other families could be detected alterations made by Glaziou material on precedence of samples. According to him: "Skepticism about Glaziou data is perhaps in order when his collection "locality" is the only evidence of disjunct species distribution or when a species is known only from a Glaziou collection and that of one other of the nine above-listed collectors (or probably also others active in Brazil just before, during, or just after the Glaziou era)." Based on that, it is possible that Ule sent one specimen to Glaziou and the label information was altered later by someone. Possibly, *Ule 1840* could be a duplicate

from the same collection of the type material of *Agarista minensis* that was later mistakenly labeled.

Due the similarity in leaf shape and size, Sleumer (1959) treated this species as a synonym of *Agarista niederleinii*. Here we follow the circumscription proposed by Judd (1984) which separate these two species because of the great variation in reproductive structures (specially inflorescences and fruits). *Agarista minensis* is easily and frequently confused with *A. niederleini*, from which can be distinguished mainly by the thinner-walled capsules with more or less central placentae, short rachis and for being almost exclusively associated with the riparian forest (*vs.* the occurrence of *A. niederleinii* in open areas and only less frequently the occurrence in riparian forest under *A. niederleinii* var. *acutifolia*). Addictionally to the main characteristics already identified by Judd (1984) to separate these species, here we also found differences of seeds size and shape. In *A. minensis*, seed are trapezoid and shorter, varying from 0.97 to 1.71 mm long *vs.* the seed elongated concave-convex, varying from 1.6—2.7 mm long in *A. niederleinii* (**Figures 8-J; 11-K**).

Figure 7. *Agarista minensis* (Ericaceae) (A) Habitat and habit in riparian forest at Passo do S, Jaquirana, RS; (B) Flowering branch; (C) Slight fissured bark; (D) Seedlings; (E) Red flowers; (F) White flowers; (G) Imature fruits; (H) Detail of imature fruit and calyx lobes; (I) Loculicidal capsule. Photos (A, B, C, D, F, G, H, I) C. H. Dalastra; photo (E) S. Bordignon.

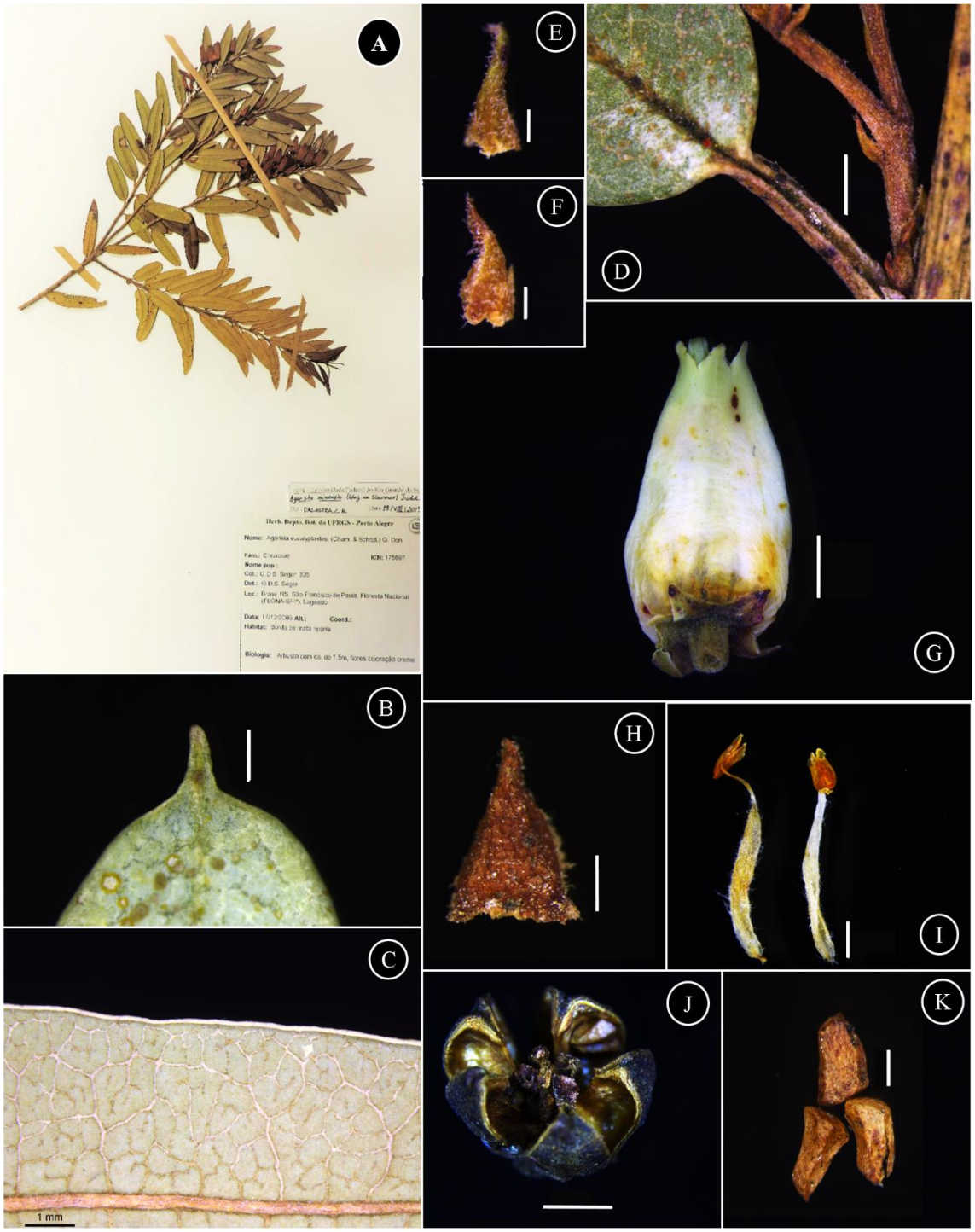

Figure 8. *Agarista minensis* (Ericaceae): *Seger* 335 – ICN. (A) Flowering branch; (B) Mucronulate apex [scale 0.5 mm]; (C) Slightly revolute margin and midvein indumentum [scale 1 mm]; (D) Short rachis [scale 1 mm]; (E) Bract [scale 0.2 mm]; (F) Bracteole [scale 0.2 mm]; (G) Urceolate flower [scale 2 mm]; (H) Calyx lobe [scale 0.5 mm]; (I) Geniculate stamens [scale 1 mm]; (J) Loculicidal capsule [scale 2 mm]; (K) Seeds [scale 0.5 mm].

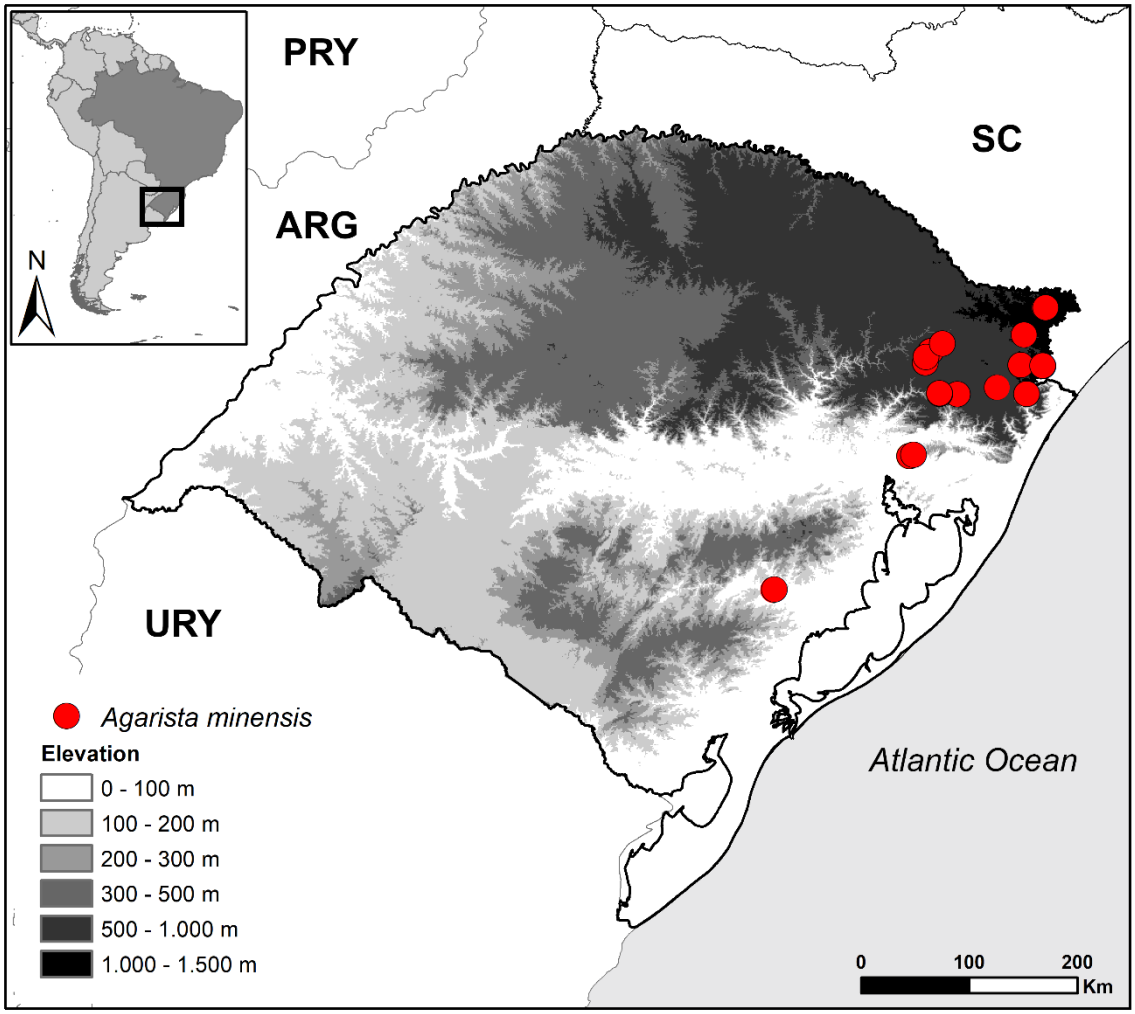

Figure 9. Distribution of *Agarista minensis* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in grey or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Agarista niederleinii (Sleumer) Judd., J. Arnold Arbor. 65: 329. 1984 ≡ *Leucothoe niederleinii* Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 12: 480. 1935. Type: BRAZIL. SANTA CATARINA, Palmas Altas, Campos de los rios Chopim y Chapecó, jan. 1887, *G. Niederlein 2006* (holotype B destroyed; neotype S [designated by Judd in J. Arnold Arbor. 65: 255-342, 1984] BRAZIL. SANTA CATARINA: São Francisco do Sul, Garuva, Monte Cristo, *R. Reitz & R.M. Klein 5889*; isoneotype B, L 2602837 [digital

image]!, NY 00300819 [digital image]!, UC, US 00116791 [digital image]!). **Figures 10-12.**

Shrubs or trees, 1—5 m high; bark longitudinally fissured; twigs glabrous to moderately or dense pubescent. **Leaves** alternate, flat, coriaceous; petiole thick and rigid, 3.06—4.45 mm long; blade ovate to elliptic, rarely oblong, 1.7—4.26 × 0.55—1.67 cm; base rounded to cuneate; apex acute to acuminate or obtuse to retuse, mucronulate; margin entire to slightly revolute; adaxial surface glabrous to slightly pubescent at midvein near the base; abaxial surface glabrous to puberulent at midvein, with inconspicuous foveolate glands ferruginous close to midvein. **Racemes** axillary, 5-9-flowered; rachis 0.91—2.7 cm long, puberulent to glabrescent; pedicel 3.62—7.5 mm long; bract linear 0.76—1.14 mm long; bracteoles triangular 0.7—1.47 mm long. **Flower** calyx lobes triangular, apex acuminate, glabrous, margins pubescent, 1.38—1.93 mm long; corolla cylindrical-urceolate, white, glabrous, 6.03—10.11 mm long; stamen filament villose 3.67—6.37 mm long; anther 1.13—1.73 mm long; ovary puberulous to glabrous. **Fruit** capsule, short-ovoid to subglobose, 3.03—4.8 mm diam × 4.55—5.75 mm high, placentae subapical; seed concave-convex, 1.6—2.7 mm long.

Key to the varieties of *Agarista niederleinii* in Rio Grande do Sul, Brazil

1. Leaves apex obtuse to retuse, blade 1—2.66 × 0.43—0.89 cm ……. ***A. niederleinii* var. *niederleinii***

1’. Leaves apex acuminate to acute, blade 1.7—4.26 × 0.55—1.67 cm ..... ***A. niederleinii* var. *acutifolia***

Agarista niederleinii (Sleumer) Judd. var. ***niederleinii***

Specimens are shorter (1 — 2.7 m high), have smaller leaves (1—2.66 cm long × 0.43—0.89 cm wide) and occur at higher altitudes and/or more exposed sites (Figures 10- A, B, D).

Specimens examined: BRAZIL. RIO GRANDE DO SUL: Bom Jesus, 16.I.1942, (PACA 9048); *B. Rambo* (PACA 9065); Rio dos Touros, 13.I.1942, *B. Rambo* (PACA 8537); Passo da Guarda, 15.I.1952, fr., *B. Rambo* (PACA 51933). Cambará do Sul, Cânion Fortaleza, 24.XI.1994, fl., *G. Hatschbach & O.S. Ribas 61314* (HUCS); 24.XI.1994, *G. Hatschbach & O.S. Ribas 61314* (ICN); 24.XI.1994, *G. Hatschbach & O.S Ribas 61314* (MBM); III.1987, fr., *J. Mattos et al. 30973* (HAS); XII.1993, fl., *N. Silveira 11649* (HAS); XI.1989, fr., *N. Silveira 7274* (HAS); IV.1982, *J. Mattos & N. Silveira 23361* (HAS); -29.065848, -49.961626, 17.XII.2018, fl., *C.H. Dalastra 9* (ICN); entrada da trilha para a Cachoeira do Tigre Preto, -29.075156, -49.984725, 23.XII.2019, fl., *C.H. Dalastra 20* (ICN); trilha para a Cachoeira do Tigre Preto, -29.074168, -49.986402, 17.XII.2018, fl., *C.H. Dalastra 11* (ICN); estrada para o Cânion Fortaleza, 17.XII.2018, fl., *C.H. Dalastra 5* (ICN); estrada de Praia Grande a Itaimbezinho, 16.XI.1984, *D.B. Falkenberg 1853* (FLOR); Cânion Itaimbezinho, 20.II.1953, B. *Rambo 54063* (HBR); -50.078889, -29.1575, 10.XII.2010, *A.A. Schneider 1786* (ICN); 11.XII.1992, fl., *D.B. Falkenberg 5993* (FLOR); 11.XII.1992, fl., *D.B. Falkenberg 5995* (FLOR); 11.XII.1992, fl., *D.B. Falkenberg 5983* (FLOR); -29.163768, -50.096291, 18.XII.2018, fl., *C.H. Dalastra 12* (ICN); caminho para São Francisco de Paula, II.1948, *B. Rambo* (PACA36728). Canela, caminho para Caracol, 17.II.1946, *K. Emrich* (PACA 33326); caminho para Passo do Inferno, 09.I.1955, *B. Rambo* (PACA56563.1); 20.II.1953, *B. Rambo* 54063 (HBR). Caxias do Sul, Criúva, Ilheus, 30.X.1988, fr., *R.A. Wasum et al.* (HUCS 4773); Vila dos Dalanhos, 03.II.2012, *M. Grizzon 60* (HUCS); Vila Oliva, 02.I.1946, *B. Rambo* (PACA 30902); Vila Seca, 01.II.2000, *A. Kegler 587* (HUCS).

Jaquirana, Funil, Rio das Antas, Balsa Velha, Campos de Cima da Serra, XI.1999, fr., *A.D. Nilson 521* (HAS); Tainhas, 16.II.1954, *B. Rambo* (PACA32262). São Francisco de Paula, caminho para Caracol, 15.I.1953, *K. Emrich* (PACA52847); Flona, arroio Lajeado, 17.XII.1998, fl., *C. Mondin et al. 1661* (PACA); Banhado Amarelo, 08.I.2010, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 174898); 25.XI.2006, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 172827). Itaimbezinho, 22.XII.1980, *A. Sehnem 17158* (PACA-AGP); Serra do Faxinal, 12.II.1946, *B. Rambo* (PACA 32150); 07.II.1941, fs., *B. Rambo* (PACA 4321); 30.I.1950, fs., *B. Rambo* (PACA 45530); 18.XII.1950, fl., *B. Rambo* (PACA 49305); 20.II.1953, fr., *B. Rambo* (PACA 54063); 20.III.1953, fr., *B. Rambo* (PACA 54121); 19.XII.1950, *A. Sehnem* (HUCS 1632); 19.XII.1950, *A. Sehnem 5164* (PACA). São José dos Ausentes, Serra da Rocinha, XI.2004, *A.M. Carneiro 804* (HAS); -49.9525, -28.8, 03.XI.2006, fl., *G.O. Romão et al. 1856* (ICN); 14.I.1942, fs., *B. Rambo* (PACA 8621); 14.I.1942, fl., *B. Rambo* (PACA 8698); 19.I.1950, fr., *B. Rambo* (PACA 45390); 03.II.1953, fr., *B. Rambo* (PACA 53824); 28.II.1954, fs., *B. Rambo* (PACA 32484); 19.I.1950, fr., *A. Sehnem 4295* (PACA); para Serra da Rocinha, 3.II.1953, *B. Rambo 53824* (HBR). Vacaria, Fazenda da Ronda, 08.I.1947, *B. Rambo* (PACA 34939).

Agarista niederleinii (Sleumer) Judd var. ***acutifolia*** Judd, J. Arnold Arbor. 65: 329. 1984. Type: BRAZIL. PARANÁ: Bocaiúva do Sul, Campina Tavarez, 21 nov. 1970, *G. Hatschbach & O. Guimarães 25598* (holotype US 00116791 [digital image]!; isotype C 10010920 [digital image]!, M 0173310 [digital image]!, M 0173311 [digital image]!, MO, NY 8173 [digital image]!, S S05-4204 [digital image]!, SP 000606 [digital image]!, UC 139620 [digital image]!).

Specimens are taller (3 m—5 m high), have larger leaves (1.7—4.26 cm long × 0.55—1.67 cm wide) and occur at lower altitudes and/or less exposed sites (Figures 10 C, E).

Speciemens examined: Caracol, caminho para Canela, 07.II.1948, *K. Emrich* (PACA37207). Cambará do Sul, Itaimbezinho, 18.XII.1950, fl., *B. Rambo* 49306 (PACA); 13.XI.1953, fl., *B. Rambo* 54523 (PACA); 20.III.1953, fr., *B. Rambo* 54121 (PACA); 19.XII.1950, *A. Sehnem 5164* (MBM). Esmeralda, 04.VI.1982, *J.A. Jarenkow s.n.* (ICN063472). São Francisco de Paula, Floresta Nacional (FLORA-SFP), lageado, 06.XI.2008, *G.D.S. Seger 649* (ICN).

Etymology: tribute to Gustav Niederlein, (1858-1924), German naturalist who developed part of his career in Argentina and collected the type specimen.

Flowering and fruiting: flowering from September to January; immature fruits from December to March. Dry fruits from the previous season may persist in the plant in the following year.

Geographical distribution & habitat: Brazil (SP, PR, SC, RS) (Flora do Brasil 2020, in contruction 2020). In Rio Grande do Sul *Agarista niederleinii* occur in Subtropical Highland Grasslands at the Atlantic Rainforest, at humid plateaus with adjacent rocky shores, at riparian forests, cloud forests and open grasslands with tall grasses.

Conservation status: **VU** to Rio Grande do Sul– *Agarista niederleinii* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO). The extent of occurrence of this species is of 11,104.136 km^2, placing this species in the category "Vulnerable" (VU) (IUCN 2019), with less than 10 (subcriterium **a**). Moreover, despite the populations found in field comprise many adult reproductive individuals, the extent area (subcriterium **bi**) and the extent and quality of habitat (subcriterium **biii**) are in continuous decline due its exclusively distribution along the *Campos de Cima da Serra* and the increasing anthropization of the native grasslands, mostly converted into monocultures and pasture for livestock, especially in the northern part of the state. This

species is not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013) and according to the Red List from CNC Flora is classified as “Least Concern” (**LC**) (CNCFlora 2020) to Brazil. We suggest the inclusion of *Agarista niederleinii* in the state´s red list, in the threat category “Vulnerable” (VU).

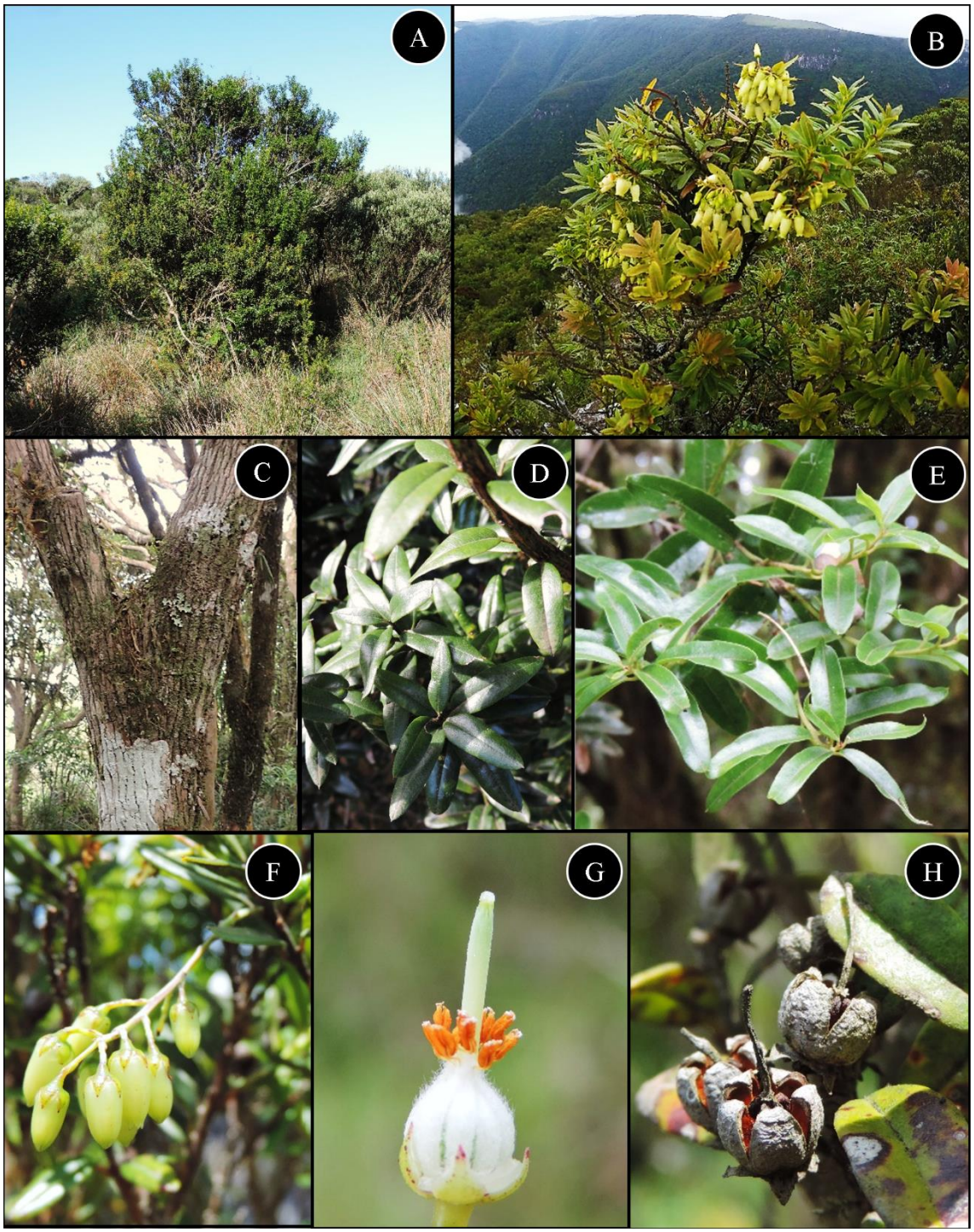

Figure 10. *Agarista niederleinii* (Ericaceae) (A) Habitat and habit in grasslands in Cambará do Sul , RS; (B) Habitat and habit in cloud forest edge; (C) Stem bark fissured;

(D) Branch of *A. niederleinii* var. *niederleinii*; (E) Branch of *A. niederleinii* var. *acutifolia*; (F) Inflorescence; (G) Geniculate stamens around gynoecium (corolla removed); (H) Loculicidal capsule. Photos (A, C, D, E. H.G.H) C.H. Dalastra; Photo B: G. Heiden.

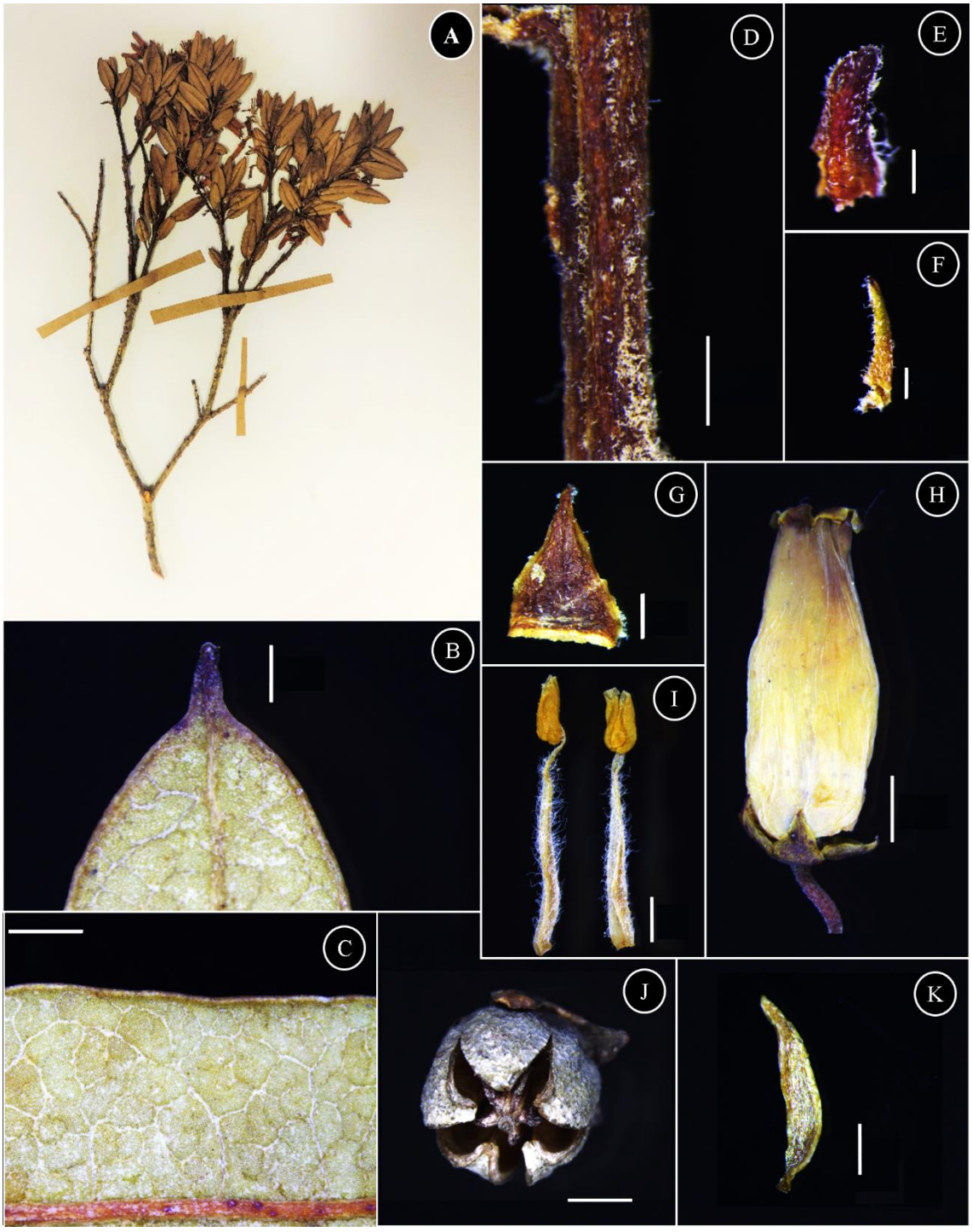

Figure 11. *Agarista niederleinii* var. *niederleinii* (Ericaceae): *Hatschabach & Ribas 61314* - ICN. (A) Flowering branch; (B) Mucronulate apex [scale 0.5 mm]; (C) Slightly revolute margin and glarescent midvein [scale 1 mm]; (D) Rachis [scale 0.5 mm]; (E) Bract[scale 0.2 mm]; (F) Bracteole [scale 0.2 mm]; (G) Calyx lobe [scale 0.5 mm]; (H) Cylindrical-urceolate flower [scale 2 mm]; (I) Geniculate stamens [scale 1 mm]; (J) Loculicidal capsule [scale 2 mm]; (K) Seeds [scale 0.5 mm].

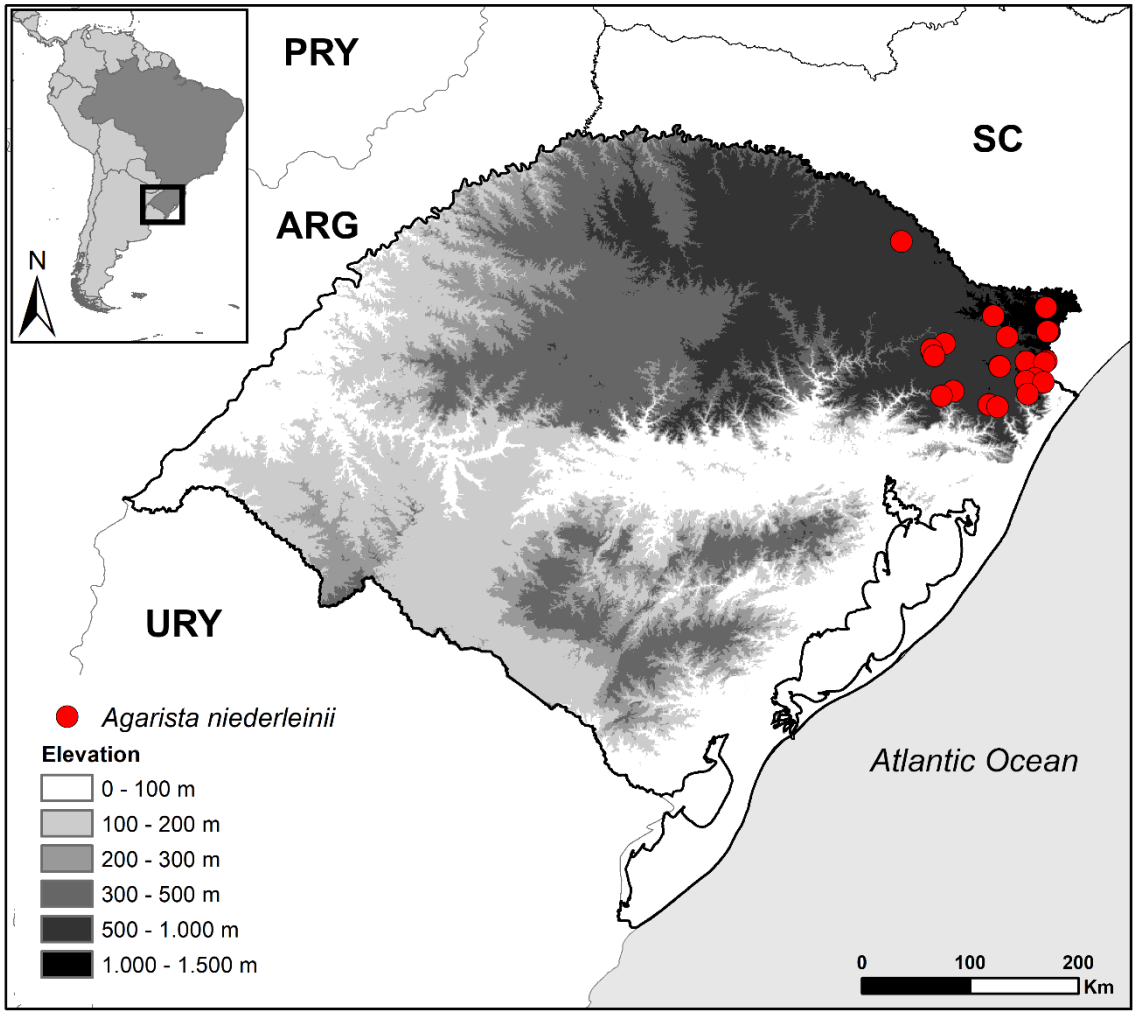

Figure 12. Distribution map of *Agarista niederleinii* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in grey or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Note: The two varieties can be recognized by the distinct morphology of the leaves and relative elevational gradient stratification. It is possible that these two varieties are likely to compose ecologically isolated extremes. However, these two taxa can grow closely in some areas as in Canyon Itaimbezinho, Canyon Fortaleza at Cascata do Tigre Preto and São Francisco de Paula. According to Judd (1984) the intermediate types between these two taxa appear to be highly fertile and then the two varieties could be ecotypes.

Agarista nummularia (Cham. & Schltdl.) G.Don., Gen. hist. 3: 837. 1834 ≡ *Andromeda nummularia* Cham. & Schltdl., Linnaea 1: 520. 1826 ≡ *Leucothoe nummularia* (Cham. & Schltdl.) DC., Prodr. 7: 603. 1839. Type: BRAZIL. RIO GRANDE DO SUL: Porto Alegre (see Meinsner in Martius [1863] apud Judd [1984]), *F. Sellow 1229* (holotype B, destroyed; isotype F V0055221F [digital image]!, G-DC G 00323837 [digital image]!, GH, HAL 098441 [digital image]!, L 0006635 [digital image]!).

Leucothoe nummularia var. *floccigera* Sleumer., Bot. Jahrb. Syst. 78: 460. 1959. Type: BRAZIL. RIO GRANDE DO SUL: [Rio Grande] Povo Novo, near Pelotas, 12 Nov. 1901, *G.O.A. Malme 401* (holotype S S05-4199 [digital image]!; GH 0015111 [digital image]!, L 0006635 [digital image]!, L 0006634 [digital image]!, S 05-4202 [digital image]!). **Figures 13-15.**

Shrubs to subshrubs, 1—1.7 m high; branches erect, puberulous, with or without scattered gland-headed trichomes. **Leaves** alternate, spiraled, frequently imbricate, coriaceous to subcoriaceous; petiole thick and rigid, 0.97—2.54 mm long; blade orbicular to ovate, 1.12—1.79 × 0.78—1.83 cm; base cordate; apex rounded to mucronulate; margin entire to serrulate, slightly revolute; adaxial surface glabrescent to pubescent at midvein near the base; abaxial surface glabrescent, pubescent or with scattered gland-headed trichomes, mainly at midvein near the base, often with inconspicuous ferruginous foveolate glands. **Racemes** axillary, subapically, 6-16-flowered; rachis 0.6—7.02 cm long, pubescent with scattered gland-headed trichomes; pedicel 4.79—8.17 mm long; bract triangular to linear, 0.93—1.5 mm long; bracteoles ovate to triangular, 0.5—3.09 mm long. **Flowers** with dense to sparsely distributed gland-headed trichomes, edge lobe pubescent, 2.63—5.04 mm long; corolla urceolate to cylidrical, cream to white, 8.07—9.92 mm long, sparsely hispidulous trichomes at the division between lobes; stamen filament villous, 4—5.23 mm long; ather 1.26—1.5 mm long; ovary pubescent. **Fruit**

capsule short-ovoid to subglobose 5.1—7.28 mm diam × 3.53—4.24 mm high, placentae subapical; seed lunate, 1.44—1.64 mm long.

Specimens examined: BRAZIL. RIO GRANDE DO SUL: Cambará do Sul, -29.064304, -50.116252, 14.XI.2003, L.P. *Deble et al.* (SMDB 10137); estrada para Cânion Fortaleza, 17.XII.2018, fr., *C.H. Dalastra 4* (ICN); trilha para o Cânion Fortaleza, -29.066971, -49.963623, 17.XII.2018, fr., *C.H. Dalastra 8* (ICN); trilha para a cachoeira do Tigre Preto, -29.074799, -49.985474, 17.XII.2018, fl., *C.H. Dalastra 10* (2018); estrada de Praia Grade a Itaimbezinho, 16.XI.1984, fl., *D.B. Falkenberg 1863a* (FLOR); 16.XI.1984, fl., *D.B. Falkenberg 1859* (FLOR); estrada para Fortaleza, 22.XI.1998, *R.A. Wasum et al.* (HUCS 12860); 22.XI.1998, fl., *R. Wasum* (MBM 234339); Fortaleza dos Aparados, 06.IV.1980, fl., *J.L. Waechter 1590* (ICN); XII.1993, *N. Silveira 11645* (HAS); Malacara, 07.X.1967, fl., *A. Schultz 4394* (ICN); 23.I.1948, *B. Rambo 36724* (ICN). Capão do Leão, Serro das Almas, -52.544722, -31.768056, 07.XI.2012, fl., *P.J.S. Silva Filho 1823* (ICN). Glorinha, Pituva, -50.80475, -29.79825, I.2015, *M. Molz* (HAS 91568). Gravataí, Itacolumi, 12.I.1950, *A. Sehnem* (HUCS 1631); 12.I.1950, fs., *A. Sehnem 4197* (MBM); 12.I.1950, *A. Sehnem 4197* (PACA). Herval, Torre da Brasil Telecom, 09.XI.2009, fl., *E. Barboza 2439* (MBM). Montenegro, 19.IX.1958, fl., *O.R. Camargo 1786* (PACA-AGP); Morro do Cabrito, 24.VII.1987, fl., I. *Fernandes 357* (ICN); 24.VII.1987, *I. Fernandes 356* (ICN); 27.VIII.1988, *I. Fernandes 405* (ICN). São Francisco de Paula, II.1948, fl., *B. Rambo* (PACA 36724); 13.VII.2002, fr., *J. Paz 125* (ICN); 16.XI.2002, fl., *J. Paz 33* (ICN); 09.IX.1952, fl., *B. Rambo* (PACA 52951); Banhado Amarelo, 29.X.2005, bud & fr., *C. Scherer & L.R.M. Baptista* (ICN 141673); CPCN – Pró Mata, -29.482405°, -50.175901°, 24.X.2015, *C.F. Jurinitz* (MPUC 21094); 30.IX.1995, *C.S.A. Martins* (MPUC 14915); Fazenda Englert, 01.I.1954, fl. & fr., *B. Rambo* (PACA 54674); 08.II.1941, fs., *B. Rambo* (PACA8694); 08.II.1941, fs., *B. Rambo*

(PACA 4439); arredores da Estação Ecológica Estadual Aratinga, XI.2005, *A. Sehnem 969* (HAS); perto da cidade, 30.X.1965, *A. Sehnem* (HUCS 2872); 31.X.1965, *A. Sehnem 8497* (PACA-AGP); Turfeira do Banhado Amarelo, 25.XI.2006, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 172828); 27.IV.2007, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 174725); 25.XI.2006, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 174783); 25.XI.2006, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 174784); 25.XI.2006, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 174785); 06.V.2006, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 174786). São José dos Ausentes, rodovia São José dos Ausentes para Silveira, 13.XI.2001, fl., *G. Hatschbach 72673* (MBM); Serra da Rocinha, topo da Serra, à esquerda em direção à Santa Catarina, -28.798597, -49.956345, fr., *C.H. Dalastra 23* (ICN); BR 285, próximo da divisa entre São José dos Ausentes e Timbé do Sul, -49.953056, -28.799722, 17.XI.2016, fl., *G. Heiden et al. 2335* (ECT); 28.II.1946, B. Rambo (PACA 32460); 18.I.1950, B. Rambo (PACA 45477); 03.II.1953, fr., B. Rambo (PACA 53881); 14.I.1942, fl., B. Rambo (PACA 8693). Sapucaia do Sul [São Leopoldo], Monte Sapucaia, X.1943, fl., *B. Rambo* (PACA 11657); IX.1943, fl., *B. Rambo* (PACA 11716); 16.X.1933, fl., *B. Rambo* (PACA 131); 05.IX.1945, *B. Rambo* (PACA 29495); 06.VI.1946, *B. Rambo* (PACA 35332); 08.VII.1948, fs., *B. Rambo* (PACA 37361); 08.VII.1948, fs., *B. Rambo* (PACA37362, duplicata); 05.IX.1945, fl., *B. Rambo* (PACA 37512); 05.VIII 1949, fl., *B. Rambo* (PACA 42757); 07.IX.1950, fl. *B. Rambo* (PACA 48694); 07.IX.1950, fl., *B. Rambo* (PACA 48695, duplicata), 07.IX.1950, fl., *B. Rambo* (PACA 48704); Monte Steinkopf, 20.XII.1948, fr., *B. Rambo* (PACA 39055); 20.XII.1948, fs., *B. Rambo* (PACA 39075, duplicata). Sapucaia do Sul, Morro Sapucaia, 28.VII.1989, *I. Fernandes 542* (ICN); 29.VI.1986, fl., *I. Fernandes 148* (ICN); 25.IX.2007, *T.C. Marchi 220* (PACA). Viamão, Refúgio da Vida Silvestre Banhado dos Pachecos, -30.092278, -50.847947, VII.2019, fr., *M. Molz el al.* (HAS 93665).

Etymology: from Latin “nummulus”, diminutive of “nummus” = coin, "like a coin", referring to the shape of leaves.

Flowering and fruiting: Flowering all year round, more frequently from September to January. Fruiting from September to February. Dry fruits from the previous season may persist.

Geographical distribution & habitat: Brazil (MG, SP, PR, SC, RS) (Flora do Brasil 2020, in contruction 2020). In Rio Grande do Sul, *A. nummularia* occurs at highland and lowland grasslands, in rocky outcrops, dry grasslands on granitic and basaltic outcrops, and peat bogs.

Conservation status: NT to Rio Grande do Sul– Agarista nummularia was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO). The extent of occurrence of this species is 27,683.153 km2, placing it in the category “Near Threatened” (NT) (IUCN 2019). Its not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013) and according to the Red List from CNC Flora (CNCFlora 2020) it is classified as “Least Concern” (LC) to Brazil. To Rio Grande do Sul, according to guidelines of IUCN (2019) *Agarista nummularia* is classified as “Near Threatened” (NT) due the extent of occurrence (EOO). Although the species does not appear threatened, the increasing anthropization of native grasslands are likely to threaten some populations in the future.

Note: *Agarista nummularia* is morphologically similar to *A. chlorantha* due it shrubby habit, its short ans thick petioles, leaf base coordate and due the variation in the indumentum and leaf shape. Considering the variation in the degree of leaf margin revolution in *A. chlorantha* and the variation in leaf shape of *A. nummularia* (from oblong to ovate), these species can be misidentified. On the other hand, both species are allopatric

and can be also differentiated by seed shape, botuliform in *A. chlorantha vs.* lunate in *A. nummularia*.

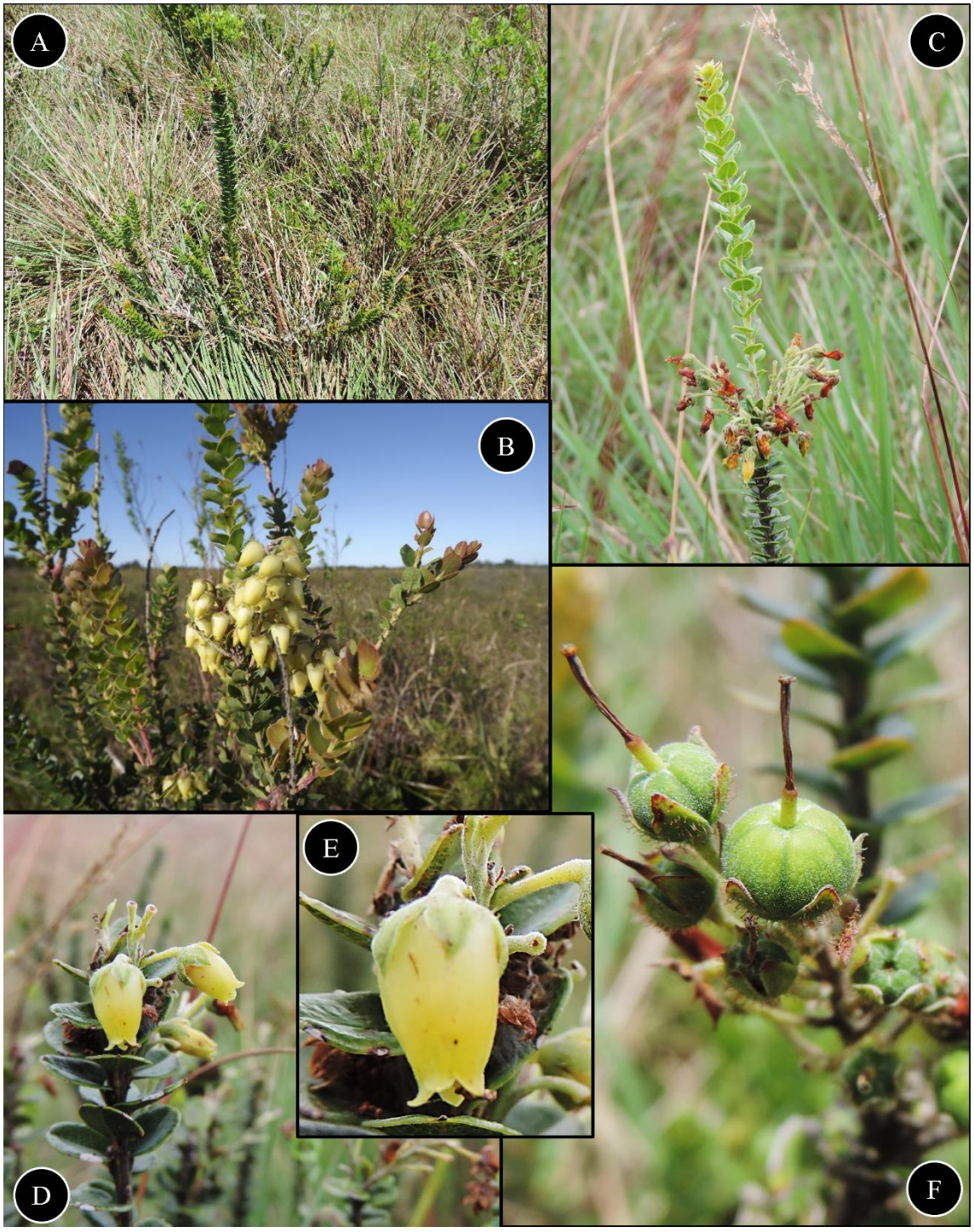

Figure 13. *Agarista nummularia* (Ericaceae) (A) Habitat and habit in grasslands in Cambará do Sul, RS; (B) Flowering specimen at lowland wetlands in Pelotas, RS; (C) Inflorescences; (D) Flowers; (E) Flower; (F) Immature fruits. Photos (A, C, D, E, F) C.H. Dalastra; photo (B) G. N. Maurício.

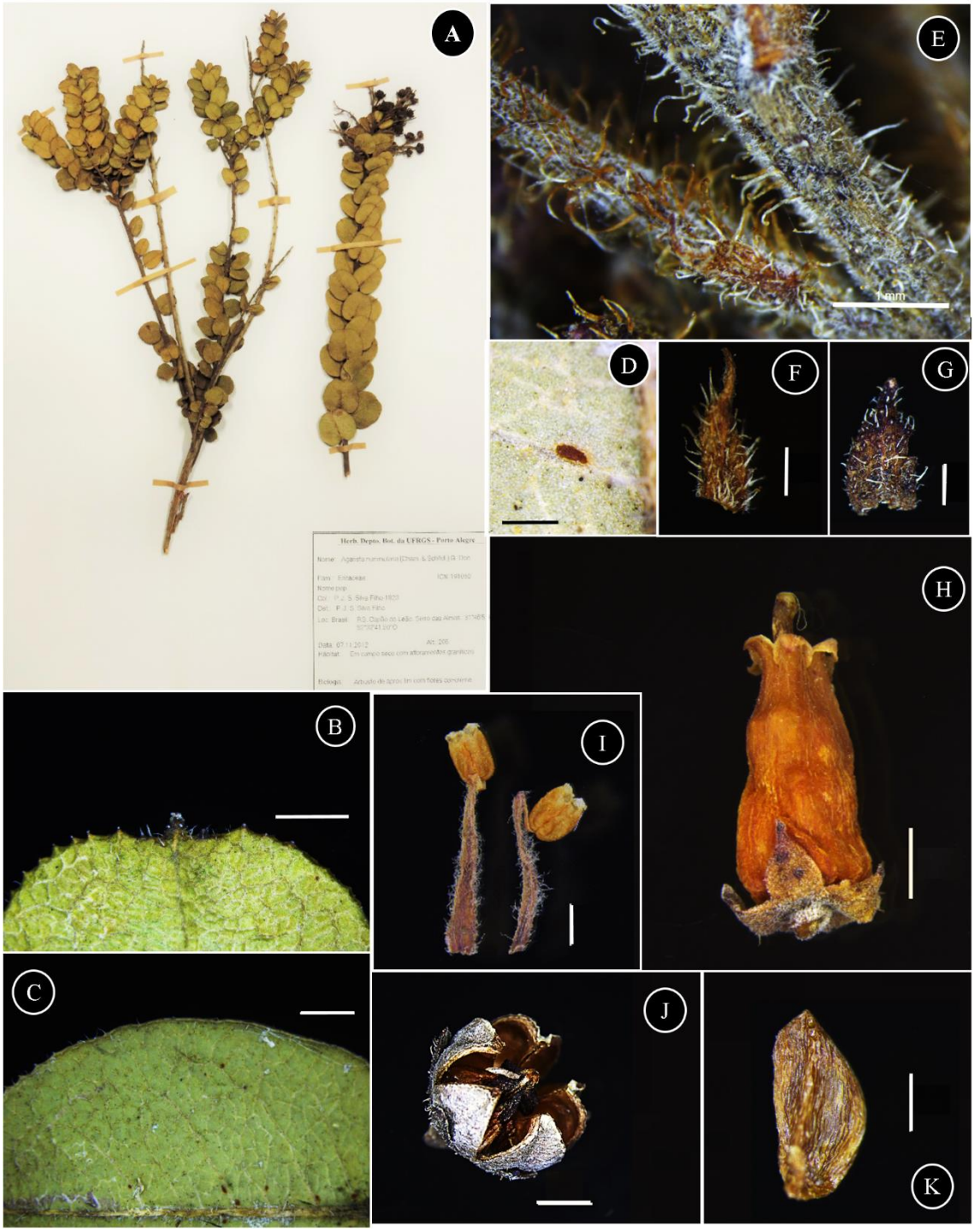

Figure14. *Agarista nummularia* (Ericaceae): *Silva Filho 1823* – ICN. (A) Flowering branch; (B) Mucronulate apex with gland-headed trichomes [scale 2 mm]; (C) Revolute margin, gland-headed trichomes and foveolate glands at miveind [scale 2 mm]; (D) Foveolate gland [scale 0.5 mm]; (E) Rachis indumentum [scale 1 mm]; (F) Bract [scale 0.5 mm]; (G) Bracteole [scale 0.5 mm]; (H) Flower [scale 2 mm]; (I) Geniculate stamens [scale 1 mm]; (J) Loculicidal capsule [scale 2 mm]; (K) Seed [scale 0.5 mm].

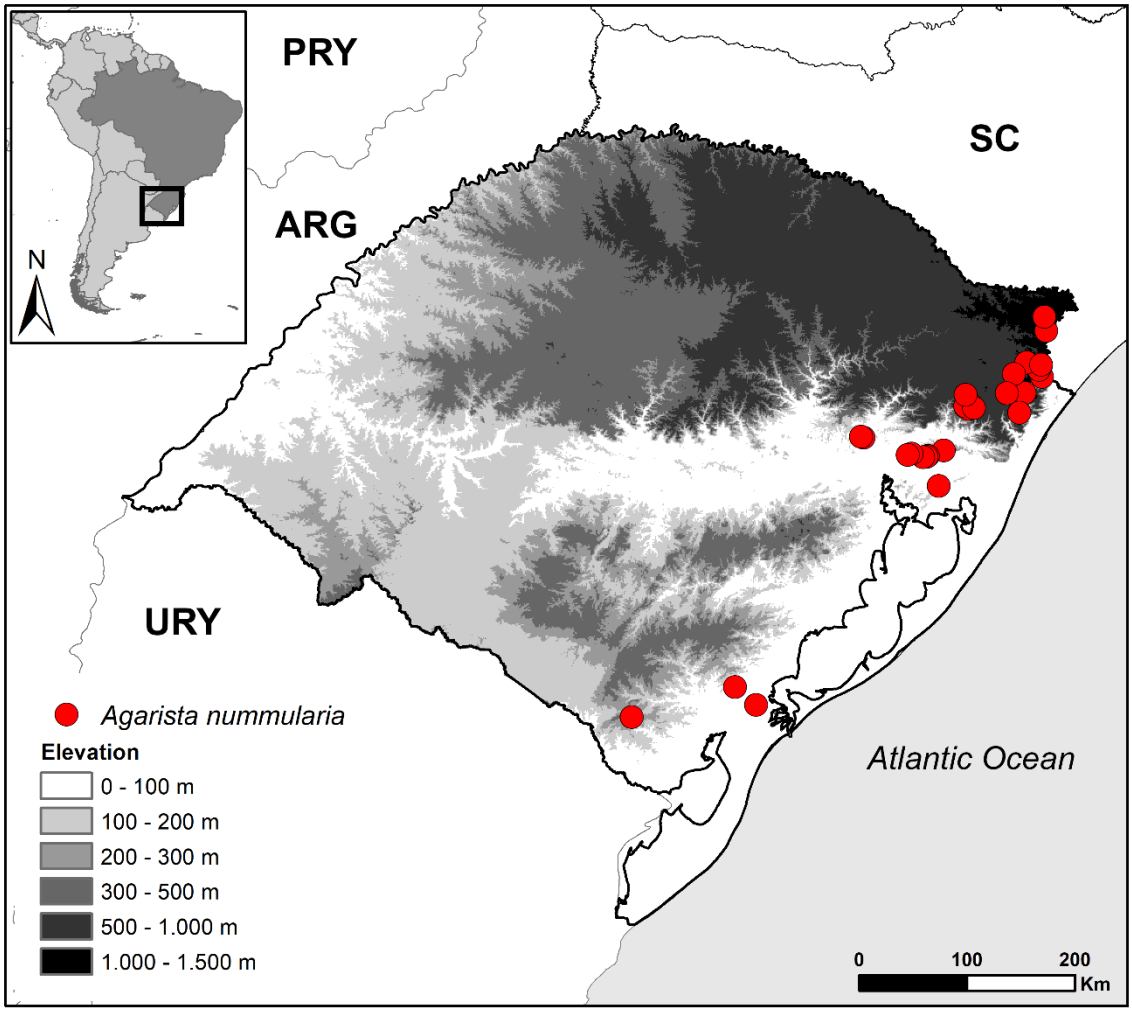

Figure 15. Distribution map of *Agarista nummularia* in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in grey or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Gaultheria (Linnaeus 1751)

Nova genera plantarum 3: 8, 14. 1751. Type: *Gaultheria procumbens* L.

Subshrubs erectly branched. **Leaves** alternate, spiraled, usually not overlapping, papery to coriaceous, flat; petiole robust; blade margin serrate; venation brochidodromous; apex without gland. **Pseudoracemes** leafy apically,sometimes like solitary axillary flowers. **Flowers** 5-merous; calyx lobes base-connated, adding up to the fruit, lobes long or shorts;

corolla gamopetalous, campanulate to urceolate; stamens 8-10; filaments erectly, papillose; anther poricidal, 2-aristated, dorsifixed; ovary superior, 4-5-loculicidal, multiovulate locus. **Fruit** loculicidal capsule, frequently globose, commonly envolved by the calyx; seeds ovoid or angulate, laterally long.

Gaultheria itatiaiae Wawra, Oesterr. Bot. Z. 31: 280. 1881 ≡ *Agarista itatiaiae* (Wawra) Wawra, It. Princip. Coburg. I: 73, t. 68. 1883. ≡ *Leucothoe itatiaiae* Wawra ex Drude, Nat. Pflanzenfam. IV(1):41, f. 28A–G. 1889. Type: BRAZIL. RIO DE JANEIRO: Itatiaia plateau, *H. Wawra II.457* (holotype W 1880-0000873 [digital image]!). **Figures 17-19.**

Subshrubs, 0.2—1 m high, erectly branched; bark smooth; branches with few hispidulous trichomes. **Leaves** alternate, spiraled, papery to coriaceous, flat; petioles short and rigid 1.49—2.46 mm long; blade ovate, 1.42—3.04 × 0.6—1.17 cm; base rounded; apex acute to mucronate, other types attenuate; margin entire to serrate at apically portion with hispid trichomes in the teeths; adaxial surface glabrous; abaxial surface glabrous to hispid. **Pseudoracemes** leafy apically, 10-20-flowered, sometimes solitary axillary flowers; rachis puberulent, trichomes hirsute, 29.14—74.99 mm long; pedicel villous, 3.17—6.42 mm long; bract foliaceous, lanceolate to narrowly lanceolate, papery to coriaceous, hispid trichomes at apical edge, 6.14—11.53 mm long; bracteole 2, widely ovate at pedicel base, 1.96—3.44 mm long, apical edge puberulent. **Flowers** calyx lobes long, narrowly triangular, hirsute hispid trichomes at apical edge, 4.51—6.54 mm long; corolla urceolate to campanulate, white, 4.42—5.31 mm long, glabrous externally, pubescent internally; stamen filament papillose, glabrous, 1.51—1.97 mm long; anther 1.1—1.77 mm long; ovary pubescent; **Fruit** capsule globose to oblate, dark brown, 3.25—3.85 mm diam × 3—3.45 mm high; seeds 0.7—1.05 mm long;

Specimens examined: BRAZIL. RIO GRANDE DO SUL: Cambará do Sul, Fortaleza dos Aparados, I.1989, fl., *M.R. Ritter* (ICN 085135); Parque Nacional da Serra Geral, Arroio do Tigre Preto próximo ao Cânion Fortaleza, 21.I.2005, fl., *V.C. Souza & V.F. Kinupp 30543* (ICN); Serra da pedra, 05.I.1947, *B. Rambo 36727* (ICN). São Francisco de Paula, II.1948, fl., *B. Rambo* (PACA36727). São José dos Ausentes, 19.I.2001, *M.R. Ritter 1272* (ICN); Pico do Monte Negro, 24.III.2014, fr., *V. Ariati 970* (MBM); Aparados da Serra, Serra da Rocinha, 17.I.1961, *A. Sehnem 7761* (PACA-AGP); [Bom Jesus] BR 285, após a subida, no topo da Serra da Rocinha, 11.I.1987, fl., *D.B Falkenberg et al. 4196* (FLOR); Serra da Rocinha, 18.I.1950, fl. and fr., *A. Sehnem 4242* (MBM); 28.II.1946, fl., *B. Rambo* (PACA32485); 14.II.1947, fl., *B. Rambo* (PACA35228.1); 18.I.1950, fl., *B. Rambo* (PACA45384); 18.I.1950, fl., *A. Sehnem 4242* (PACA-AGP); 03.II.1953, fl. and fr., *B. Rambo* (PACA53869); 12.II.1941, fl., *B. Rambo* (PACA7931); 14.I.1954, fs., *B. Rambo* (PACA8685); 14.I.1954, fl., *B. Rambo* (PACA8692); 11.I.1987, fl., *D.B. Falkenberg 4196* (MBM); 22.XII.1995, fl., *D.B. Falkenberg 7602* (FLOR).

Etymology: The epithet alludes to the locality of the type specimen from Serra do Itatiaia, Rio de Janeiro and Minas Gerais states, Brazil.

Flowering and fruiting: Flowering from December to February, fruiting from November to February.

Geographical distribution & habitat: Brazil (MG, SP, RJ, PR, SC, RS) (Flora do Brasil 2020, in contruction 2020). In Rio Grande do Sul *Gaultheria itatiaiae* occur in Subtropical Highland Grassland among rock outcropss, peat bogs, at riverside grasslands, and at grasslands close to cloud forest edges.

Figure 16. *Gaultheria itatiaiae* (Ericaceae)(A) Habitat at riparian vegetation at Cascata do Tigre Preto, Cambará do Sul, RS. (B) Flowering branch; (C) Habitat and habit at rocky outcrop at Serra da Rocinha, São José dos Ausentes, RS; (D) Pseudoraceme and flowers. Photo (A) C.H. Dalastra photos (B, C, D) M. Grings.

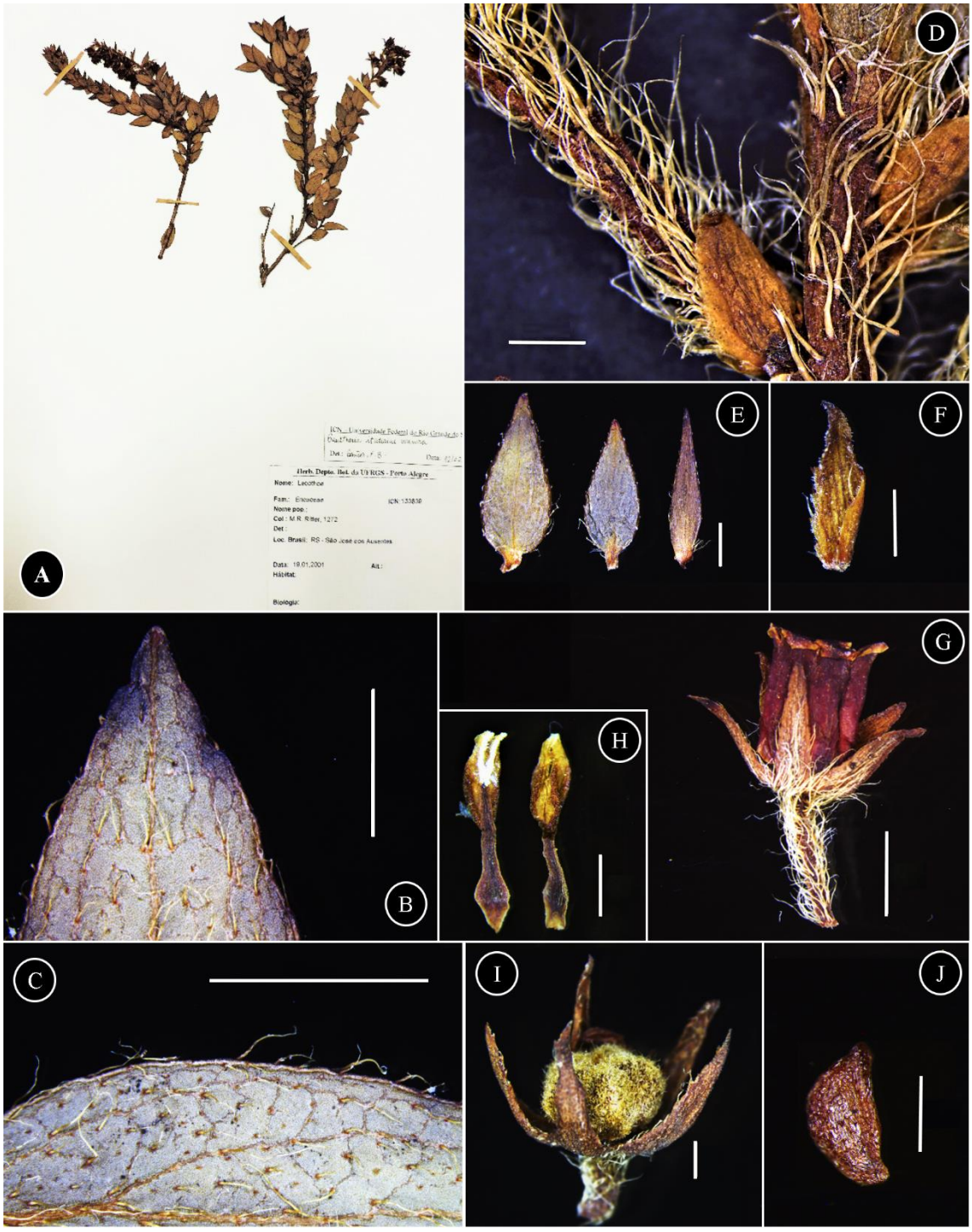

Figure 17. *Gaultheria itatiaiae* (Ericaceae): *Ritter 1272* - ICN. (A) Flowering branch; (B) Leaf apex [scale 3 mm]; (C) Hirsute trichomes [scale 5 mm]; (D) Pseudoraceme indumentum [scale 1 mm]; (E) Base to apex bracts along the pseudoraceme [scale 2 mm]; (F) Bracteole [scale 1 mm]; (G) Flower [scale 3 mm]; (H) Frontal and back view of stamen [scale 1 mm]; (I) Fruit [scale 1 mm]; (J) Seed [scale 0.5 mm].

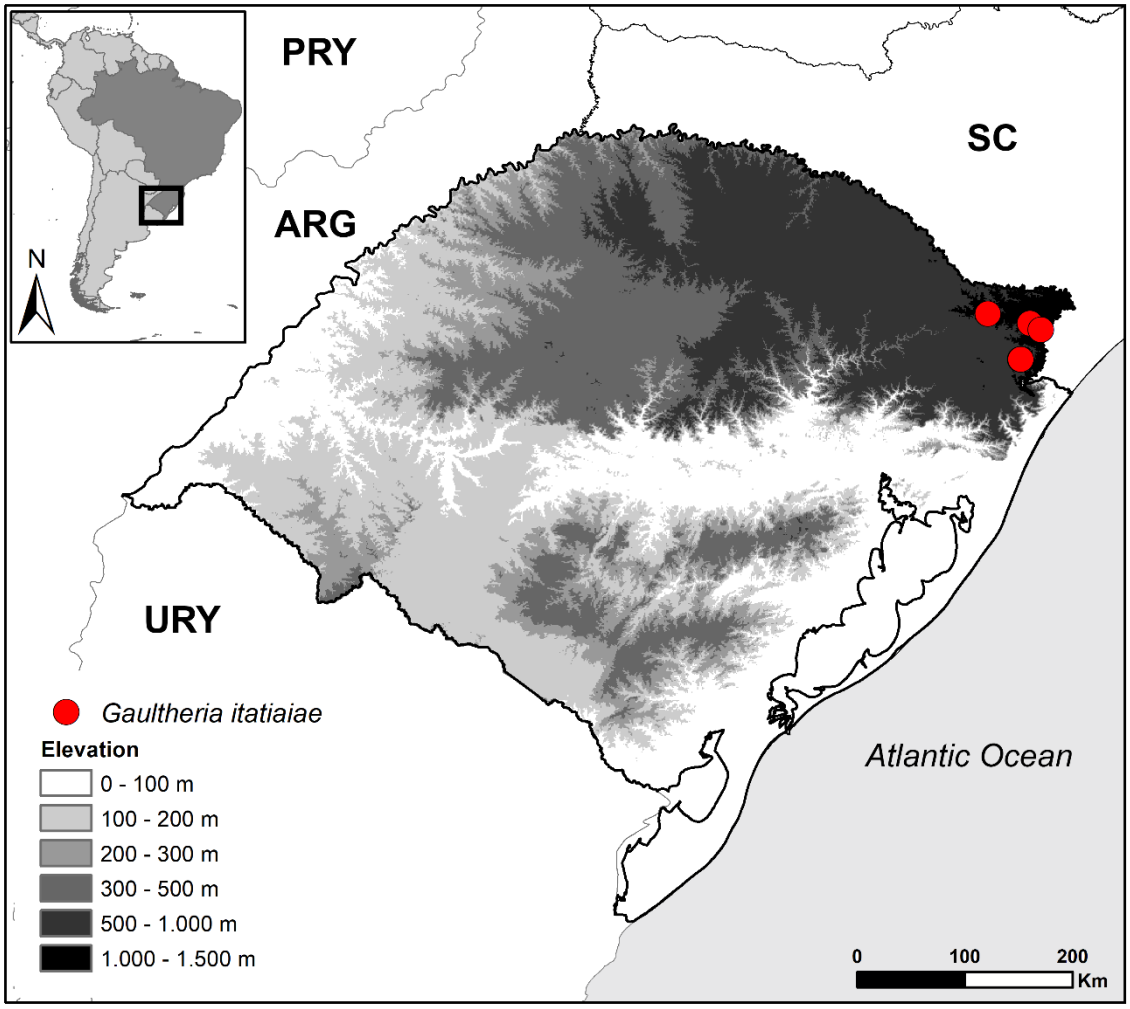

Figure 18. Distribution of *Gaultheria itatiaiae* in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in gray or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Conservation status: **EN** to Rio Grande do Sul– *Gaultheria itatiaiae* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO) and B2 (AOO). The extent of occurrence of this species is of 775.446 km² and its area of occupancy is of 20.000 km², both placing this species under the category "Endangered" (EN), with less than five and relatively close locations (subcriterium **a**) in the Subtropical Highland Grasslands. Moreover, the area of occupancy of this species is limitated and it is passing by a continuous decline in the extent area (subcriterium **bi**), a decrease in the

quality of habitat (subcriterium **biii**) and a decline in the number of locations (subcriterium **biv**) due to the decline in the species register over the years and the specificity of the habitat. Most of the collections was made by Balduíno Rambo (1906-1961) and was difficult to find this species in fieldwork. It is not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013), neither in the CNC Flora Red List (CNCFlora 2020) to Brazil. We suggest the inclusion of *Gaultheria iatiaiae* in the state´s red list, in the threat category "Endangered" (EN)

Gaylussacia (Kunth 1818)

Gen. Sp. Pl. 3: 275 (ed. qu.); 215 (ed. f.) 1818. Type: *Gaylussacia buxifolia* Kunth

Subshrubs to shrubs erect to procumbent, orthocladous to deliquescent. **Leaves** alternate, papery to coriaceous; blade margin entire to serrate; apical calloused gland; glabrous to tomentose; venation camptodromous. **Racemes** axillary; subapically with a basal bract; 1-bract vistous at pedicel base; 2-bracteoles in the pedicel axis. **Flowers** 5-merous; hypanthium pubescent to glabrous, calyx lobes basally-connated; corolla gamopetalous, campanulate to urceolate; 10-stamenated, connivent; filament straight, flat, pubescent to tomentose; anther dorsifixed; thecae parallel, long-tubular, dehiscence poricidal or by a small intricate apical cleft; ovary inferior; pseudo-10-locular, one ovule per locus; stigma depresso-capitate. **Fruit** drupoid (nuculanium), globose; seeds lenticular.

Key to the species of *Gaylussacia* in Rio Grande do Sul, Brazil

1. Corolla red, urceolate ……..…… ***Gaylussacia brasiliensis***

1’. Corolla white, campanulate

2. Leaf blade linear-oblanceolate to linear-lanceolate, surface puberulent …….

…….…….....… ***Gaylussacia angustifolia***

2’. Leaf blade oblong to ellipitic, surface pubescent …….. ***Gaylussacia pseudogaultheria***

Gaylussacia angustifolia Cham., Linnaea 8: 499. 1833 ≡ *Adnaria angustifolia* Kuntze, Revis. Gen. Pl. 2: 383. 1891. Type: BRAZIL. “Brasilia Aequinoctiali”, *F. Sellow s.n.* (lectotype [designated by Romão, *in press*] F V0055383F [digital image]!; isolectotype L 00071713 [digital image]!, MP). **Figures 20-22.**

Subshrubs to shrubs 0.25-1.3 m high, base procumbent, crown profusely branched; stem bark smooth to rugulate; branches glabrous to pubescent or tomentulose. **Leaves** alternate, surface puberulent; papery to coriaceous, slightly discolour; petioles hard, 1.05—1.77 mm long; blade linear-oblanceolate to linear-lanceolate 1.74—3.14 × 0.4—0.63 cm; base attenuate; apex rounded to acute, mucronulate, with an apical calloused gland; margin entire to serrulate due to the glands, plane to slightly revolute mainly at base; adaxial surface lustrous, glabrous to puberulous at midvein; abaxial surface glabrous to pubescent at midvein, with sparsely punctate yellowish to nigrescent glands in blade, denser at midvein. **Racemes** axillary subapically 5-12-flowered; rachis puberulous to tomentose, with scattered capitate glands, 1.5—4.16 cm long; pedicel 1.56—3.72 mm long; bracts leafy, oblanceolate, glabrescent to ciliate, with capitate glands at edge, 5.37—7.89 mm long; bracteoles linear to narrowly oblanceolate, 2.41—3.6 mm long. **Flowers** hypanthium green to reddish, capitate glands close to pedicel, lobe edges tomentose, 1.42—2.45 mm long; corolla campanulate, white, 4.8—7.42 mm long; stamen filament tomentose, 1.65—2.62 mm long; anther 2.18—4.15 mm long. **Fruit**

nuculanium globose, smooth or costate, greeny, 2.3—4.78 mm diam × 3.3—4.1 mm high; seeds 1.7— 2 mm long long.

Specimens examined: BRAZIL. RIO GRANDE DO SUL: Bom Jesus, Fazenda Potreirinhos, 4º Distrito, XII.1977, *O.R. Camargo 5630* (HAS). Cambará do, X.1993, *N. Silveira 11623* (HAS); 26.XI.1980, fl., *D.B. Falkenberg 46* (FLOR); 3 km da cidade de São José dos Ausentes, IX.2006, fl., *G.O. Romão et al.* 1895 (HAS); -50.123611, -29.026389, 03.XI.2006, fl., *G.O. Romão et al. 1896* (ICN).; Itambezinho, 12.XI.1994, fl., *R. Santos & C.M. Martinello 162* (FLOR); XI.1967, *D.A. Lima* (ICN 4850); I.1978, *J. Mattos 18378* (HAS); 30.I.1950, fr., *B. Rambo* (PACA 45520); 20.II.1953, fr., *B. Rambo* (PACA 54077); 13.XI.1954, fr., *B. Rambo* (PACA 54497); 16.II.1955, fr., *B. Rambo* (PACA 56808); Prope urbem, 31.X.1965, fl., *A. Sehnem* 5153 (MBM); trilha do cotovelo, na beira da trilha, 18.XII.2018, fl., *C.H. Dalastra 12* (ICN); trilha para Cachoeira Véu de Noiva, -29.164002, -50.097823, 18.XII.2018, fr., *C.H. Dalastra 13* (ICN); Serra do Faxinal, XII.1983, fl., *M. Sobral & J.R. Stehmann 2711* (ICN); Fazenda Celulose, 21.XII.1989, *S.J. Longhi 1424* (HDCF); 07.II.1983, J.*A. Jarenkow & R.M. Bueno 75* (ICN); 27.XII.1989, fl., *J.A. Jarenkow & R.M. Bueno 1132* (FLOR); Parque Nacional Aparados da Serra, 13.XII.1980, fl., *D.B. Falkenberg 48* (FLOR); -50.1444444, -29.0477778, 27.IV.1985 (MPUC 15833); 03.XII.1971, fl., *J.C. Lindeman et al.* (ICN 009306). Canela, Passo do Inferno, 09.I.1955, fl. & fr., *B. Rambo* (PACA 56572). Caracol, caminho para Canela, 10.II.1951, fr., *K. Emrich* (PACA 50208); 25.II.1954, fl. & fr., *K. Emrich* (PACA 54245). Caxias do Sul, Vila Oliva, 01.IV.2000, fr., *A. Kegler 974* (MBM); 01.IV.2000, fr., *L. Scur 715* (HUCS, MBM); 05.I.1946, fr., *B. Rambo* (PACA 31075); 24.II.1954, fr., *B. Rambo* (PACA 55011); 08.II.1955, fl. & fr., *B. Rambo* (PACA 56638). Gramado, em direção à Canela, 03.I.1943, fl. & fr., *K. Emrich* (PACA 52854). Jaquirana [Campos de Cima da Serra], Passo da Ilha, Parque Estadual do Tainhas,

XII.2005, *R.M. Senna 1014* (HAS). Maquiné, Reserva Biológica da Serra Geral, I.2005, *R. Schmidt 944* (HAS). São Francisco de Paula, II.1948, fr., *B. Rambo* (PACA 36729); 31.X.1965, *A. Sehnem* (HUCS 2954); 31.X.1965, fl., *A. Sehnem 8495* (PACA); a 15 km em direção à Bom Jesus, XII.1986, fl., *M. Neves 752* (HAS); Pró Mata, fl. & fr., *M. Sobral 9406* (MBM); CPCN Pró-Mata, -50.5755555556, -29.4205555556, 30.X.2003 (MPUC 10883); 50.1744444, -29.4808333, 12.XI.2012 (MPUC 18005); Fazenda Englert, I.1944, fr., *P. Buck* (PACA 11542); 02.I.1955, fr., *B. Rambo* (PACA 56268); 02.I.1955, fr., *B. Rambo* (PACA 8217); Fazenda Mulita, 11.I.2002, *R.A. Wasum 1316* (HUCS); Floresta Nacional, Morro dos Cavalos, 06.XI.2008, fl., *G.D.S. Seger 653* (HUCS); 06.XI.2008, fl., *G.D.S Seger 653* (ICN). Morrinhos do Sul, 07.II.1952, fr., *B. Rambo* (PACA 52151). São Francisco de Paula, rodovia RS-110, próximo ao trevo para Tainhas, 17.XII.1994, *G. Hatschbach 60625* (MBM); na cidade de São Francisco de Paula, XII.2001, fl., *M. Sobral 9406* (MBM); Taimbé, 19.XII.1950, fl., *A. Sehnem 5153* (MBM); 19.XII.1950, *A. Sehnem 5153* (PACA50959); 03.IV.1960, *A. Sehnem 7663* (PACA); São José dos Ausentes, Serra da Rocinha, 18.I.1950, fr., *B. Rambo* (PACA 45332); 14.I.1942, fl., *B. Rambo* (PACA 8631); 26.II.2006, fr., *V.F. Kinupp & H. Lorenzi* 3156 (ICN); topo da Serra, à esquerda em direção à Santa Catarina, -28.798597, -49.956345, 23.XII.2019, fr., *C.H. Dalastra 22* (ICN).

Etymology: from Latin “angustifolia”= “narrow leaf”

Flowering and fruiting: Flowering from September to February and fruiting from January to April.

Geographical distribution & habitat: Brazil (RJ, PR, SC, RS) (Flora do Brasil 2020, in construction 2020). In Rio Grande do Sul occurs in Subtropical Highland Grasslands close to forest edges, in clay and acidic soils, basalt outcrops, temporary wetlands and peat bogs.

Conservation status: **NT** to Rio Grande do Sul– *Gaylussacia angustifolia* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO). The extent of occurrence of this species is of 22,450.006 km^2, placing it in the category "Near Threatened" (NT) (IUCN 2019). It is not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013) neither in the CNC Flora Red List (CNCFlora 2020) to Brazil. According to the guidelines of IUCN (2019) *Agarista nummularia* is classified as "Near Threatened" (**NT**) to Rio Grande do Sul due the extent of occurrence (EOO). Although the species is not threatened, the increasing anthropization of native grasslands are likely to threaten some populations in the future.

Note: Some specimens of *Gaylussacia angustifolia* can be confused with morphotypes of *Gaylussacia pseudogaultheria* with less glandular indumentum and/or narrower leaves. However, they can be differentiated based on the indumentum of *G. angustifolia* that is never densely glandular, showing sometimes only few, sparsely and normally short glandular trichomes, additionally the always narrowly leaves (*vs.* leaves oblong to elliptic, sometimes oblanceolate, but never narrow, the gland-headed trichomes in the surface and the hypanthium densely hispidulous glandular in *G. pseudogaultheria*).

Romão (*in press*) proposed a lectotype in his Ph.D. monograph, which is in press (personal communication). This current study reviewed protologues and types and is in agreement with the lectotype proposed by Romão (*in press*).

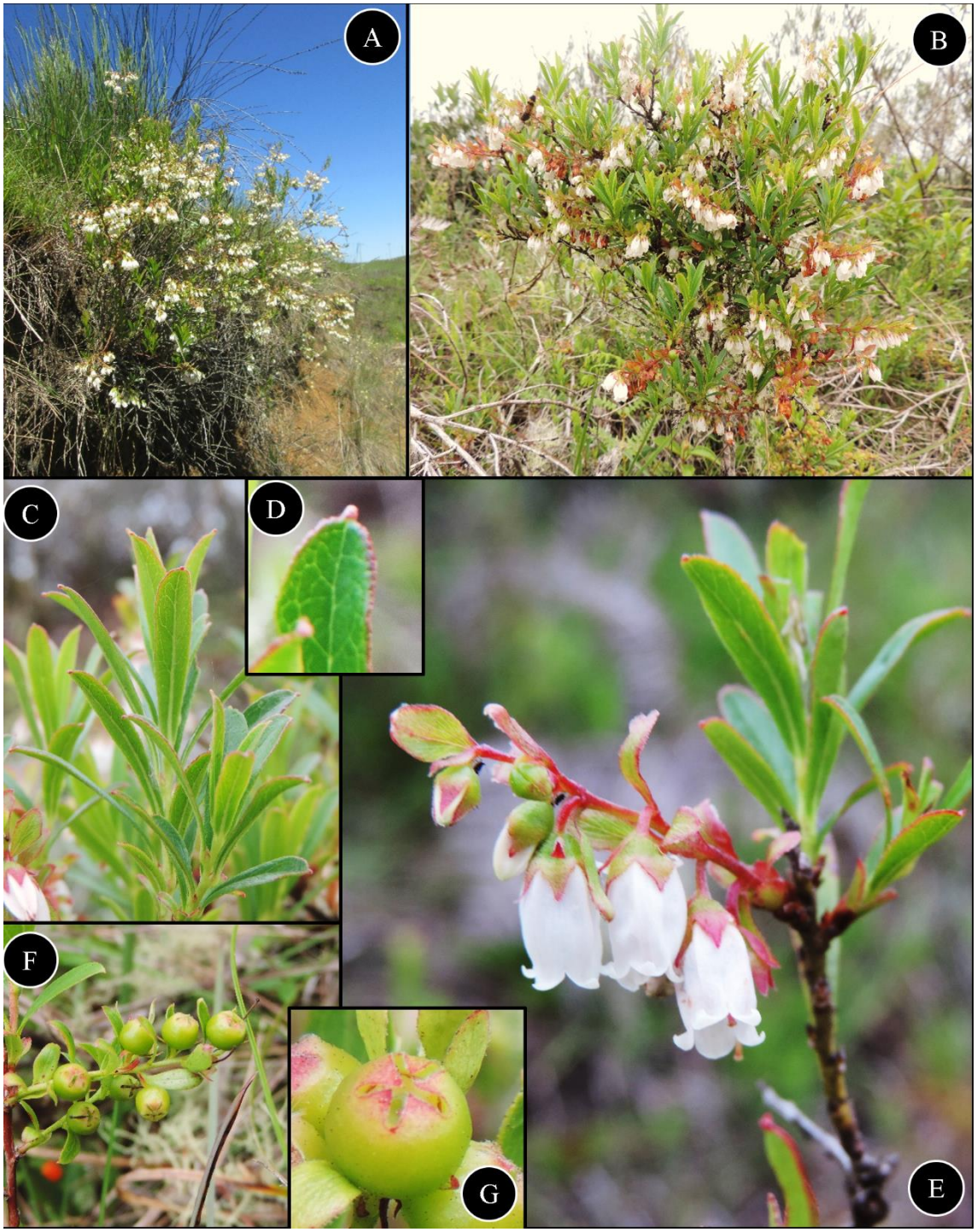

Figure 19. *Gaylussacia angustifolia* (Ericaceae) (A) Habitat and habit in grasslands in Trilha do Cotovelo, Itaimbezinho Canyon, Cambará do Sul, RS; (B) Habit (C) Narrow leaves; (D) Callous gland at leaf apex; (E) Inflorescence and flowers; (F) Immature fruits; (G) Fruit. Photo (A) G. Heiden; photos (B, C, D, E) C.H.Dalastra.

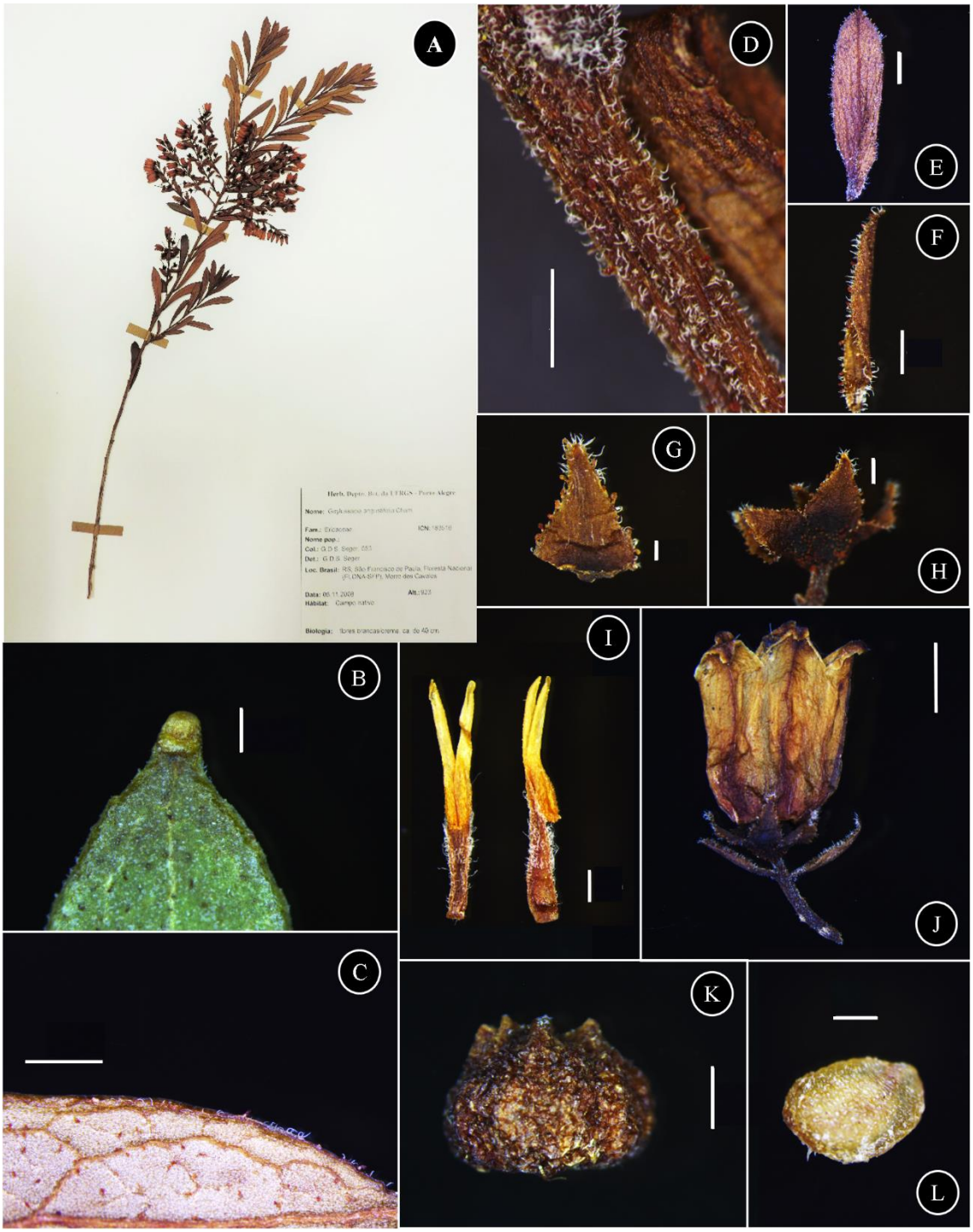

Figure 20. *Gaylussacia angustifolia* (Ericaceae): *Seger 653* - ICN. (A) Flowering branch (B) Callous gland at leaf apex [scale 0.5 mm]; (C) Glands in leaf abaxial surface [scale 1 mm]; (D) Rachis indumentum [scale 0.5 mm]; (E) Bract [scale 1 mm]; (F) Bracteole [scale 0.5 mm]; (G) Calyx lobe [scale 0.2 mm]; (H) Hypanthium [scale 0.5 mm]; (I) Stamen [scale 0.5 mm]; (J) Campanulate flower [scale 2 mm]; (K) Fruit [scale 1 mm]; (K) Seed [scale 0.5 mm].

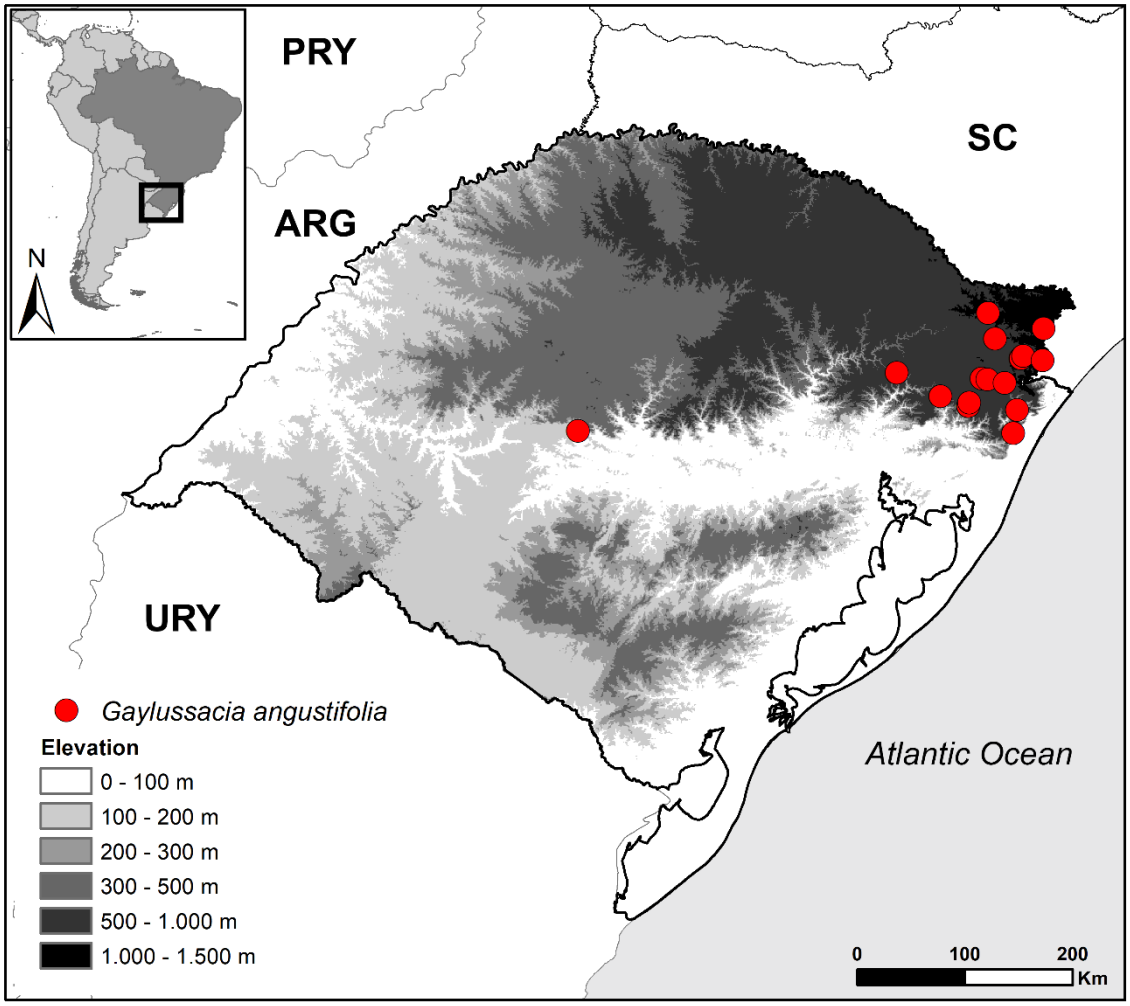

Figure 21. Distribution of *Gaylussacia angustifolia* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in gray or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Gaylussacia brasiliensis (Spreng.) Meisn., *Fl. bras.* 7:129. 1863 ≡ *Vaccinium brasiliense* Spreng., Nov. Prov. 42.1819 ≡ *Adnaria brasiliensis* Kuntze, Revis. Gen. Pl. 2:382. 1891 ≡ *Gaylussacia pseudovaccinium* Cham. & Schltdl. var. *glabra* Cham. & Schltdl., Linnaea 1(4):530. 1826, nom. sup.- *Lussacia vaccinium* Spreng., Syst. Veg. 4(2, Cur. Post.): 160. 1827, nom. sup. Type: BRAZIL., *F. Sellow s.n.* (neotype designated by Romão, *in press*: G 191729 [digital image]!; isoneotype G 00191730 [digital image]!).

Andromeda ciliata Nees, Flora 4 (19) 297. 1821 ≡ *Leucothoe ciliata* (Nees) DC., Prodr. 7: 605. 1838 ≡ *Agarista ciliata* (Nees) Hook.f. ex Nied., Bot. Jahrb. 11: 236. 1890. Type: BRAZIL. RIO DE JANEIRO: Cabo Frio, "Laguna de Sagoarema", 1815, *W. Neuwied "12"* (lectotype [designated by Sleumer, 1967] GOET 000801 [digital image]!).

Andromeda coccinea Schrad., Goett. Gel. Anz. 72: 709. 1821 ≡ *Leucothoe coccinea* (Schrad.) DC., Prodr. 7: 605. 1838 ≡ *Agarista coccinea* (Schrad.) Hook.f. ex Nied., Bot. Jahrb. 11: 236. 1890 ≡ *Gaylussacia brasiliensis* var. *oblongifolia* Meisn., *Fl. bras*. 7:131. 1863, nom. superfl. Type: BRAZIL. RIO DE JANEIRO: Cabo Frio, "Laguna de Sagoarema", 1815, *W. Neuwied "11"* (lectotype [designated by Sleumer, 1967] LE 00015811 [digital image]!; isolectotype BR, GOET 000800 [digital image]!; NY 00010067!).

Gaylussacia adenochaeta DC., Prodr. 7: 559. 1838. Type: BRAZIL. SÃO PAULO: "Araracoara" (Araraquara), IV.1834, fl., *P. Lund s.n*. (lectotype [designated by Sleumer, 1967] G-DC G00214415 [digital image]!, C, L 0007178 [digital image]!).

Gaylussacia brasiliensis (Spreng.) Meisn. var. *maximiliani* Meisn., *Fl. bras.* 7: 132. 1863. Type: BRAZIL. *s.l.*, 1817, fl., *W. Neuwied – herbarium Martii s.n.* (lectotype [designated by Romão, *in press*] BR 0000008675354 [digital image]!; isolectotype BR 0000008674005 [digital image]!, BR0000008675682 [digital image]!).

Gaylussacia brasiliensis var. *sellowii* Meisn., *Fl. bras.* 7:131. 1863. Type: BRAZIL. "in Brasilia aequinoctiali", *F. Sellow 925* (lectotype [designated by Romão, *in press*] F F0055384F [digital image]!).

Gaylussacia brasiliensis var. *subevenia* Meisn., *Fl. bras.* 7: 131. 1863. Type: BRAZIL. RIO DE JANEIRO: "Macahé" (Macaé), VI.1850, fl., *L. Riedel 495 p.p.* (lectotype [designated by Sleumer, 1967] LE; isolectotype GOET; isolectotype K!; L 0007180 [digital image]!).

Gaylussacia discolor Dunal in DC., Prodr. 7:556. 1838. Type: BRAZIL. BAHIA: "circa Bahiam in Brasilia aequinoctiali", 1834, *J.S. Blanchet 1696* (lectotype [designated by Sleumer, 1967] G-DC; isolectotype F 0055391 [digital image]!, MPU 012329 [digital image]!, NY00010055 [digital image]!).

Gaylussacia imbricata Pohl, Pl. bras. 2: 40, tab. 126. 1831 ≡ *Gaylussacia brasiliesis* (Spreng.) Meisn. var. *ovalifolia* Meisn., *Fl. bras.* 7:130. 1863. Nom. superfl. Type: BRAZIL. RIO DE JANEIRO: "ad Rio Tejucco", *A. Schott in Herbarium J.B.E. Pohl 5641* (lectotype [designated by Sleumer, 1967] W 0051002 [digital image]!; isolectotype NY 00162381 [digital image]!).

Gaylussacia myrtifolia Cham., Linnaea 8:494. 1833 ≡ *Gaylussacia brasiliesis* (Spreng.) Meisn. var. *myrtifolia* Meisn., *Fl. bras.* 7: 130. 1863. Type: BRAZIL. SÃO PAULO: "Brasilia itratropica", *F. Sellow s.n.* (lectotype [designated by Romão, *in press*] HAL 1006618 [digital image]!; isolectotype E 292747 [digital image]!, HBG 525446 [digital image]!, K 534730 [digital image]!, L 0007174 [digital image]!, LE, P 647786 [digital image]!).

Gaylussacia pseudovaccinium Cham. & Schltdl. var. *pubescens* Cham. & Schltdl., Linneae 1: 531.1826. *Gaylussacia brasiliesis* var. *pubescens* (Cham. & Schltdl.) Meisn.,

Fl. bras. 7:131. 1863. Type: BRAZIL. “In Brasilia tropica”, *F. Sellow s.n.* (lectotype [designated by Romão, *in press*] K 534729 [digitasl image]!; isolectotype F6109668 G 191757 [digital image]!, HBG 515448 [digital image]!; K 534728 [digital image]!). **Figures 23-25.**

Shrubs to subshrubs, 0.5-1.5 m high, erect, branched; stem with smooth to rugulate bark, branches pubescent to glabrous. **Leaves** alternate, papery to coriaceous, slightly discolour; petioles 1.43—3.27 mm long; blade oblanceolate to elliptic or lanceolate, 2.48—5.6 × 1.01—1.8 cm; base rounded to attenuate; apex obtuse to rounded, rarely acute, mucronulate, with an apical callous gland; margin entire to serrulate close to the apex, sepia gland at the teeth apex, slightly revolute; adaxial surface glabrous to puberulent at midvein; abaxial surface glabrescent to pubescent, mainly at basal portion of midvein to entire blade, with punctate glands maroon to sepia scattered in blade. **Racemes** axillary apically, 6-14-flowered; rachis 1.71—4.15 cm long, glabrous to pubescent or tomentose, sparsely glandular; pedicel 3.56—7.57 mm long; leafy bracts, reddish, ovate, apical gland and punctate glands in edge, 5.45—11.86 mm long; bracteoles narrowly triangular, 1.86—3.56 mm long. **Flowers** hypanthium pubescent to glabrous, lobes triangular, glands at lobes apex, 1.11—2.39 mm long; corolla urceolate, red/cinnabar, 5.45—11.1 mm; stamen filament tomentose, 1.45—2.46 mm long; anther 4.22—7.52 mm long. **Fruit** nuculanium subglobose to globose, 2.95—6.57 mm diam × 2.5—7.2 mm high, vinaceuos to dark vinaceous, glabrous to pubescent; seed 1.85—2.91 mm long.

Specimens examined: BRAZIL. RIO GRANDE DO SUL: BR-101, 15.I.1973, fl., *K. Hagelund 6619* (ICN). Arroio do Sal, Balneário Rondinha Nova, IX.1986, fl. & fr., *M. Bassan 658* (HAS); 19.VIII.2000, fl., *C. Mondin & A. Iob 1970* (PACA). Barra do Ribeiro, Fazenda Boa Vista, 3028'06'S, 5116'35"O, 15.XII.2008, fl., *R. Roland 1* (ICN);

Lagoa das Capivaras, I.2003, *M.L. Abruzzi 4937* (HAS); IV.2003, *M.L. Abruzzi 5096* (HAS); dunas na Lagoa dos Patos, 15.XII.2008, *M. Grings 1864* (ICN). Bom Jesus, arroio Fundo do Cilho, 07.I.2005, *R. Wasum 2321* (HUCS, MBM). Cambará do Sul, a 5 km da saída do Parque Nacional de Aparados da Serra em direção à Cambará do Sul, XI.1986, fl. & fr., *O. Bueno 4647* (HAS); caminho para o Cânion Fortaleza, 29.0820471290499, -50.0047631375492, 06.III.2012, fl., *P.J.S. Silva Filho 1537* (ICN); estrada de acesso ao Cânion Fortaleza, -29,071098, -50,015511, 16.XI.2016, fl., *G. Heiden et al. 2333* (ECT); 22.XI.1998, *R. Wasum et al.* (HUCS 12862); estrada para Fortaleza, 22. XI. 1998 *R. Wasum et al.* (HUCS 12862); -28.798597, -49.956345, 17.XII.2018, fl., *C.H. Dalastra 7* (ICN); Fortaleza, 03.IX.1995, *R. Wasum et al.* (HUCS 10764); 08.XI.1986, *R. Wasum et al.* (HUCS 2288) 27.IX.1992, *R. Wasum et al.* (HUCS 8680); 03.IX.1995, fl., *R. Wasum 10764* (MBM); 08.XI.1986, fl., *R. Wasum 2288* (MBM); 09.IV.1982, fl., *J.A. Jarenkow* (MBM); IX.1981, bud, *O. Bueno 3057* (HAS); I.1994, *N. Silveira & C.J. Mansan 10232* (HAS); XI.1989, fl., *N. Silveira 7269* (HAS); fl., *N. Silveira 7276* (HAS); XI.1993, fl., *M. Neves 1783* (HAS); Parque Nacional da Serra Geral, estrada para cânion Fortaleza, XI.2006, fl., *G.O. Romão & A.P.T. Dantas 1899* (HAS); -29.0775, -50.005, 04.XI.2006, fl., *G.O. Romão & A.P.T. Dantas 1901* (ICN); Pedra do Segredo, 25.X.1986, *R. Wasum et al.* (HUCS 2197); Serra do Faxinal, VI.1990, fl., *N. Silveira 8136* (HAS); Serra geral, Fortaleza, -29,071865, -49,992329, 10.X.2003, fl., *L.P. Deble et al.* (SMDB 10136); Trilha da Cachoeira do Tigre Preto, 22.X.2017, fl., *C.C. Alff et al. 52* (ICN). Caxias do Sul, Vila Oliva, 01.IV.2000, *A. Kegler 974* (HUCS). Cidreira, caminho para Fazenda Capão da Lagoa, -30,123103, -50,279862, 23.X.2011, *E. Valduga 143* (HUCS); Lagoa da Tapera, -30.053332, -50.226388, 10.III.2012, *F. Gonzatti 413* (HUCS, PACA). Dom Pedro de Alcântara, 17.XII.2008, fl., *P.J.S. Silva Filho 12* (ICN). Gravataí, monte Itacolumi, 11.I.1950, fl., *B. Rambo* (PACA 45250); Morro das Cabras, VII.1978, fl., *L.*

Aguiar (HAS 8421); Morungava, 29.X.1989, *J. Larocca* (HUCS 12545, PACA-AGP 92897). Morrinhos do Sul, Morro da Tajuvas, -29,3874, -50,014506, 17.VIII.2017, fl., *C.C. Alff et al.* (ICN 194671). Mostardas, Parna Lagoa do Peixe, Balneário Mostardense, IV.1991, fl. & fr., *M.L. Abruzzi 2346* (HAS); fl., *M.L. Abruzzi 2353* (HAS); Lagoa Fundos, 15.I.2008, *M. Sartori 337* (HUCS). Osório, 01.V.1950, fl. & fr., *B. Rambo* (PACA 47009); Estrada Osório, 10 km de Osório em direção a Tramandaí, fl., *M. Neves 1104* (HAS); Tramandaí, X.1980, fl. & fr., *J. Mariath 846* (HAS); Fazenda do Arroio, 03.X.1954, *B. Rambo* (PACA-AGP 55883); 04.I.1950, fl., *B. Rambo* (PACA 45195); 06.III.1950, fl. & fr., *B. Rambo* (PACA 46137); 14.IV.1950, fl., *B. Rambo* (PACA 46826); 23.I.1958, fl., *B. Rambo* (PACA-AGP 63584); Lagoa das Traíras, 28.XI.2014, *F. Gonzatti 1376* (HUCS); VII.1990, *N. Silveira 9506* (HAS); Morro Alto, III.1988, *A.Nilson 225* (HAS); Morro Grande, 10.I.1952, fl., *B. Rambo* (PACA 51742). Palmares do Sul, Ilha Grande, IV.2003, *M.L. Abruzzi 4504* (HAS). São Francisco de Paula, II.1948, fs., *B. Rambo* (PACA36725, 36726); CPCN – Pró-Mata, 18.XI.1996 (MPUC 7725); 21.I.1997 (MPUC 7796); -29.8022222, -50,3355556, 24.IX.2016 (MPUC 21163); Fazenda Englert, II.1942, fl., *P. Buck* (PACA 8778); 01.I.1954, fr., *B. Rambo* (PACA 54669); 16.X.1965, fl., *A. Sehnem 8496* (HUCS, MBM, PACA); Itaimbezinho, 18.XII.1950, fr., *B. Rambo* (PACA 49303); -28,740185, -50,099184, 04.II.2010, *C.A. Marchett* (HUCS 35725); -28,619227, -49,802312, 16.XI.2007, *C.T. Pedrollo 6* (ICN). São Leopoldo, IX.1943, *B. Rambo* (PACA 11737); Monte das Cabras, 07.XII.1954, fs., *B. Rambo* (PACA 38574); Pico Montenegro, -28,617048, -49,802607, IX.2005, *A.M. Carneiro et al. 805* (HAS); 25.VII.1946, fl., *E. Ruppel* (PACA-AGP 33472); 08.VII.1948, fl., *B. Rambo* (PACA-AGP 37340); 05.IX.1948, fl., *B. Rambo* (PACA-AGP 37510); 05.VIII.1949, fl., *B. Rambo* (PACA-AGP 42740); 17.X.1949, fl. & fr., *B. Rambo* (PACA-AGP 43914); 03.II.1956, fl., *B. Rambo* (PACA-AGP 59173); Morro do Chapéu,

03.VII.1965, *A. Sehnem* (HUCS 2953); 31.X.1966, *A. Sehnem 8935* (PACA-AGP); 31.VII.1965, *A. Sehnem 8442* (PACA-AGP).Sapucaia, Morro Sapucaia, 10.XI.1932, fl., *B. Rambo 133* (UPCB, PACA-AGP 133); 05.I.1945, fl., *B. Rambo* (PACA 29498.1) 8.X.1833; 23.III.1986, *I. Fernandes 79* (ICN); -29,837304, -51,105011, 25.IX.2007, *T.C. de Marchi 223* (PACA); caminho para São Leopoldo, 05.VIII.1948, fl., *B. Rambo 37510* (MBM). Torres, XI.1973, *L. Torgan* (HAS 528); 11.II.19854, fr., *B. Rambo* (PACA 54812); 31.I.1975, *K. Hagelund 8576* (HAS); 4.I.1974, *K. Hagelund 7740* (HAS); 8.I.1975, *K. Hagelund 8662* (HAS); ao lado norte da Lagoa do Jacaré, II.1986, fl., *N. Silveira & J.L. Waechter 3261* (HAS); I.1987, fr., *N. Silveira 4525* (HAS); Beira BR 101, 15.I.1973, *K. Hagelund 6619* (HAS); butiazal, 30.I.1983, *K. Hagelund 14503* (HAS); estrada camping a Lagoa Itapeva, 27.X.1985, fl. and fr., *D.B. Falkenberg 2965* (MBM, FLOR); Faxinal, 25.IV.1998, fl. & fr., *R.S. Rodrigues & A. Kindel 678* (ICN); Itapeva, VII.1985, fl., *N. Silveira 2579* (HAS); na estrada para Itapeva, X.1984, fl., *N. Silveira 1773* (HAS); Parque de Itapeva, III.2006, fl., *C. Mansan 682* (HAS); Lagoa Simão, II.2005, fr., *R.M. Senna & C. Mansan 778* (HAS); praia de Rondinha Nova, IV.1987, fl. & fr., *C. Mondin 52* (HAS); próximo a lagoa do Jacaré, I.1985, fl., *N. Silveira 4080* (HAS); VII.1985, fl., *N. Silveira 2981* (HAS); IX.1985, fl., *R. Frosi et al. 528* (HAS); próximo da Lagoa Itapeva, VII.1985, fl. & fr., *N. Silveira 2211* (HAS);. São José dos Ausentes, Pico Montenegro, -28,617048, -49,802607, IX.2005, *A.M. Carneiro et al. 805* (HAS). Tramandaí, próximo à Lagoa, 11.XI.1977, *D.A. Lima et al.* (ICN 34110); Fazenda São José, 09.V.2001, *T.C. de Marchi 42* (PACA-AGP). Vacaria, Passo do Socorro, 26.XII.1951, fs., *B. Rambo* (PACA 51401). Viamão, Capivari, X.1989, fl., *V.F. Nunes & G. Roch 492* (HAS). Xangrilá, Praia de Atlântida, a 5 quadras a norte da P. Liamar, II.1995, fl. & fr., *R. Zachia et al. 1721* (HAS).

Etymology: from Brazil

Flowering and fruiting: Flowering and fruiting throughout the year.

Geographical distribution & habitat: Brazil (TO, SE, AL, BA, PE, DF, GO, MT, MS, MG, ES, SP, RJ, PR, SC, RS) (Flora do Brasil 2020, in construction 2020). In Rio Grande do Sul it is widely distributed, occurring from the Subtropical Highland Grasslands, in forest edges, mainly at the transition between the grassland and the nebular forest, in, rock outcrops, in the riverside, in sandy and moist soils and at peat bogs. The range of *G. brasiliensis* extends to the Temperate Grasslands at medium and low altitudes, rocky soils, and peat bogs.

Conservation status: **LC** to Rio Grande do Sul– *Gaylussacia brasiliensis* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO). The extent of occurrence of this species is 45,436.938 km^2, placing it in the category "Least Concern" (LC) (IUCN 2019). Its not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013) neither in the CNC Flora Red List (CNCFlora 2020) to Brazil. According to guidelines of IUCN (2019) the threatened risk of *Gaylussacia brasiliensis* is "Least Concern" (LC) to Rio Grande do Sul due its occurrence extent (EOO). Although the species does not appear threatened, the increasing anthropization of native grasslands and exploration of the real state sector in the coastal zone are likely to threaten and extinguish some populations.

Note: Romão (2010) proposed netotypifications to *Adnaria brasiliensis*, *Gaylussacia brasiliesis* var. *maximilianii*, *Gaylussacia brasiliesis* var. *sellowii*, *Gaylussacia myrtifolia* and *Gaylussacia pseudovaccinium* var. *pubescens* in his Ph.D. monograph, which is in press (personal communication). Besides that, were also proposed sinonimizations of some names This current study reviewed protologues and types and is in agreement with

the neotypes and sinonimy proposed by Romão (in press).

Figure 22. *Gaylussacia brasiliensis* (Ericaceae) (A) Habitat in Subtropical Highland Grasslands in Cambará do Sul, RS; (B) Flowering specimen (C) Inflorescence; (D) Flowers; (E) Immature fruits; (F) Mature and immature fruits. Photos (A, C, D, E) C.H. Dalastra; Photo (B) R. Rigon.

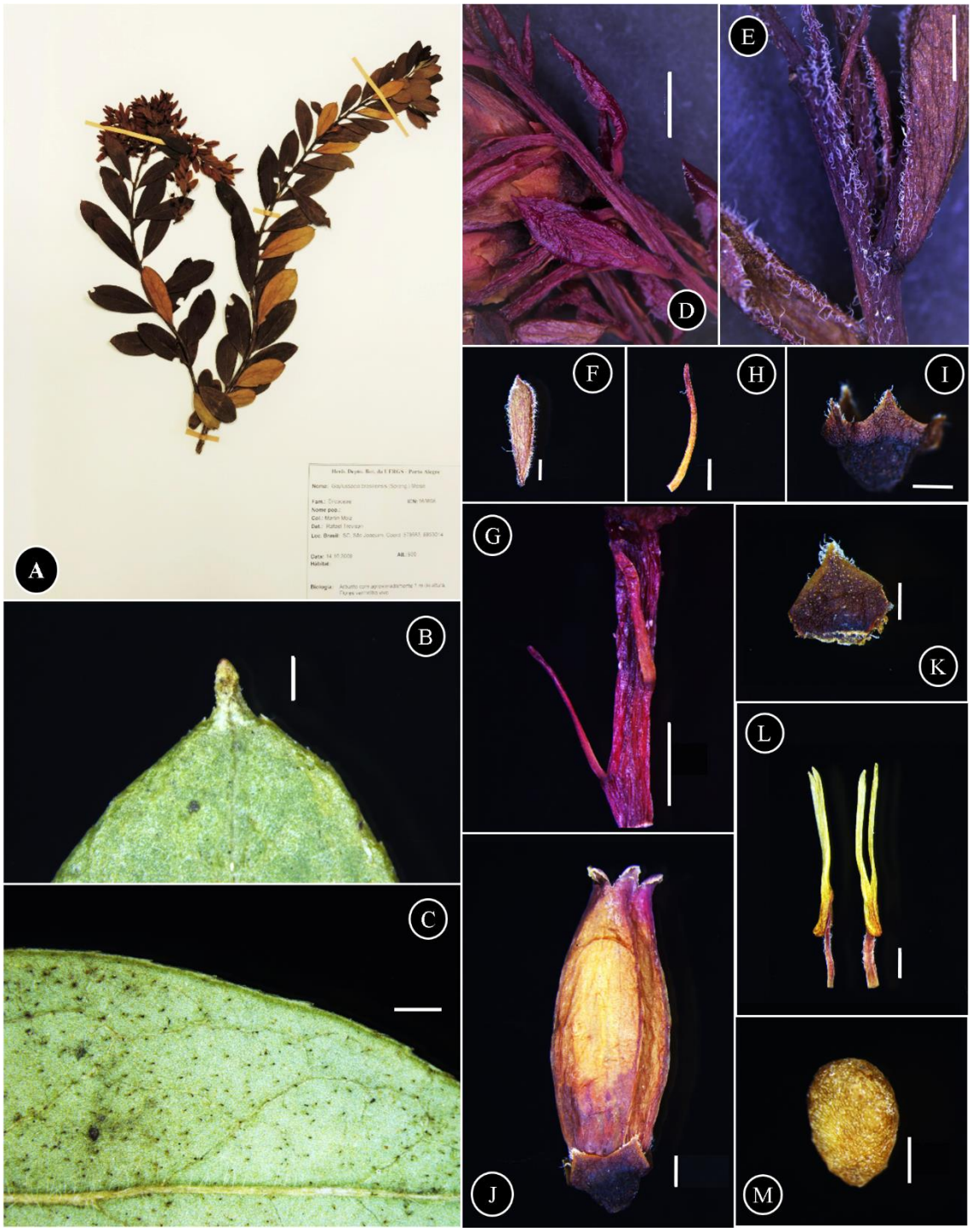

Figure 23. *Gaylussacia brasiliensis* (Ericaceae): *Molz s.n.* - ICN 163696. (A) Flowering banch; (B) Callous gland at leaf apex [scale 1 mm]; (C) Glands in leaf abaxial surface and serrate leaf margin [scale 1 mm]; (D [scale 2 mm]-E [scale 1 mm]) Rachis indumentum; (F) Bract [scale 1 mm]; (G) Bracteoles in the pedicel [scale 1 mm]; (H) Bracteole [scale 0.5 mm]; (I) Hypanthium [scale 1 mm]; (J) Flower [scale 1 mm]; (K) Calyx lobe [scale 0.5 mm]; (L) Stamen [scale 1 mm]; (M) Seed [scale 0.5 mm].

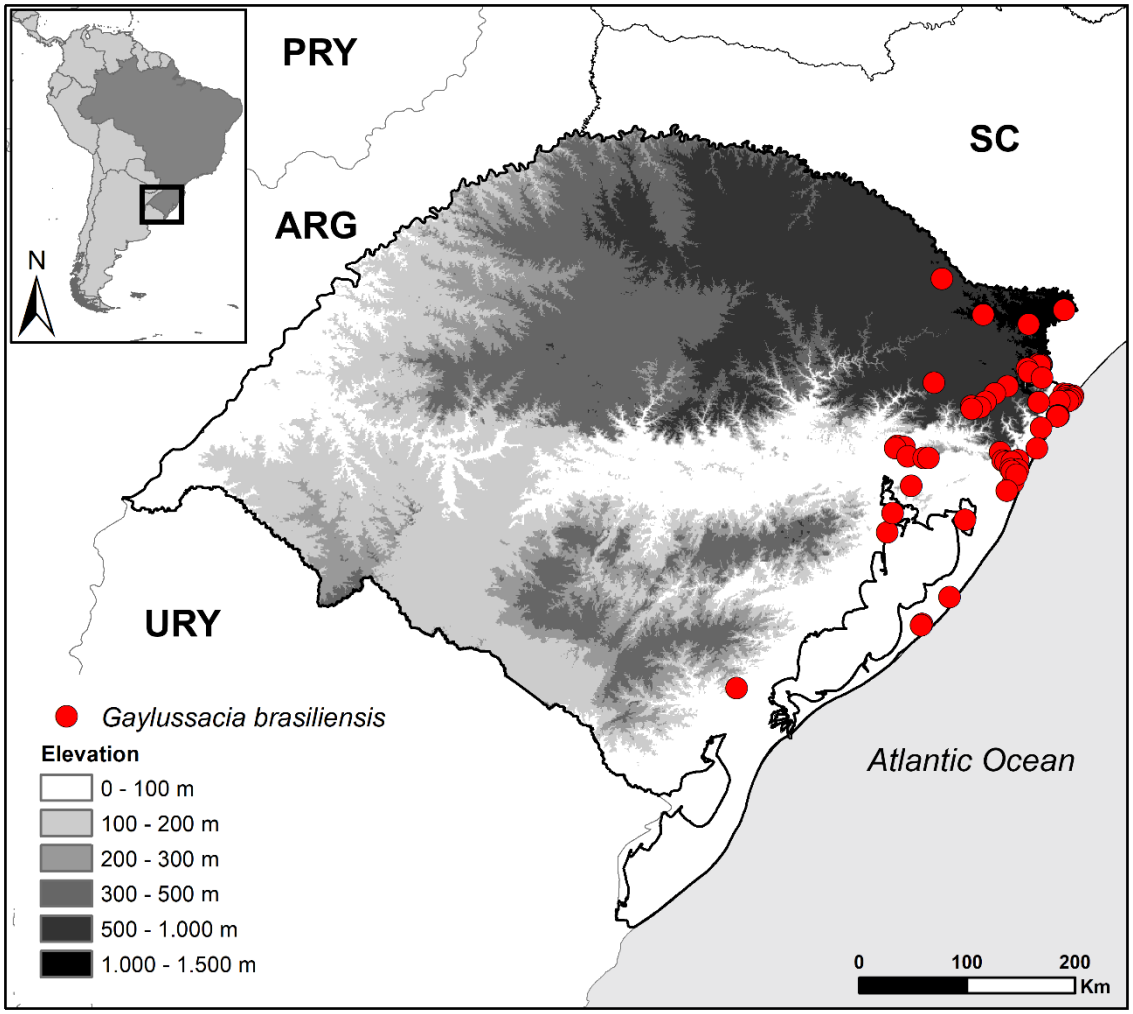

Fig 24. Distribution of *Gaylussacia brasiliensis* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in gray or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Gaylussacia pseudogaultheria Cham. & Schltdl., Linnaea 1: 535. 1826. ≡ 1827 Spreng., Syst. Veg. 2: 28. 1825. ≡ *Lussacia hispida* Spreng., Syst. Veg. 4 (2, Cur. Post.): 160. 1827 ≡ *Adnaria hispida* Kuntze, Revis. Gen. Pl 2: 382. 1891. Type: BRAZIL. MINAS GERAIS: Barbacena, "In Brasilia Tropica", 1825, fl., *F. Sellow s.n.* (lectotype [designated by Romão, *in press*]: HAL 0098449 [digital image]!; isolectotype BM000993615 [digital image]!, BR0000006996574 [digital image]!, E E00292760 [digital image]; isolectotype F V0055403F [digital image]!; isolectotype G-DC

G00204390 [digital image]!, HAL 0098450 [digital image]!, HBG515433 [digital image]!, K 534702 [digital image]!, K 534703 [digital image]!, K 534704 [digital image]!, L 0007283 [digital image]!, L 0007214 [digital image]!, NY 10074 [digital image]!, NY 10075 [digital image]!, MPU 012321 [digital image!], P 00647809 [digital image]!, W 0050990 [digital image]!).

Vaccinium scabrum Pohl, Pl. Bras. Icon. Descr. II. 37. t. 124. 1828. Type: BRAZIL. MINAS GERAIS: Barbacena, Registro Velho, IX.1818, *J.B.E. Pohl 194* (lectotype [designated by Sleumer 1967]: W 0050989 [digital image]!; isolectotype BR 0000005068425 [digital image]!, F F0055560F [digital image]!, NY00162379 [digital image]!). **Figures 26-28.**

Subshrubs, 0.2—0.8 m high, base erect and crown profusely branched; stem smooth; branches tomentose, gland-headed trichomes scattered. **Leaves** alternate, papery to coriaceous, slightly discolour; surface pubescent; petioles hard, 1.36—2.61 mm long; blade oblong, to elliptic, sometimes oblanceolate, 1.73—2.99 cm long × 0.6—1.08 cm wide; base rounded to obtuse, frequently subcordate; apex rounded to obtuse, mucronulate, apical callous gland; margin entire to slightly revolute; sometimes seeming serrulate due to gland-headed trichomes; adaxial surface lucid, puberulous to glabrescent mainly at midvein and at the blade margins, scattered gland-headed trichomes; abaxial surface tomentose, gland-headed trichomes mainly at midvein and blade margins, scattered punctate glands tawny to fawn. **Racemes** axillary apically, 5-16-flowered, pubescent to tomentose, densely gland-headed trichomes, 1.04—6.07 cm long; pedicel 1.06—6.25 mm long; leafy bracts, ovate to rhombic or elliptic, citrine and or redish, pubescent, gland-headed trichomes and capitate gland in the edge, 5.92—8.4 mm long; bracteoles narrowly triangular to linear, 2.43—3.52 mm long. **Flowers** hypanthium densely hispidulous glandular and with gland-headed trichomes, lobes 1.87—2.7 mm

long; corolla campanulate, white, 4.67—9.1 mm long; stamen filament tomentose, 0.87—2.48 mm long; anther 2.27—4.77 mm long. **Fruit** nuculanium oblate, greenish/brownish, 4.09—4.25 mm diam × 2.27—2.57 mm high; seed 1.7—1.84 mm long.

Specimens examined: BRAZIL. RIO GRANDE DO SUL: 19.I.1975, *K. Hagelund 8731* (HAS). Cambará do Sul, estrada para o Cânion Fortaleza, 17.XII.2018, fl., *C.H. Dalastra 6* (ICN); Itaimbezinho, 30.I.1950, fs., *B. Rambo* (PACA 45516); 18.XII.1950, fr., *B. Rambo* (PACA 49304, 49307); 20.II.1953, fr., *B. Rambo* (PACA 53938); I.1978, fr., *J. Mattos & N. Mattos 18869* (HAS); 11.XII.1992, *D.B. Falkenberg 5994* (ICN, MBM); 27.XII.1980, *J. Goergem* (ICN 049991); I.1978, *S. Boechat* (ICN 41928); 11.XII.1992, *D.B. Falkenberg 5994* (MBM); XII.1978, fl. & fr., *J. Mattos et al. 20002* (HAS); 11.XII.1992, fl., *D.B. Falkenberg & F.A. Silva-Filho 5994* (FLOR); -29.142495,-50.087782, 05.XII.2015, *F. Gonzatti 2249* (HUCS); -29.0477778, -50.1444444, 27.V.1983 (MPUC 15832); trilha do cotovelo, na beira da trilha, 18.XII.2018, fl., *C.H. Dalastra 16* (ICN); trilha para Cachoeira Véu de Noiva, -29.165212, -50.09699, fr., 18.XII.2018,fr., *C.H. Dalastra 14* (ICN); ao longo dos Aparados, próximo da BR 285, 22.XII.1995, fl., *D.B. Falkenberg 7600* (FLOR); Parque Nacional dos Aparados da Serra, 13.XII.1980, fl., *D.B. Falkenberg 47* (FLOR); estrada para o cânion Fortaleza, ca. 22 km de Cambará do Sul, -29.075083, -49.974861, 04.XI.2006, *G.O. Romão 1898* (MBM, ICN). São Francisco de Paula, Colinas de São Francisco, -29.458333, -50.613333, 04.III.2012, fr., *P.J.S. Silva Filho 1552* (ICN); CPCN Pró-Mata, -29.4808333, -50.1744444, 12.XI.2012, fr. (MPUC 18004); Turfeira do Banhado Amarelo, 16.III.2007, *M.L. Lorscheitter & L.R.M. Baptista* (ICN 172829). São José dos Ausentes, Serra da Rocinha, 27.I.1995, *N.I. Matzenbacher* (ICN); 18.I.1950, fl., *A. Sehnem 4241* (FLOR, MBM, PACA); 18.I.1950 (MPUC 21493); 18.I.1950, fl., *B. Rambo* (PACA 45385); 03.II.1953, fl. & fr., *B. Rambo* (PACA 53785); -28,795936, -49,957895, 03.II.1953, fr.,

B. Rambo (PACA 53827); 03.II.1953, fr., *B. Rambo* (PACA 53914).Serra da Rocinha, Morro Asa Delta, XI.2004, fl., *A.M. Carneiro 801* (HAS); 18.I.1950, *A. Sehnem 4241* (MBM); mirante no alto da Serra, -28.8, -49.9525, 03.XI.2006, fl., *G.O. Romão et al. 1861* (ICN, HAS); BR 285, próximo da divisa entre São José dos Ausentes/RS e Timbé do Sul/SC, -28.799722, -49.953056, 17.XI.2016, fl., *G. Heiden et al. 2334* (ECT). Sapucaia do Sul [São Leopoldo], Monte Sapucaia, 05.IX.1945, fl., *B. Rambo* (PACA 29498).

Etymology: false *Gaultheria* L., due to the superficial resemblance with this genus.

Flowering and fruiting: Flowering from September to February and Fruiting from December to March.

Geographical distribution & habitat: Brazil (BA, MG, SP, SP, PR, SC, RS) (Flora do Brasil 2020, in construction 2020). In Rio Grande do Sul the species occur in Subtropical Highland Grasslands in rocky hillsides and cliffs, basaltic outcrops, wet sandy soils, peat bogs, grasslands along cloud forests and riverine forests, rarely at dry grasslands.

Conservation status: **EN** to Rio Grande do Sul– *Gaylussacia pseudogaultheria* was analyzed under criterium B of IUCN (2019) and the geographic range in the form of B1 (EOO) and B2 (AOO). The extent of occurrence of this species is 1,888.156 km² and its area occupancy is 20.000 km², both placing it under category "Endangered" (EN). The occurrence in the state is limited to few records and seems severely fragmented (subcriterium **a**). Moreover, the decline area, extent and quality of habitat (subcriterium **biii**) are in continuous decline due its habitat specificity and the increasing anthropization of the native grasslands, mostly converted into monocultures and pasture for livestock. This species is not included in the Official List of Endangered Species of Brazilian Flora (Martinelli & Moraes 2013) neither in the CNC Flora Red List (CNCFlora 2020) to

Brazil. We suggest the inclusion of *Gaultheria iatiaiae* in the state´s red list, in the threat category “Endangered” (EN)

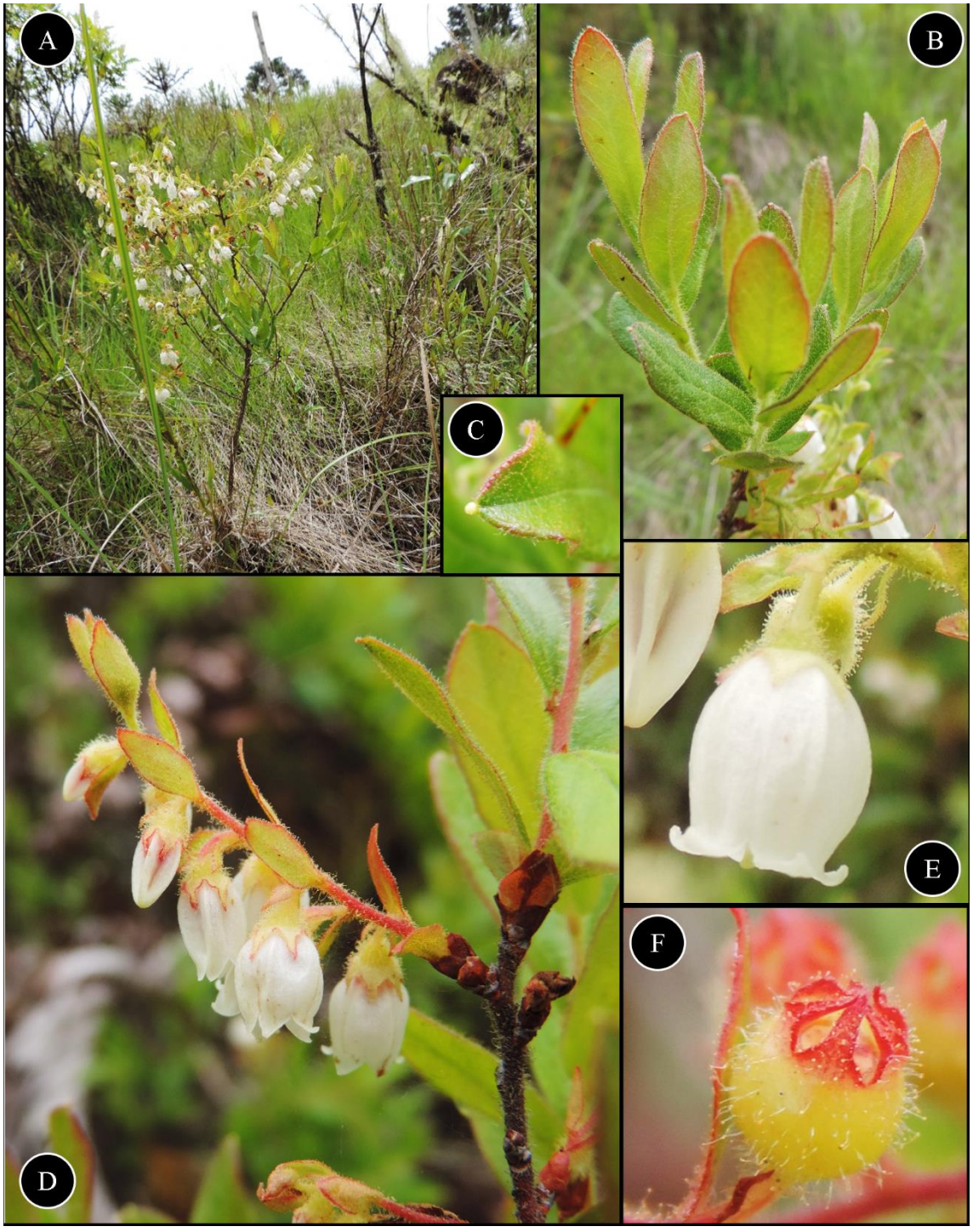

Figure 25. *Gaylussacia pseudogaultheria* (Ericaceae) (A) Habitat and habit in grasslands in Trilha do Cotovelo, Itaimbezinho Canyon, Cambará do Sul, RS; (B) Leaves (C) Callous gland at leaf apex; (D) Raceme; (E) Flower; (E) Fruit. Photos C.H. Dalastra;

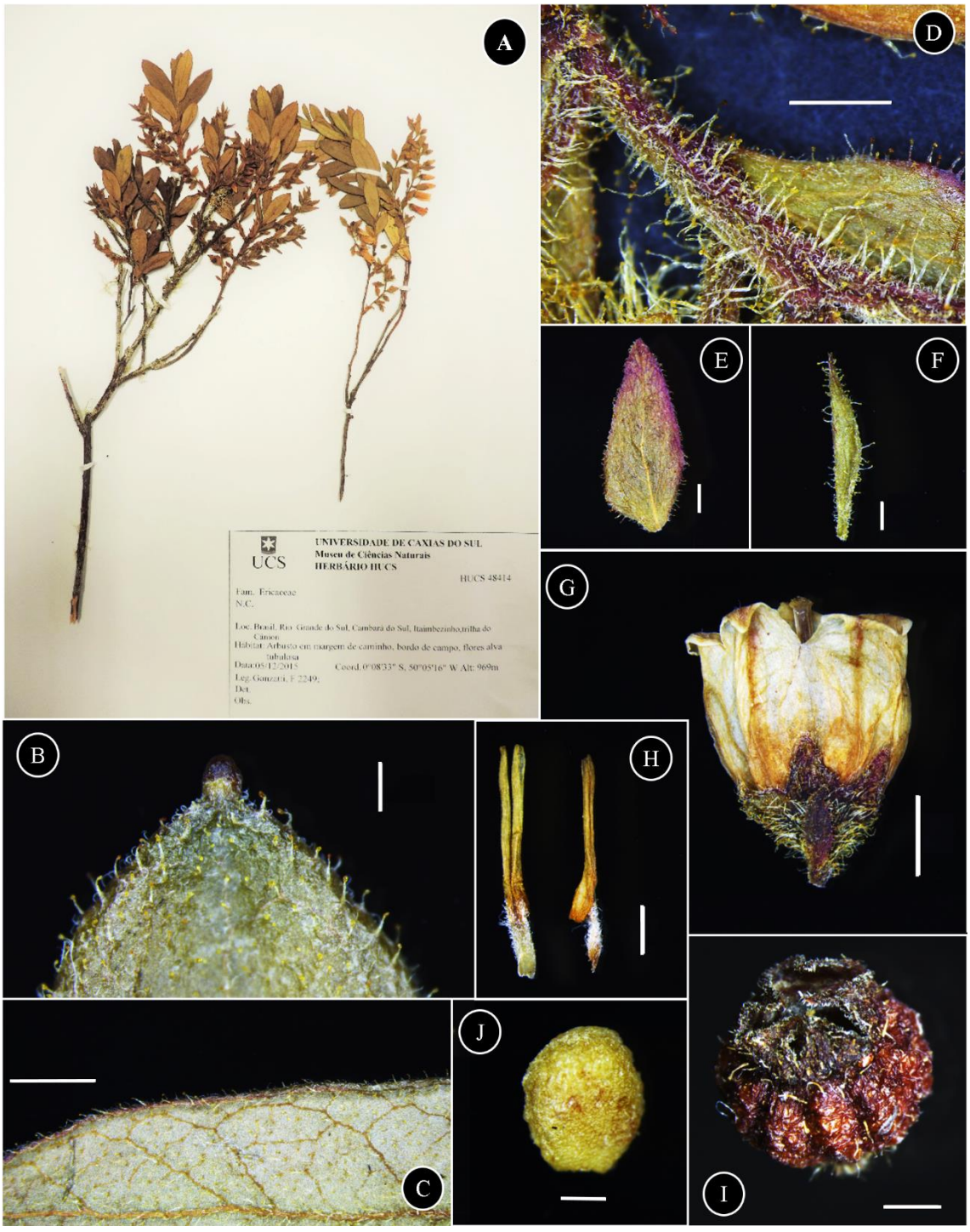

Fig 26. *Gaylussacia pseudogaultheria* (Ericaceae): *Gonzatti 2249* – HUCS. (A) Flowering branch; (B) Callous gland at leaf apex and indumentum [scale 0.5 mm]; (C) Leaf abaxial surface [scale 2 mm]; (D) Rachis indumentum [scale 1 mm]; (E) Bract [scale 1 mm]; (F) Bracteole [scale 0.5 mm]; (G) Flower, notice hypanthium hispidulous glandular *Gaultheria itatiaiae* like [scale 2 mm]; (H) Stamen [scale 1 mm]; (I) Fruit [scale 1 mm]; (J) Seed [scale 0.5 mm].

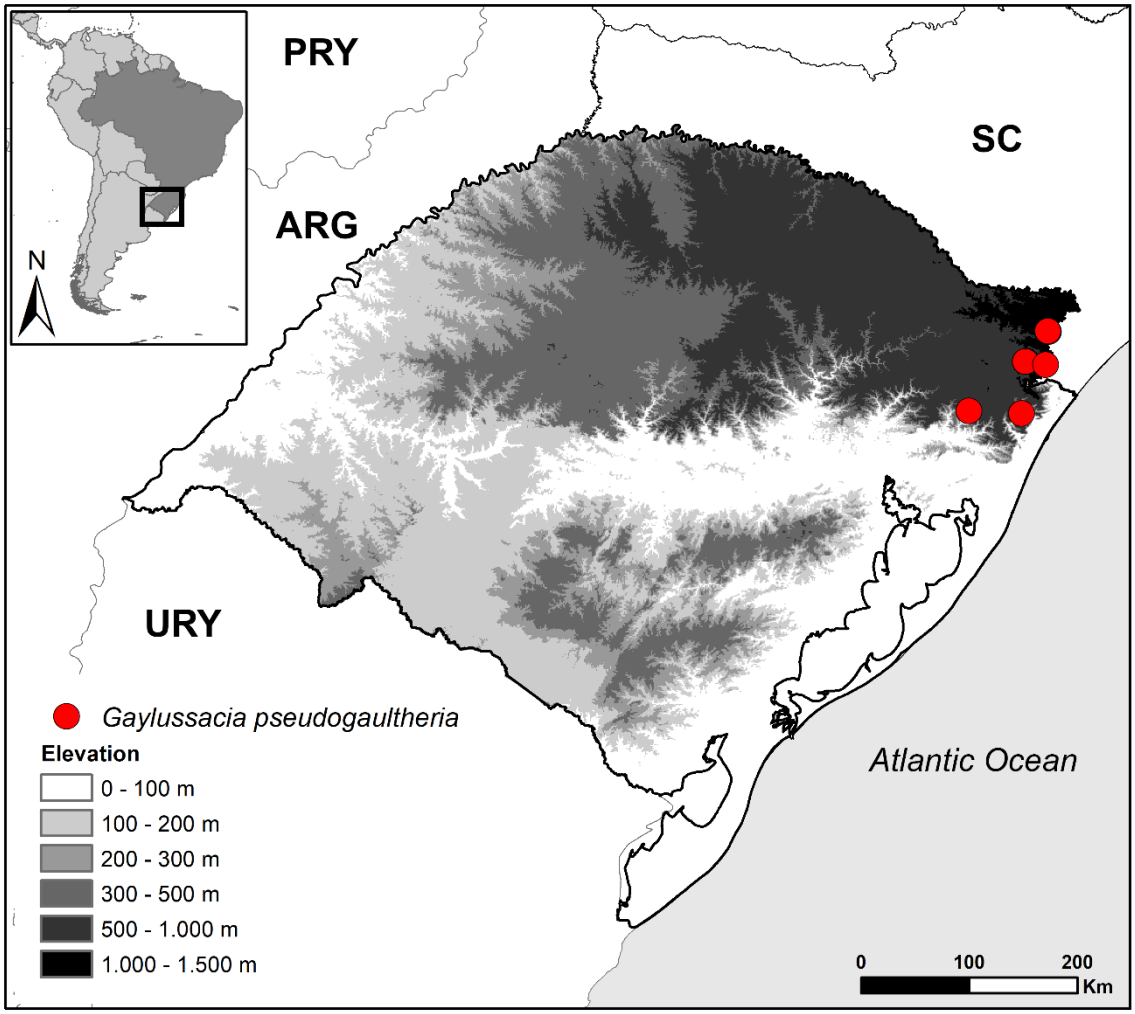

Fig 27. Distribution of *Gaylussacia pseudogaultheria* (Ericaceae) in Rio Grande do Sul state (RS), Brazil. The overview map in upper left corner indicates the position of RS in Southeast of the South America. Continuous lines in gray or black represent the boundaries between countries or federation units. Gray scale represents the elevation ranges for RS, where lighter tones characterize lower altitudes and darker higher altitudes. ARG= Agentina; PRY= Paraguay; URY= Uruguay; SC= Santa Catarina state (Brazil).

Note: Romão (*in press*) proposed a lectotype in his Ph.D. monograph, which is in press (personal communication). This current study reviewed protologues and types and is in agreement with the lectotype proposed by Romão (*in press*).

Some morphotypes of *Gaylussacia pseudogaultheria* with less glandular indumentum and/or narrower leaves might be confused with *Gaylussacia angustifolia*. The characteristics used to separed them are previously cited in the item "*Note*"of *Gaylussacia angustifolia*.

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CAPÍTULO 2: **TYPIFICATION OF FIVE NAMES IN *AGARISTA* (ERICACEAE, VACCIONOIDEAE, LYONEAE)**

Typification of five names in *Agarista* (Ericaceae, Vaccionoideae, Lyoneae)

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Abstract

Five names are typified here as a first step towards a taxonomic revision of *Agarista*. We reviewed protologues, type specimens and digital images of type specimens of previously published names and negative photos at F from specimens originally deposited at B. Lectotypes are here proposed to the names *Andromeda chlorantha*, *Andromeda serrulata*, *Andromeda eucalyptoides*, *Andromeda multiflora* and *Andromeda nummularia*. These lectotypes are designated from isotypes and other original material conserved in the herbaria E, F, HAL, G, GH, L, M, NY, S and W. Additionally, epitypes are also designated.

Keywords: Berlin-Dahlem herbarium (B), epitypes, lectotypification, Sellow.

Introduction

Agarista D. Don (1834: 837) comprises 31 species circumscribed in two sections (Judd 1984). *Agarista* sect. *Agauria* Judd (1984: 339) consist of a single species, *Agarista salicifolia* G.Don (1834: 837), variable and widely distributed in the African continent and Reunion, Mauritius and Madagascar islands. *Agarista* sect. *Agarista* Judd (1984: 339) encompasses 30 species distributed along the Americas. In Brazil, 21 species occurs mainly in the quartizite mountaintop grasslands (*campos rupestres*) of the Espinhaço range to the highland tropical grasslands in the Southeast and the subtropical highland grasslands and temperate lowland grasslands to the South (Judd 1995).

Some type specimens of the genus were deposited in Botanical Museum Berlin-Dahlem (B), which in time "housed the world's largest collection of Neotropical types" (Grimé & Plowman 1986). The herbarium was partially destroyed by a fire in March 1943 and some specimens of nomenclatural types were burnt out. These specimens were documented in 1929 by J. Francis Macbride when he travelled to Europe to photograph herbarium specimens of nomenclatural types (Grimé & Plowman 1986). Nowadays this material constitutes the collection of images Berlin Negatives of Field Museum of Natural History (The Field Museum 2020).

Judd (1984) reviewed *Agarista* and made some typifications. However, the holotype destroyed was cited and Berlin's negatives and isotypes were indicated, but none lectotype was designated. According to Art. 9.8 from the International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) (Turland *et al.* 2018) and

following Staples & Prado (2018) “the photos of original material have no nomenclatural standing, since they were not available to the author prior to, or cited or published in the protologue, and, therefore, cannot be chosen as lectotypes. However, they can be chosen as neotypes, standing in place of the destroyed Berlin specimens, if no other original material survives”. In this current case, some specimens that will be treated here have not isotypes available, or sometimes only fragments remain and they cannot be considered alone to fully understand the concepts of some names, and then, in specified cases, lectotypes and epitypes are designated here.

Typifications and notes

Agarista chlorantha D.Don (1834: 838)

≡ *Leucothoe chlorantha* Candolle (1839: 604) ≡ *Andromeda chlorantha* Chamisso (1833: 508)

Type (lectotype, designated here):—BRAZIL. *s.l.*, *s. d.*, *F. Sellow s. n.* (F barcode V0055220F [digital image]!; isolectotypes NY00008200 [digital image]!, F [field photo] [digital image]!, G, GH. Epitype (designated here):— Field Negative 220513.

Note:—The specimen *F. Sellow s.n.* of *Andromeda chlorantha* comprises four specimens. The specimen deposited in the Berlin-Dahlem herbarium (B) was destroyed by the fire of 1943, remaining fragments and the negative from J. Francis Macbride photos. The remaining material (F, NY, G and GH) consists of few fragments from this Berlin´s material and none lectotype was indicated to *Andromeda chlorantha* Chamisso (1833: 508) in the genera revision (Judd 1984). In this way, we are designating here the isotype from Field Museum V0055227F to be lectotypified. This material comprises fragments, and the remaining isotypes do not comprise enough material to help to fully understanding the concepts of the name *Agarista chlorantha*. To fill this lack of information in the sheets, we are also designating the Field negative photo 220513 of the holotype to assist as an interpretative type of the lectotype.

Agarista serrulata G. Don (1834: 838)

≡ *Andromeda serrulata* Chamisso (1833: 506)

Type (lectotype, designated here):—BRAZIL. São Paulo, *s.d.*, *F. Sellow s.n.* (K K000494447; isolectotypes, E00326877, F V0055227F [digital image]!, F [field photo] [digital image]!, G, GH [field photo], K000494448 [digital image]!, L0006617 [digital image]!, L0006618 [digital image]!, L0006619 [digital image]!, NY00008207 [digital image]!).

Note:—The specimen *F. Sellow s.n.* of *Andromeda serrulata* comprises nine specimens. The type material was deposited in the Berlin-Dahlem herbarium (B) and destroyed by the fire of 1943. The remaining material are deposited in the herbaria collections of E, F, K, L and NY. The material of F, L and NY consists of fragments and are not sufficiently informative to fully understand the concept of the name *Agarista serrulata*. In this way we are designating here the isotype K000494447 to be lectotypified because it is better preserved and complete material with more fertile structures.

Agarista eucalyptoides G. Don (1834: 837)

≡ *Leucothoe eucalyptoides* Candolle (1839: 605) ≡ *Leucothoe multiflora* var. *eucalyptoides* Meisner (1863: 155) ≡ *Andromeda eucalyptoides* Chamisso & Schlechtendal (1826: 518)

Type (lectotype, designated here):—BRAZIL. (Brasilia Meridionalis) Rio Grande do Sul, *F. s.d., Sellow 1040* (G00323842 [digital image]!; isolectotypes BR0000006995737 [digital image]!, E00326891 [digital image]!, G00342168 [digital image]!, G00342169 [digital image]!, HAL0098440 [digital image]!, HAL 0098501 [digital image]!, HAL0098591 [digital image]!, HAL0107382 [digital image]!, K000494454 [digital image]!, L0006628 [digital image]!, NY00008201 [digital image]!, NY00008202 [digital image]!).

Note:—The specimen *F. Sellow s.n.* of *Andromeda eucalyptoides* (*provincia Rio Grande do Sul*) comprises thirteen specimens. The type material was deposited in the Berlin-Dahlem herbarium (B) and destroyed by the fire of 1943. However, this material does not have the negative from J. Francis Macbride photos. The remaining material are deposited in the herbaria collections of BR, E, G, HAL, K, L and NY. The material of NY (008202) and L consists of fragments. The material of BR, E, G (00342169), HAL (00998440), K and NY (008201) consists of entire, but infertile, branches. In this way, we are designating here the isotype from Geneva Herbarium G00323842 to be lectotypified, since it complies with the protologue, contains an original label and a better preserved material with entire branches and fertile structures.

Agarista multiflora G. Don (1834: 837)

≡ *Leucothoe multiflora* Candolle (1839: 605) ≡ *Leucothoe multiflora* Candolle var. *pohlii* Meisner. (1863:155), nom. superfl. ≡ *Andromeda multiflora* Pohl (1828:122)

Type (lectotype, designated here):—BRAZIL. Minas Gerais: Rancho Novo, Serra da Mantiqueira, Sep.-Oct. 1819, *J.B.E. Pohl s.n.* (W0059390 [digital image]!; isolectotypes W0059389 [digital image]!, W0059391 [digital image]!, M0173318 [digital image]!, BR0000006996390 [digital image]!, BR0000006996093 [digital image]!)

Note:—The specimen *Pohl s.n.* of *Andromeda multiflora* comprises sevens specimens. The type specimen of *Andromeda multiflora* Pohl was deposited in Natural History Museum of Vienna Herbarium (W). Sleumer (1958) cited an isotype deposited in Botanische Staatssammlung München (M0173318) and stated that the holotype was not preserved. Judd (1984) in the review of American *Agarista* cited this material enquiring if it was destroyed ("holotype, W [destroyed?]") and do not cited the isotypes from W. Currently, the type does not exist in W, only the three isotypes. In this way, among the isotypes we are designating here the specimen W0059390 as lectotype. This material is well preserved and have an original label in the sheet with the type location indicated.

Agarista nummularia G. Don (1834: 837)

≡ *Leucothoe nummularia* Candolle (1839: 603) ≡ *Andromeda nummularia* Chamisso & Schlechtendal (1826: 520)

Type (lectotype, designated here):—BRAZIL. Rio Grande do Sul, Porto Alegre (see Meisner in Martius 1863, (apud Judd 1984), *s.d., F. Sellow 1229* (G00323837 [digital image]!; isolectotypes F V0055221F [digital image]!, F [field photo] [digital image]!,

HAL0098441 [digital image]!, L0006634 [digital image]!, L0006635 [digital image]!). Epitype (designated here):— L0006635.

Note:—The specimen *F. Sellow 1229* of *Andromeda nummularia* comprises seven specimens. The type material was deposited in the Berlin-Dahlem herbarium (B) and destroyed by the fire of 1943. The remaining material are deposited in the herbaria collections of F, G, HAL, and L. The material of F and L consists of fragments and are not enough to fully understand the concept of the name *Agarista nummuaria*. In this way we are designating here the isotype from Geneva Herbarium G00323837 to being lectotypified because it comprises an original label and the best conserved material with entire branches and remnats, but not complete, fertile structures. In this way, we are additionally designating here the epitype L0006635 to aid in fully understand the concept of that name, given that this material does not have complete branches, but comprises good preserved fertile structures.

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CONSIDERAÇÕES FINAIS

A partir das revisões bibliográficas, consulta aos materiais-tipo, aos acervos dos principais herbários do Rio Grande do Sul, da região sul do Brasil e herbários virtuais e de expedições a campo, foi possível confirmar a ocorrência de três gêneros, e 10 táxons correspondendo a nove espécies e duas variedades de Ericaceae nativas do Rio Grande do Sul.

Agarista é o mais diversificado no estado, compreendendo seis táxons correspondendo a cinco espécies e duas variedades (*A. chlorantha*, *A. eucalyptoides*, *A. minensis*, *A. niederileinii* var. *niederleinii*, *A. niederileinii* var. *acutifolia* e *A. nummularia*), seguido por *Gaylussacia* com três espécies (*G. angustifolia*, *G. brasiliensis* e *G. pseudogaultheria*). Todas as espécies são registradas para os Campos de Cima da Serra da Mata Atlântica, sendo nos campos subtropicais de altitude a maior abundância de espécies da família no estado. Das nove, cinco espécies são também registradas para os afloramentos rochosos, campos de clima temperado e litoral do Pampa: *Agarista eucalyptoides, A. chlorantha, A. minensis, A. nummularia* e *Gaylussacia brasiliensis.*

A distribuição de Ericaceae nos campos temperados do Pampa não é contínua, exceto por *Gaylyssacia brasiliensis* ao longo do litoral. Os registros são restritos à uma ou duas coletas únicas. Essas ocorrências disjuntas e o baixo número de registros podem ser resultado de subamostragem, redução de habitat ideal para algumas espécies, resultado de um processo de expansão ou mesmo extinção local. Entretanto, o que explica essa distribuição disjunta e pontual ainda é desconhecido e uma modelagem de nicho ecológico da distribuição potencial, juntamente com um maior esforço amostral poderiam fornecer subsídios para melhor compreensão da distribuição dessas espécies no Pampa.

Agarista eucalyptoides e *G. brasiliensis* são as espécies com distribuição mais ampla no estado. A primeria ocupando afloramentos rochosos até regiões fronteiriças com o Uruguai, a segunda ocupando também áreas de menor altitude e chegando até o litoral. *Gaylussacia brasiliensis* juntamente com *A. nummularia* são as únicas espécie no estado registradas em baixas altitudes. *Agarista chlorantha*, apesar de não ser tão frequente no estado quanto *A. eucalyptoides*, ocorre simpratricamente com esta em afloramentos areníticos e basálticos próximos à fronteira com o Uruguai.

Considerada extinta no Rio Grande do Sul, nesse trabalho foi registrada novamente a ocorrêcia de *Agarista minensis*. Essa espécie não era registrada para o estado

desde 1952 (*B. Rambo* 51333 [NMNH 2102247]) e foi redescoberta a partir de coletas pré-existentes que haviam sido identificadas de forma equivocada como *Agarista niederleinii*. Ela também foi registrada em campo e coletas recentes também foram estudadas, além do estado de conservação que aqui é apresentado como "Quase Ameaçada" (NT).

De acordo com as recomendações e critérios da IUCN (2019) foi avaliado o risco de ameaça para as espécies de Ericaceae nativas do Rio Grande do Sul. Foram categorizadas quatro espécies como ameaçadas de extinção no estado: *Agarista chlorantha* (EN), *Agarista niederleinii* (VU), *Gaultheria itatiaiae* (EN) e *Gaylussacia pseudogaultheria* (EN).

Ainda, a partir da revisão dos protólogos, espécimes-tipo e imagens digitais de espécimes com nomes publicados anteriormente e negativos das fotos dos espécimes depositados no herbário F (proveniente dos espécimes originalmente depositados no herbário B e destruídos pelo incêndio de 1943), apresentamos aqui também a lecotipificação dos tipos nomenclaturais de cinco basiônimos de *Agarista*: *Andromeda chlorantha*, *Andromeda serrulata*, *Andromeda eucalyptoides*, *Andromeda multiflora* e *Andromeda nummularia*, juntamente com epítipos que auxiliarão como tipos interpretativos para *Agarista chlorantha*, *A. serrulata* e *A. nummularia*

Por fim, destaca-se ainda que, apesar da variação morfológica e similaridade entre morfotipos de diferentes espécies em *Agarista*, a morfologia das sementes no gênero é destacada como uma característica distintiva para diferenciação das espécies ocorrentes no Rio Grande do Sul. Essa informação denota a importância de ampliar o conhecimento morfológico do grupo. A família Ericaceae carece de trabalhos no Brasil, estando limitada, principalmente, a trabalhos florísticos locais e estaduais. Dos gêneros ocorrentes no Brazil, *Agarista* e *Gaylussacia* têm centro de diversidade na Região Sudeste do país e compreendem elevado número de endemismos, representando um componente importante dos campos de altitude e da flora brasileira de modo geral. Apesar disso, esses grupos carecem de informações, principalmente *Agarista*, com escassa literatura especializada, subamostragem e muitos problemas de identificação das espécies. Tendo isso em vista, é inexorável a necessidade de revisão taxonômica em *Agarista* para se conhecer e delimitar as espécies a partir da ampliação das informações morfológicas, bem como trabalhos filogenéticos e biogeográficos que venham a esclarecer as relações de parentesco entre as espécies e as relações intergenéricas em Vaccinioideae, elucidando os

processos evolutivos que levaram a diversificação do gênero nos campos de altitude da região sudeste brasileira. Essas abordagens estão previstas como continuação do trabalho desenvolvido nessa dissertação por meio do projeto a ser desenvolvido no doutorado "Sistemática e biogeografia de *Agarista* (Ericaceae)".

Apêndice 1. Lista de espécies aceitas e material examinado

I.I. Lista numérica das espécies de Ericaceae aceitas para o Rio Grande do Sul arranjadas em ordem alfabética

1. *Agarista chlorantha*

2. *Agarista eucalyptoides*

3. *Agarista minensis*

4. *Agarista niederleinii*

5. *Agarista nummularia*

6. *Gaultheria itatiaiae*

7. *Gaylussacia angustifolia*

8. *Gaylussacia brasiliensis*

9. *Gaylussacia pseudogaultheria*

I.II. Espécimes examinados ordenados em ordem alfabética de coletor. A espécie referida em cada coleta é citada entre parênteses e remete à lista acima citada.

Abruzzi, M.L. 4937 (8); 5096 (8); 2346 (8); 2353 (8); 4504 (8).

Adamy, S. et al. s.n. (HDCF 3404) (2).

Aguiar, L. 211 (2); 212 (2); 197 (2); 200 (2); s.n. (HAS 8421) (8).

Alff, C.C. et al. CCA37 (7); 52 (8); s.n. (ICN 194671) (8).

Antoniutti, M.J. et al. 14 (7).

Ariati, V. 970 (6).

Baptista, L.R.M. s.n. (ICN 088699) (3).

Barboza, E. 2439 (5); 997 (7).

Bassan, M. 658 (8); 641 (8).

Boechat, S. s.n. (ICN 41928) (9).

Brack, P. 78 (2).

Buck, P. s.n. (PACA-AGP 11542) (7); s.n. (PACA-AGP 8778) (8).

Bueno, O. 4648 (2); 4647 (8); 3057 (8).

Camargo, O.R. 95 (2); 664 (3); s.n. (HAS 81157) (3); s.n. (HAS 81156) (3); 1786 (5); 5630 (7).

Larocca, J. s.n. (HUCS 12545) (8); s.n. (PACA-AGP 92897) (8).

Lima, D.A. et al. s.n. (ICN 4850); s.n. (ICN 34110) (8).

Lindeman, J.C. et al. s.n. (ICN 009351) (3); s.n. (ICN 009306) (7).

Longhi, S.J. 1424 (7).

Lorscheitter, M.L. et al. s.n. (ICN 174898) (4); s.n. (ICN 172827) (4); s.n. (ICN 172828) (5); s.n. (ICN 174725) (5); s.n. (ICN 174783) (5); s.n. (ICN 174784) (5); s.n. (ICN 174785) (5); s.n. (ICN 174786) (5); s.n. (ICN 172829) (9).

Machado, P.F.S. s.n. (HDCF 4063) (2).

Mansan, C. et al. 486 (2); 682 (8).

Marchett, C.A. s.n. (HUCS 35725) (8).

de Marchi , T.C. 220 (5); 223 (8); 42 (8).

Marchiori, J.N.C. et al. 89 (2); s.n. (HDCF 40) (2); 279 (2); 584 (2).

Mariath, J. s.n. (HAS 12206) (2); 846 (8).

Martins, C.S.A. s.n. (MPUC 11144) (2), s.n. (MPUC 14915) (5).

Mattos, J. et al. 27131 (2); 23632 (2); 30466 (2); 30980 (2); 2975 (2); 3765 (2); 26422 (2); 2765 (2); 24092 (3); 30466 (3); 23361 (4); 30973 (4); 18378 (7); 7784 (7); 6236 (7); 5454 (7); 18869 (9); 20002 (9).

Matzenbacher, N.I. s.n. (ICN 106346) (9).

Molz, M. et al. s.n. (ICN 163715) (2); s.n. (ICN 161862) (2); s.n. (HAS 91589) (2); s.n. (HAS 91568) (5); s.n. (HAS 93665).

Mondin, C. et al. s.n. (ICN 184648) (2); 2564 (2); 1661 (4); 52 (8); 86 (8); 1970 (8).

Neves, M. 752 (7); 1104 (8); 1783 (8).

Nilson, A.D. 521 (4); 225 (8).

Nunes, V.F. et al. 492 (8).

Paz, J. 125 (5); 33 (5).

Pedrollo, C.T. 6 (8).

Pinheiro, M. 427 (2).

Pontes, G. s.n. (MPUC 8653) (2).

Porto, M.L. et al. s.n. (HAS 1174) (2).

Rabuske, C. 311 (2).

Rambo, B. 4954 (2); 56563 (2); 4871 (2); 31063 (2); 8309 (2); 39161 (2); 132 (2); 27043 (2); 33725 (2); 39655 (2); 29424 (2); 40072 (2); 51626 (2); s.n. (SMDB 28) (2); 8537 (3); 9048 (3); 30902 (3); 4750 (3); 32150 (3); 32262 (3); 34939 (3); 36728 (3); 9048 (4); 9065

(4); 51933 (4); 8537 (4); 53824 (4); 32484 (4); 45390 (4); 8621 (4); 8698 (4); 36728 (4); 56563.1 (4); 30902 (4); 4750 (4); 32150 (4); 4321 (4); 45530 (4); 49305 (4); 49306 (4); 54063 (4); 54121 (4); 54523 (4); 32262 (4); 34939 (4); 32460 (5); 45477 (5); 53881 (5); 8693 (5); 36724 (5); 52951 (5); 54674 (5); 8694 (5); 4439 (5); 11657 (5); 11716 (5); 131 (5); 29495 (5); 35332 (5); 37361 (5); 37362 (5); 37512 (5); 39055 (5); 39075 (5); 42757 (5); 48694 (5); 48695 (5); 48704 (5); 36727 (6); 32485 (6); 35228.1 (6); 45384 (6); 53869 (6); 7931 (6); 8685 (6); 8692 (6); 36727 (6); 45332 (7); 8631 (7); 56572 (7); 31075 (7); 55011 (7); 56638 (7); 36729 (7); 56268 (7); 56348 (7); 8217 (7); 52151 (7); 45520 (7); 54077 (7); 54497 (7); 56808 (7); 60090 (7); 45250 (8); 47009 (8); 55883 (8); 45195 (8); 46137 (8); 46826 (8); 63584 (8); 51742 (8); 36725 (8); 36726 (8); 54669 (8); 49303 (8); 11737 (8); 38574 (8); 29498.1 (8); 37340 (8); 37510 (8); 42740 (8); 43914 (8); 59173 (8); 133 (8); 37510 (8); 54812 (8); 51401 (8); 45385 (9); 53785 (9); 53827 (9); 53914 (9); 45516 (9); 49304 (9); 49307 (9); 53938 (9); 29498 (9).

Rambo, R.R. s.n. (UPCB 22715) (2).

Ramos, R.D. 478-A (2).

Reitz, R. et al. 6440 (7); 7792 (7).

Ribeiro, C.L. et al. 319 (2).

Ritter, M.R. 1456 (2); s.n. (ICN 085135)(6); 1272 (6); 793 (7).

Rodrigues, R.S. et al. 68 (2); 678 (8).

Roland, R. 1 (8).

Romão, G.O. et al. 1856 (4); 1895 (7); 1896 (7); 1899 (8); 1901 (8); 1898 (9); 1861 (9); 1863 (9); 1862 (9).

Rossato, M. 253 (2).

Ruppel, E. s.n (PACA-AGP 33472) (8).

Salazar, E. s.n. (HAS 42461) (2); s.n. (HAS 42468) (2).

Santos, R. dos 162 (7).

Sartori, M. 337 (8).

Scherer, C. et al. s.n. (ICN 141673) (5).

Schmidt, R. et al. 1342 (2); s.n. (PACA-AGP 105940) (2); 1344 (4); 944 (7).

Schneider, A.A. 1786 (4).

Schultz, A. 4394 (5).

Scur, L. 715 (7).

Seger, G.D.S. 649 (3); 335 (3); 653 (7)

Sehnem, A. 15641 (2); s.n. (HUCS 2737) (2); 5780 (2); 4295 (4); 17158 (4); 5164 (4); s.n. (HUCS 1632) (4); s.n. (HUCS 1631) (5); 4197 (5); 969 (5); s.n. (HUCS 2872)(5); 8497

(5); 7761 (6); 4242 (6); 5153 (7); s.n. (HUCS 2954)(7); 8495 (7); 5153 (7); 7663 (7); s.n. (HUCS 2866) (8); 8496 (8); s.n. (HUCS 2953) (8); 8935 (8); 8442 (8); 4241 (9).

Senna, R.M. et al. 1092 (4); 1014 (7); 778 (8).

Silva, J.M. 7283 (7); 4052 (7).

Silva Filho, P.J.S. 1538 (1); 1823 (5); 1537 (8); 12 (8); 1552 (9).

Silveira, N. et al. 414 (2); 11649 (4); 7274 (4); 11645 (5); 11623 (7); 7269 (8); 7276 (8); 8136 (8); 9506 (8); 2579 (8); 1773 (8); 4525 (8); 4080 (8); 2211 (8); 2981 (8); 3261 (8); 10232 (8).

Soares, Z. 108 (2).

Sobral, M. et al. 3556 (2); 8037 (3); 2711 (7); 9406 (7).

Souza, M.L. et al. 1764 (7); 1778 (7); 1785 (7).

Souza, V.C. et al. 30543 (6).

Torgan, L. s.n. (HAS 528) (8).

Trevisan, R. et al. 1293 (7); 1294 (7).

Valduga, E. 143 (8).

Waechter, J.L. et al. 1922 (1); 847 (3); 1590 (5).

Wasum, R.A. et al. 2556 (2), 4689 (2); s.n. (HUCS 4773) (3); s.n. (HUCS 4773) (4); s.n. (HUCS 12860) (5); 1316 (7); 2321 (8); 10764 (8); 2288 (8); s.n. (HUCS 12862) (8); s.n. (HUCS 10764) (8); s.n. (HUCS 2288)(8); s.n. (HUCS 8680)(8); s.n. (HUCS 2197) (8); 2321 (8).

Wiesbauer, M.B. 70 (2).

Zachia, R. et al. 1721 (8).

Zanin, A. et al. 987 (7).