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Campomanesia lorenziana as a replacement name for *Abbevillea langsdorffii* (Myrtaceae), a rare and endemic fruiting species from the Brazilian Atlantic Forest

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Summary. This study was initially driven by efforts to identify a species of *Campomanesia* from the Brazilian Atlantic Forest that was introduced into cultivation because of it excellent fruits, using seeds collected in 2007. Tentatively interpreted as a new taxon, after examination of the types of synonyms of its apparent close relatives, we found that this taxon corresponds closely to the type and original description of *Abbevillea langsdorffii*, which is currently considered a synonym of *Campomanesia sessiliflora* var. *sessiliflora*. Examination of original descriptions, types, historical and modern herbarium collections and cultivated individuals support the recognition of *A. langsdorffii* as a distinct species. The existence of *C. langsdorffii* prevents using this combination, and, therefore, we propose *Campomanesia lorenziana* as a necessary replacement name. We provide herein an updated morphological description for *C. lorenziana*, including a report on fruit taste, morphological photographs and drawings and a taxonomic discussion. *Campomanesia lorenziana* is similar to *C. hirsuta* and *C. phaea*, so we provide morphological data to distinguish them and a brief historical overview regarding the cultivation of *C. lorenziana* is also presented.

Key Words. Cultivated plant, horticulture, Myrteae, Neotropics, superguabiroba.

Introduction

Currently comprising 42 species and nine varieties (POWO 2023), *Campomanesia* Ruiz & Pav. is a South American Myrtaceae genus, with 35 species occurring in Brazil (Oliveira *et al.* 2020). The genus is a member of subtribe Pimentinae, one of the nine currently accepted subtribes of Myrteae (Lucas *et al.* 2019). *Campomanesia* is markedly distinct from other Myrteae genera as its leaves have marginal veins formed by prominent loops of the secondaries near the margin, i.e., they lack the continuous marginal vein characteristic of the family. Distinctive reproductive features of *Campomanesia* are the relatively large flowers, multilocular ovaries (4 – 18) and frequently capitate stigma. Similar morphology can be found in *Psidium* L., but that genus has often fewer locules (3 – 5) in comparison. Other diagnostic features for *Campomanesia* are the locule wall, which becomes thickened during fruit development and probably works as a false seed coat and, usually all, or all but one, ovule aborts within each locule (McVaugh 1968; Landrum 1986; Landrum & Kawasaki 1997). Usually less than half of the locules produce seeds. The genus is also known for its fleshy, edible fruits that are popularly known as 'guabiroba'.

This study was initially driven by efforts to identify a species of *Campomanesia* that was introduced into cultivation, from seeds collected in 2007, by one of the authors (MTCL) at São José de Fruteiras, Vargem Alta, state of Espírito Santo, Brazil (see *Tsuji et al.* 1500 [HPL6923]). This species has large and delicious fruits, and was tentatively interpreted as a new taxon, being listed as such in a book about Brazilian fruits (Lorenzi *et al.* 2015: 386). However, after examining types of synonyms of its apparent close relatives, we found that our species corresponds closely to the type and original description of *Abbevillea langsdorffii* O.Berg (1859: 608), currently considered a synonym of *Campomanesia sessiliflora* (O.Berg) Mattos var. *sessiliflora* (Mattos 1967: 26; basionym *Britoa sessiliflora* O.Berg 1856: 436). Examination of original descriptions, types, historical

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and modern herbarium collections and cultivated individuals has, however, prompted us to conclude that *A. langsdorffi* should be treated as separate from *Campomanesia sessiliflora* var. *sessiliflora*. However, the existence of *Campomanesia langsdorffii* O.Berg (1859: 610) prevents transfer of the epithet to *Campomanesia* and, therefore, we propose the name *C. lorenziana* as a necessary replacement name for *A. langsdorffii*.

We provide herein an updated morphological description for *Campomanesia lorenziana*, including a report on fruit taste, morphological figures and drawings and a taxonomic discussion. A brief historical overview, regarding the cultivation of *C. lorenziana*, is also presented. Specimens of *C. lorenziana* are often found in herbaria under *C. hirsuta* Gardner (1843: 353). Another species, *C. phaea* (O.Berg) Landrum (1984: 241; basionym *Abbevillea phaea* O.Berg 1857: 435), is also morphologically related. Therefore, we here provide morphological data for distinguishing these similar species.

Material and Methods

This study was based on literature survey and examination of virtual and physical herbarium collections. High-resolution images of specimens from several herbaria were examined through REFLORA (https://reflora.jbrj.gov.br/), CRIA (https://splink.cria.org.br/), JSTOR Global Plants (https://plants.jstor.org/) and LE virtual herbarium (https://en.herbariumle.ru/). Measurements presented in the description were taken from dry material, except when otherwise stated (e.g., fruit). Terminology for leaf features follows Hickey (1973); general shapes follows Radford *et al.* (1974) and colours and other general features follow the glossary of Beentje (2016).

Taxonomic Treatment

Campomanesia lorenziana *T.Fern., M.T.C.Lacerda & J.M.A.Braga*, **nom. nov.**

http://www.ipni.org//urn:lsid:ipni.org:names:77338999-1

Replacement name for: *Abbevillea langsdorffii* O.Berg, *Fl. Bras.* (*Martius*) 14 (1): 608 (1859), non *C. langsdorffii* O.Berg (1859: 610). Type: Brazil. São Paulo, Mogi das Cruzes, pr. Mugy das Cruzes, pr. S. Pauli, Nov. 1834, fl., *L. Riedel* 1381 (lectotype LE! (LE00003983) Fig. 1A, inadvertently designated by Landrum (1986); isolectotypes F — fragment n.v., GH! (GH00068789!), LE! (LE00003982), P! (P05204269!), P! (P05204270!), S! (S05-2380), U (U0004978)).

Shrubs to trees 3 – 10 m tall. *Trunk* brownish-grey; bark peeling often in long and irregular strips. *Treetop* with scattered branches in multiple directions, or columnar architecture and strongly pendent branches, lowest ones often touching the ground. *Young shoots* with prophylls and very young leaves pubescent to sericeous, fuscous, citrine or white, brownish when dry. *Young twigs* puberulent to villose, glabrescent during aging; trichomes up to 1 mm long, amber, cinnamon or fuscous, brownish when dry. *Mature twigs* exfoliating like the trunk; internodes 1 – 3.5 cm long. *Leaves* with petioles 0.3 – 0.7 cm long, puberulent to pubescent; blades (3 –) 5 – 12.5 × 1.5 – 4 cm, chartaceous, lanceolate; base cuneate to obtuse; apex acute to attenuate or apiculate. *Leaf blade* adaxially sparsely pilose to glabrous; except for the pubescent to pilose midvein, usually green darker and slightly lustrous; abaxially usually pubescent or sparsely pilose, little discoloured; trichomes like those of young twigs on both surfaces; margin ciliate when young; venation adaxially impressed, abaxially with secondary veins strongly raised and tertiary veins slightly raised; midvein slightly darker than the secondaries, usually with persisting trichomes. *Flowers* solitary, axillary, 1 (2) per axil of leaves; pedicels 0.5 – 3 mm long, pubescent, green or rarely fuscous; bracteoles 1 – 3.5 × 1 – 1.2 mm, lanceolate to filiform, often flexuous with rolled tips like the sepals, pubescent, green or rarely fuscous. *Flower buds* 9.5 – 10.5 × 8 – 9 mm, pyriform, pubescent to villose, pale green to white or rare fuscous, brownish when dry, usually constricted above the ovary; petal globe at early development stages only visible apically, not laterally, gradually expanding and becoming more visible during maturation; sepals fused basally, forming a tube c. 1.5 mm. *Calyx lobes* 4 – 5 (– 7), 3.5 – 5 × 5.5 – 7.5 mm, ovate, apex acute, often reflexed at the very tip and appearing obtuse, reflexed and tearing at base at anthesis; sometimes tearing and forming a single structure of two sepals; coriaceous, pale green to white, rarely fuscous, brownish when dry, externally pubescent to villose, internally glabrous to pubescent. *Petals* 4 – 6, 10.5 – 12 × 10 – 12.5 mm, orbicular, concave, white, membranaceous, white, brownish when dry, externally pubescent to villose, internally glabrous. *Staminal ring* depressed in the centre at the point of style insertion; stamens c. 390; filaments 4.5 – 6 mm long, white; anthers c. 1.2 × 0.6 mm, yellow. *Style* c. 12 mm long; stigma slightly capitate, white; hypanthium 3.5 – 4.5 × 4 – 5.2 mm, oblate, pale green or rarely fuscous, pubescent, trichomes usually white, rarely fuscous; ovary with 12 – 15 locules, each with c. 12 ovules. *Fruits* oblate, initially pubescent to hirsute, becoming glabrous when fully mature; when dry 3.5 – 4.5 cm in diam.; when fresh 4.5 – 5.5 × 6 – 10 (– 12) cm; when immature dark green and markedly costate, with multiple longitudinal ribs; when mature pale green to soft pale yellow, longitudinal ribs less conspicuous or with surface smooth; apex crowned by persistent and

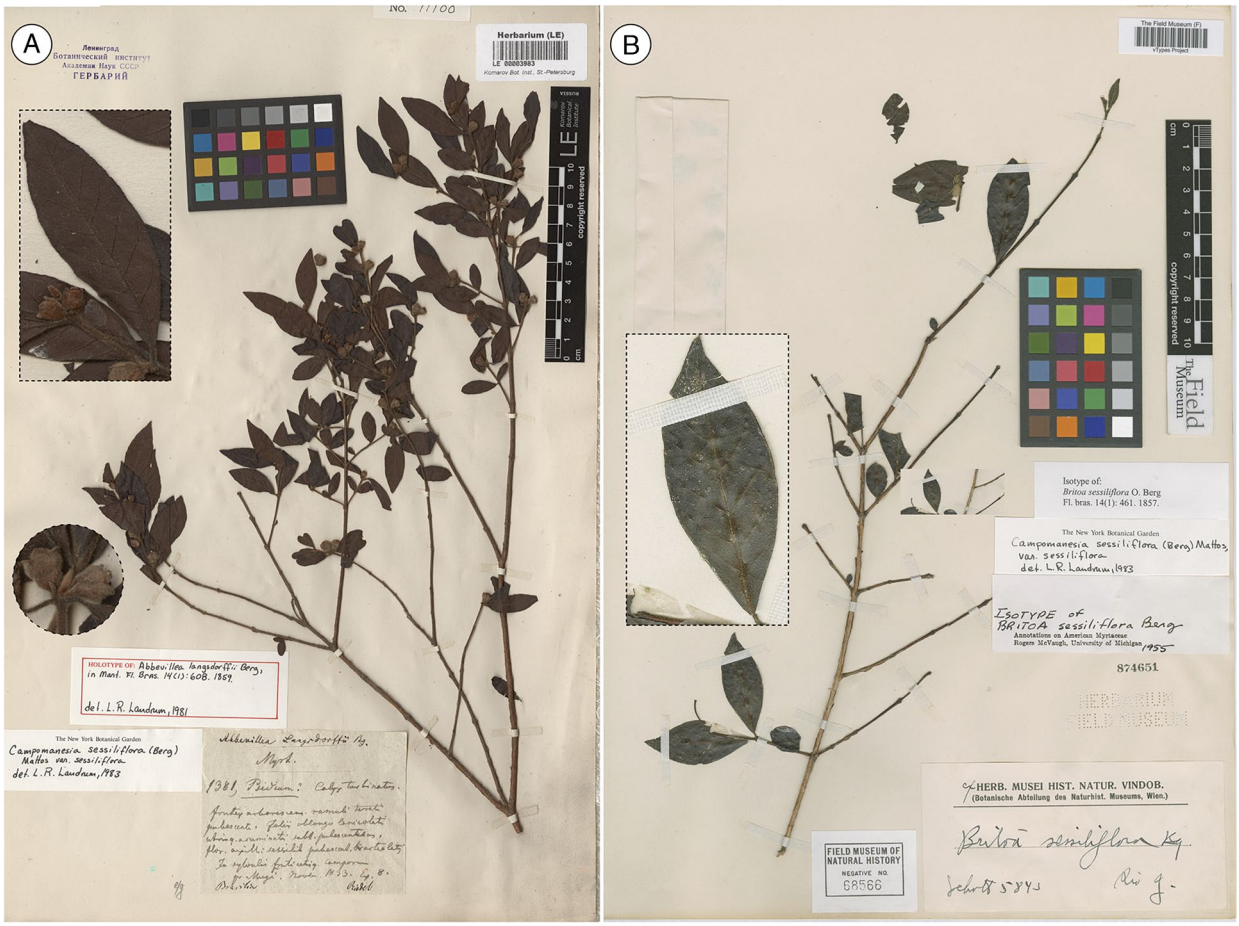

Fig. 1. Type specimens. **A** *Abbevillea langsdorffii* (LE00003983); **B** *Britoa sessiliflora* (F0064792F). IMAGES REPRODUCED WITH THE CONSENT OF LE AND F HERBARIA.

strongly inflexed sepals that almost entirely cover the relatively narrow floral disk, which comprises c. 10% of fruit diameter; skin relatively thin, covering very aromatic, juicy, acid and non-astringent in flavour, pulp; seeds flat, to 12 per fruit, 8 – 13 × 1 – 2 mm, including locular-walls, white to cream. Figs 2, 3, 4B.

SPECIMENS EXAMINED. BRAZIL. Espírito Santo: Cachoeiro do Itapemirim, Parque Rodoviário, 2 April 2002, fr., *A. G. Moreira* s.n. (IAC [IAC42603]!); Vargem Alta, 5 km de Fruteira Nova, propriedade do Sr. Guilherme, 23 Jan. 2007, fr., *R. Tsuji et al.* 1500 (HPL!); ibidem, Taquarussu, próx. à oficina, 14 April 2016, fl. & fr., *J. Luber* 227 (ASE!); ibidem, 1,060 m, 27 May 2014, fr., *M. L. Dan & R. G. de Sousa* s.n. (RB [RB01176727]!). Minas Gerais: Santana do Paraíso, Achado, Sítio da Vista Linda de José Dermo, 9 Sept. 2009, fr., *H. Lorenzi* 6736 (HPL!); São João do Manhuaçu, Serra da Sericata, 1,300 m, Nov. 1997, fl., *L. S. Leoni* 3780 (RB!); São Sebastião do Rio Preto, margem da estrada de terra de Morro do Pilar para Itambé do Mato Dentro, 697 m, 11 July 2016, fr., *J. E. Q. Faria et al.* 6258 (HDJF!, UB!). Rio de Janeiro: Resende, Bosque do Visconde, Trilha da Família, Parque Estadual da Pedra Selada, 17 April 2018, fr., *C. Baez* 1595 (RB!); ibidem, 19 Aug. 2019, fr., *J. Pessanha* s.n. (RB [RB01423697]!). São Paulo: Joanópolis, rodovia para Montes-Verdes, 5 Nov. 1979, fl., *H. F. Leitão-Filho* 10614 (ASU!, SP!, UEC!); Paraibuna, próximo a divisa de Salesópolis, perto da cachoeira do Altino, 15 Sept. 2021, fl., *Y. M. Lourenço* 1 (SORO!); Salesópolis, próximo à nascente do rio Tietê, Sept. 2021, fl., *Y. M. Lourenço* 2 (SORO!). Cultivated: Rio de Janeiro, Duque de Caxias, Xerém, Coleção Botânica Sítio E-jardim, propriedade de Marco T. C. Lacerda [cultiv. orig. Vargem Alta-ES], 27 July 2022, fr., *T. Fernandes et al.* 1125 (NIT!, RB!); São Paulo, Nova Odessa, Jardim Botânico Plantarum [cultiv. orig. Vargem Alta-ES], 30 March 2023, fr., *T. Fernandes & M. T. C. Lacerda* 1374 (HPL!, NIT!, RB!).

ETYMOLOGY. The specific epithet honours Harri Lorenzi, agronomist and botanist, founder of Jardim

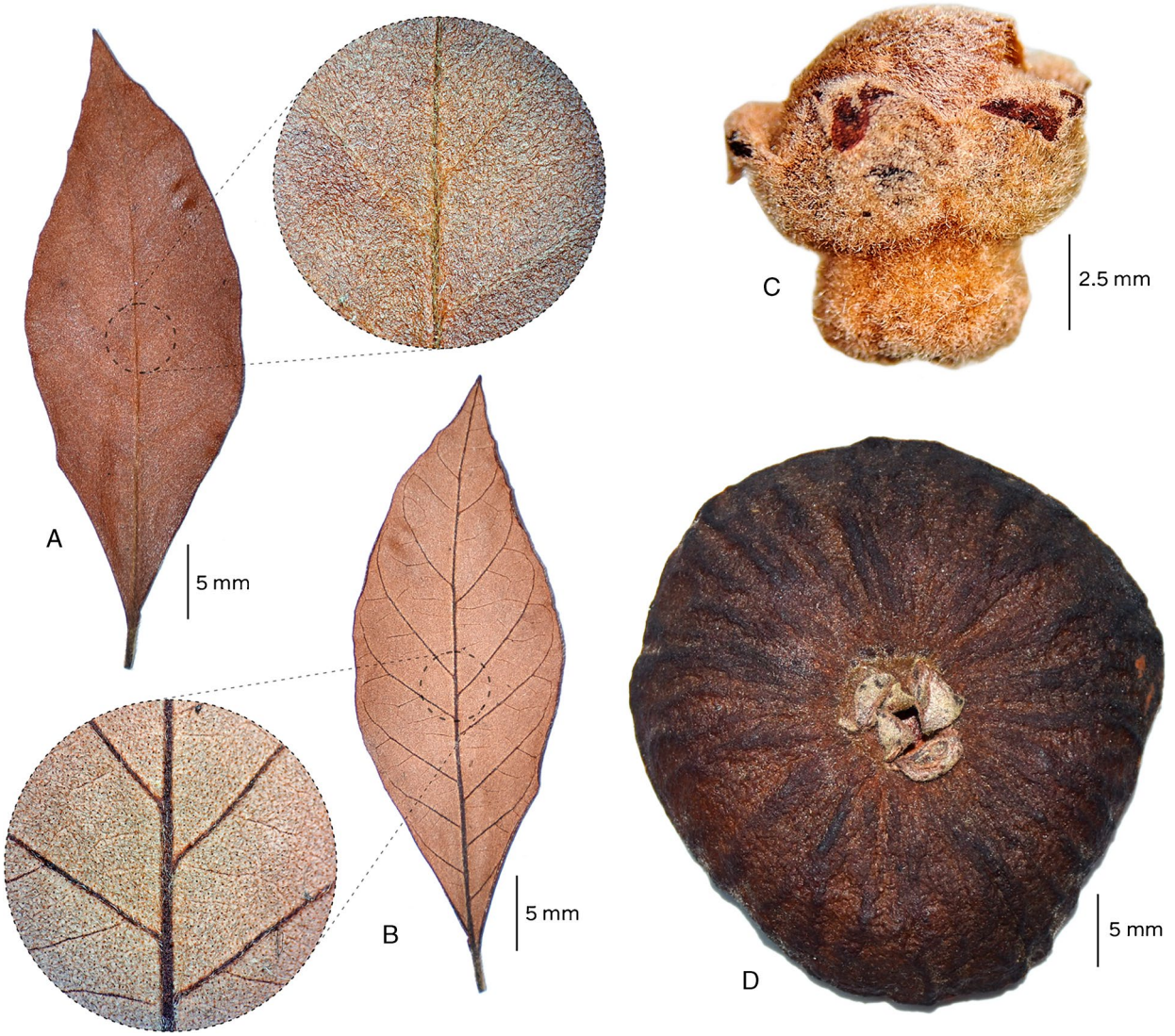

Fig. 2. Morphology of *Campomanesia lorenziana* in a dry state. **A** leaf adaxial surface; **B** leaf abaxial surface; **C** flower bud with calyx lobes distinctively folded at the very apex; **D** immature fruit with multiple longitudinal ridges. (All from *Fernandes* 1125).

Botânico Plantarum (JBP) and author of numerous reference books on Brazilian plants (e.g., Lorenzi 2009; Lorenzi *et al.* 2006; Lorenzi *et al.* 2015). HL had direct involvement in the present study, and he is also acknowledged for his admirable work on the conservation, investigation and discovery of Brazilian Flora.

VERNACULAR NAME. *Campomanesia lorenziana* has been popularly known as 'superguabiroba-gigante' (Lorenzi *et al.* 2015) since its introduction into cultivation. See the section of this article giving historical notes on the cultivation of this species.

TAXONOMIC NOTES. Landrum (1986), in his taxonomic treatment of *Campomanesia*, treated *C. sessiliflora* var. *sessiliflora* and *Abbevillea langsdorffii* as conspecific, which was later followed in the *Flora do Brasil 2020* web project (Oliveira *et al.* 2020). Three varieties are accepted for *C. sessiliflora*. Two are well represented in herbaria and morphologically remarkable, especially due to its bullate and discolorous leaves with distinctive features on the abaxial surface: glabrous to pubescent in *C. sessiliflora* var. *bullata* (Barb.Rodr.) Landrum, and lanuginose in *C. sessiliflora* var. *lanuginosa* (Chodat & Hassl.) Landrum. On the other hand, the typical variety, *C. sessiliflora* var. *sessiliflora* (Fig. 1B), has apparently been less collected. Landrum (1986) considered it a rare taxon restricted to the Brazilian states of Rio de Janeiro and São Paulo, citing only a single collection, apart from the type, as examined material (*Leitão* 10614 [BM, NY]). Unlike the other varieties, *C. sessiliflora* var. *sessiliflora* lacks a distinctive vegetative feature

Fig. 3. *Campomanesia lorenziana*, cultivated individual. **A** columnar architecture; **B** leaves; **C** flower bud with sepals distinctively folded at the very apex; **D** open flower; **E** immature fruits with longitudinal ribs; **F** ripe fruits; **G** lateral view of a ripe fruit. PHOTOS: JOÃO MARCELO ALVARENGA BRAGA.

that allows prompt recognition. It has leaves adaxially flat and only slightly discolorous (vs bullate and markedly discolorous in the other varieties).

The type collection of *Abbevillea langsdorffii* is composed of flower buds (Fig. 1A). In the protologue, Berg (1859) cites material examined at "Herbario Horti Botanici Petropolitani", the current Herbarium (LE) of the Komarov Botanical Institute in Saint Petersburg, Russia. Curiously, the specimen LE00003982 bears a single fruit detached from the branch, even though neither the protologue nor the collector's labels provide any information about the presence of fruits. Thus, there is strong evidence that a mixing of specimens took place in this case. The type collections of *Campomanesia sessiliflora* var. *sessiliflora* have fruiting branches (Fig. 1B). Although the fruits are no longer attached to the type sheets, Berg's description in the protologue ("*bacca obovata*") clarifies that the fruits are obovoid (in a dry state). At the time these species were synonymised (see Landrum 1986), flowers of *C. sessiliflora* var. *sessiliflora* were unknown, and also unknown were fruiting collections matching *A. langsdorffii*. Hence *Britoa sessiliflora* (the basionym) and *A. langsdorffii* were synonymised based on material at distinct phenological stages albeit their vegetative features, such as leaf shape, venation and indumentum, are indeed strikingly similar (Fig. 1).

Recent examination of the collection *Lorenzi* 6233 (HPL 11653), combined with study of the living tree

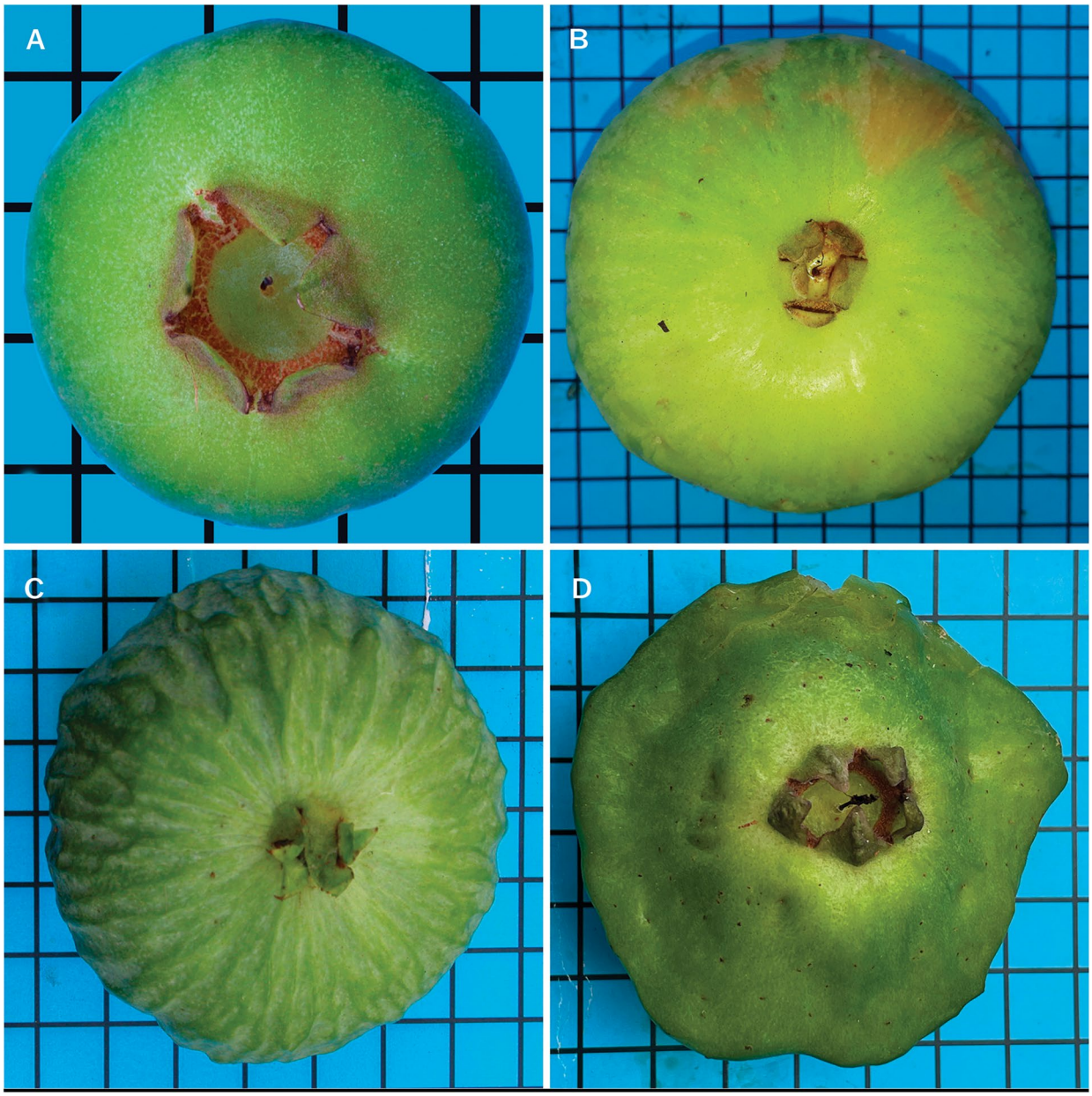

Fig. 4. Comparison of ripe fruits of **A** *Campomanesia sessiliflora*; **B** *C. lorenziana*; **C** *C. hirsuta;* **D** *C. phaea.* (Squares = 1 cm^2). PHOTOS: **A** HARRI LORENZI; **B** – **D** MARCO T.C. LACERDA.

descended from this collection, which is cultivated in the arboretum of JBP (see Lorenzi 2023), has significantly improved our interpretation of the typical variety of *Campomanesia sessiliflora*. Based on this, and other collections in herbaria, *C. sessiliflora* var. *sessiliflora* can be diagnosed by its flowers with a cinerous indumentum and subglobose fruits crowned by acute sepals that never obscure the floral disk; the floral disk is relatively large, comprising c. 40 % of the fruit diameter (Fig. 4A). This flower morphology is congruent with the other two varieties of *C. sessiliflora*, the differences between the three are solely vegetative.

Another population of cultivated *Campomanesia*, introduced from seeds collected by one of the authors of this study (MTCL), vouchered as *Tsuji et al.* 1500 (HPL [HPL6923]), closely matches the protologue and type collection of *Abbevillea langsdorffii*. This population has flowers with amber indumentum and ovate sepals that are distinctively folded outwards at the very apex, just like the type of *A. langsdorffii* (Fig. 2, see also insert

on Fig. 1A). These living plants produce fruits that are strongly oblate and longitudinally costate, especially when young, and crowned with strongly inflexed sepals that almost entirely cover the relatively narrower floral disk. The floral disk comprises c. 10% of the fruit diameter (Fig. 4B).

Further evidence that the cultivated *Campomanesia* population is conspecific with *Abbevillea langsdorffii* comes from their geography. The type collection of *A. langsdorffii* (*Riedel* s.n., from 1834) was made in the municipality of Mogi das Cruzes, state of São Paulo, Brazil (Berg 1859; Urban 1906). This locality is only 40 km away, on the border between the municipalities of Salesópolis and Paraibuna, also in the state of São Paulo, from where the collection with oblate and longitudinally costate fruits (*Lourenço* 1 [SORO]) was found in 2021.

The separate identities of *Abbevillea langsdorffii* and *Campomanesia sessiliflora* var. *sessiliflora*, mean that the former name should be treated apart and re-established as a separate species. However, the existence of *C. langsdorffii* O.Berg (1859: 610), a synonym of *C. sessiliflora* var. *lanuginosa*, prevents a possible combination, and, therefore, we propose here *Campomanesia lorenziana* as a necessary replacement name for *Abbevillea langsdorffii*. The differences between *Campomanesia lorenziana* and *C. sessiliflora* are listed in Table 1.

Fruits of *Campomanesia lorenziana* are produced twice a year, maturing in December – January and in June – July. They are the largest of all *Campomanesia* species, being morphologically similar to the also unusually large fruits of *C. hirsuta*, except that in that species the calyx remnants after anthesis are long acuminate and partially deciduous (Fig. 4C; Table 1). The fruit skin is quite thin in *C. lorenziana*, covering a very aromatic and juicy pulp, with an acid and non-astringent flavour, resembling that of *C. phaea* (O.Berg) Landrum except for the latter's pronounced astringency. *C. phaea* is commonly cultivated in the vicinities of Atlantic Forest remnants in Brazil, under the vernacular name 'cambuci' (i.e. 'Flying Saucer Fruit' in English), and further resembles *C. lorenziana* in the usually amber and pubescent indumentum on the hypanthia, which can, however, also be tomentose. *Campomanesia phaea* can be readily separated from *C. lorenziana* by its flattened, 'UFO' shaped fruits (see Lacerda & Morschbacker 2012 and Fig. 4D). See Table 1 (also Fig. 4) for distinguishing characteristics.

The similarity between *Campomanesia lorenziana* and these morphologically related species has resulted in years of taxonomic confusion. The sole collection cited by Landrum (1986) apart from the type for *C. sessiliflora* var. *sessiliflora* (i.e., *Leitão* 10614) matches *C. lorenziana* in every respect. Furthermore, recent collections of *C. lorenziana* from the state of Espírito Santo were treated as *C. sessiliflora* by Luber *et al.* (2017). *C. lorenziana* was also misidentified as *C. hirsuta* by Souza *et al.* (2018).

Notes on the history of *Campomanesia lorenziana* as commercial fruits

In 2002, Mr Alberto G. Moreira sent the Instituto Agronômico de Campinas (IAC) material of an unusual native fruit from the state of Espírito Santo, Brazil, which he considered to have economical potential for the preparation of industrial juices (*Moreira* s.n. [IAC42603]). Mr Moreira intended to license the commercial production of the drink. For such an

Table 1. Morphological features separating *Campomanesia lorenziana* and allied species.

	C. lorenziana	*C. hirsuta*	*C. phaea*	*C. sessiliflora*
Floral buds, colour and indumentum (when fresh)	pale green to white or rarely fuscous; pubescent to villose	white or fuscous; villose	amber; pubescent to tomentose	cinereous; villose
Calyx lobes	coriaceous; ovate, apex acute, often reflexed at the very tip and appearing obtuse	membranaceous; lanceolate (foliaceous), apex acuminate partially caducous	coriaceous; deltate, apex acute to acuminate	coriaceous; deltate, apex obtuse to acute
Floral disk, proportion of fruit diameter (approx.)	10%	15%	20%	40%
Fruits	oblate; longitudinally costate when young or less conspicuous to smooth when mature	oblate; longitudinally costate	obovoid to rhomboid; smooth	subglobose to oblate; smooth
Fresh, ripe fruit (maximum diam., cm)	12	8	8	5
Calyx (in fruit)	involute; covering almost the entire floral disk	involute; covering almost the entire floral disk	involute; with a denticulate aspect, partially covering the floral disk	erect; floral disk completely exposed

undertaking, however, one requirement is a correct botanical identification at the species level. So, the Instituto Agronômico asked Harri Lorenzi (see Etymology) to help and he brought to the attention of one of the authors (MTCL), the existence of a rare, potentially economically important *Campomanesia* fruit. Mr Moreira's goal matched the aims of Lorenzi and MTCL, who had published a book on Brazilian fruits (see Lorenzi *et al.* 2006) and intended a future, expanded edition. In January 2007, a visit to the natural habitat of the *Campomanesia* referred by Mr Moreira was included in the itinerary of a planned botanical expedition organised by Jardim Botânico Plantarum, to the state of Espírito Santo. The field work resulted in a rich collection of this species, in all its reproductive stages, so that a large set of dry material (*Tsuji et al.* 1500 [HPL 6923]) became available for examination and comparison with morphologically similar species. The collectors noticed strong similarities between its ripe fruits and those of another giant-fruited guabiroba, namely *C. hirsuta* (see Gardner 1846: 548 for information regarding its early introduction to England as a live plant). Interestingly, at that time, *C. hirsuta* was considered possibly extinct in the wild (Leslie Landrum, pers. comm.; Carrara 1997), until flowering individuals were found and collected in 2002, by *Morschbacker & Lacerda* (s.n., ASU [ASU0009417]) in ombrophilous forest of the mountainous region of Rio de Janeiro state, south-eastern Brazil. Then, in 2006, fruits of *C. hirsuta* were photographed for the first time (see Lorenzi 2009). For a detailed report on *C. hirsuta* rediscovery, see Lacerda (2019). Seeds from the plant vouchered as *Tsuji et al.* 1500 (HPL [HPL6923]) were brought by MTCL for cultivation, and the species, in cultivation, proved to be much tougher, and faster than *C. hirsuta* to produce its unusually large fruits (in only three years from seed), and was consequently named 'superguabiroba-gigante' ('giant super guabiroba' in English) (see Lacerda 2010; Lorenzi *et al.* 2015).

Lorenzi *et al.* (2015) presented colour photos of the tree, showing flowering branches and fruits, and gave a brief description of its main features and other information, remarking that it was an undescribed species. At the same time, Melo (2009) published, online, photos of the same *Campomanesia* species as 'guabiroba grande'. He also remarked that this tree is infrequently found in the middle Rio Doce valley in Minas Gerais state, having himself found only three individuals, in semideciduous forest. However, he mistakenly considered his 'guabiroba grande' to be *C. hirsuta,* after comparing its fruits with the photographs of *C. hirsuta* published by Lorenzi (2009). Since then, this sense of *C. hirsuta* has been mistakenly propagated among plant growers (e.g., Giacon 2017) and in scientific studies (e.g., Luber *et al.* 2017; Souza *et al.* 2018). Melo's plant is represented in herbaria by *Lorenzi* 6736 (HPL [HPL11840]) and Souza's by *M. L. Dan & R. G. de Sousa* s.n. (RB [RB01176727]). Finally, it is of note that nowadays *C. lorenziana* is known for its fruit and cultivated by fruit growers in every region of Brazil. For a video displaying details of fresh fruits and leaves of *C. lorenziana* see Lacerda (2018).

Acknowledgements

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Declarations

Conflict of Interest The authors declare they have no conflict of interest.

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