



Short Communication

Nomenclatural updates on names linked to the genus *Axonopus* for the Brazilian flora (Poaceae, Panicoideae, Paspaleae)

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Abstract

A nomenclatural update for 20 names related to the genus *Axonopus* for the Brazilian flora is here presented. *Axonopus* comprises around 90, mostly New World, species characterized by having solitary spikelets in an inverted position. In order to stabilize the nomenclature and, based on thorough study of original collections and pertinent literature, we designated lectotypes for nine names, of which three are second-step lectotypes. We also corrected to lectotypes erroneous applications, in previous contributions, of the term “holotype” (for four names), clarified three cases in which lectotypification is not required, as well as discussed four situations of uncertainty.

Key words: *Flora e Funga do Brasil*, Gramineae, Paspalinae, taxonomy, typification.

Resumo

A presente contribuição inclui uma atualização nomenclatural para 20 nomes relacionados ao gênero *Axonopus* para a flora do Brasil. *Axonopus* compreende aproximadamente 90 espécies, majoritariamente originárias das Américas, caracterizadas pelas espiguetas solitárias e em posição invertida. Com o objetivo de estabilizar a nomenclatura, e baseando-se no estudo minucioso de coleções originais e literatura pertinente, foram designados lectótipos para nove nomes, dos quais três são lectótipos de segundo passo. Aplicações errôneas do termo “holótipo” em contribuições anteriores também foram corrigidas a lectótipos (para quatro nomes), três casos em que a lectotipificação não é necessária foram esclarecidos, bem como discutidas quatro situações de incerteza.

Palavras-chave: Flora e Funga do Brasil, Gramineae, Paspalinae, taxonomia, tipificação.

Axonopus P. Beauv. is one of richest genera within Paspaleae (Morrone *et al.* 2012), comprising around 90 species (Zuloaga *et al.* 2003; Morrone *et al.* 2012). Most of them are native to the Americas, mainly distributed in tropical and subtropical regions, with a few introduced in the Old World (Black 1963; Giraldo-Cañas 2008; Delfini *et al.* 2020; BFG 2021). *Axonopus* is an economically important grass genus as it includes numerous species used as forage (*e.g.*, *Axonopus fissifolius* (Raddi) Kuhl., *A. obtusifolius* (Raddi) Chase, *A. purpusii* (Mez) Chase, *A. scoparius* (Flüggé) Kuhl., *A. suffultus* (Mikan ex Trin.) Parodi), as

well as other species widely utilized as ornamentals [*e.g.*, *Axonopus aureus* P. Beauv., *A. brasiliensis* (Spreng.) Kuhl., *A. compressus* (Sw.) P. Beauv.] (Black 1963; Nicora & Rúgolo de Agrasar 1987; Giulietti *et al.* 1988).

Morphologically, *Axonopus* is characterized by having racemose inflorescences distributed along a common axis, lower glume absent, and solitary spikelets with an inverse position (*i.e.*, with the backs of the upper glume and the upper lemma turned away from the rachis) (Black 1963). Infrageneric categories for *Axonopus* were based exclusively on morphological features of

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inflorescences, being recognized four sections, five series, and three subseries (Chase 1906, 1911; Black 1963; Giraldo-Cañas 2000).

Axonopus have been considered a taxonomically complex group mainly due to its large number of species and the difficulty of establishing clear limits between many of them (Black 1963; Delfini *et al.* 2020). The only revision of the entire genus was made by Black (1963) but, important advances have been done in recent years to clarify its taxonomic and phylogenetic relationships (*i.e.*, López & Morrone 2012; Delfini *et al.* 2020, 2022).

This article is part of a broader proposal that includes phylogenetic and taxonomic studies for *Axonopus* species, focusing on the Brazilian flora (Delfini *et al.* 2020, 2022). We aim here to contribute to the stabilization of nomenclature for 20 names that will appear in the project *Flora e Funga do Brasil* and also, before long, in the *Flora Neotropica* for the genus; thus, we designated lectotypes for nine names (*i.e.*, *Axonopus argentinus* var. *glabriflorus* Parodi, *A. obtusifolius* var. *rolfsii* G.A. Black, *A. suffultus* var. *pubiflorus* Parodi, *Paspalum comatum* Mez, *P. pellitum* Nees ex Trin., *P. polydactylon* Steud., *Panicum surinamense* Hochst. ex Steud., *Paspalum longispicum* Döll, and *P. uninode* Hack., being second-step lectotypes the last three), corrected to lectotypes four erroneous applications of the term “holotype” (for *Paspalum anceps* Mez, *P. arcuatum* Mez, *P. caulescens* Mez, and *P. purpusii* Mez), clarified three cases which lectotypification is not required (in *Axonopus camargoanus* G.A. Black, *A. derbyanus* G.A. Black, and *Paspalum herzogii* Hack.), as well as discussed four situations of uncertainty (for *Paspalum carinato-vaginatatum* Mez, *P. erythrochaetum* Mez, *P. flexile* Mez, and *P. triglochinosides* Mez).

Our study was based on bibliographical research including original descriptions, as well as analyses of specimens housed in the following herbaria [acronyms according to Thiers (continuously updated)]: B, BAA, BR, C, F, G, GH, GOET, HAL, IAN, K, L, LE, M, MG, MO, MPU, NY, P, RB, S, SI, TUB, U, US, and W. We examined types in person and images available online at the JSTOR Global Plants website (<<http://plants.jstor.org>>) and/or at the websites of aforementioned herbaria.

The protologues of all taxa have been checked. Unless otherwise stated, the specimen designated as the lectotype was that which matches

the protologue, corresponds to the current usage of the plant name, and is in the best preservation condition, according to the modern rules of the *International Code of Nomenclature* (ICN; Turland *et al.* 2018). For each name the place of valid publication is given followed by the holotype or lectotype and an explanation of the nomenclatural decisions made. The taxa were listed alphabetically, the names currently accepted, according to Delfini *et al.* (2022), are in bold italics and, for synonyms its respective accepted names are indicated after the citation of the type collection.

1. *Axonopus argentinus* var. *glabriflorus* Parodi, *Notas Mus. La Plata, Bot.* 3(17): 19. 1938. *Axonopus argentinus* subsp. *glabripes* (Parodi) Roseng., B.R. Arril. & Izag., *Gram. Urug.* 293, f. 21. 1970. Type: URUGUAY. SALTO: Río Uruguay, laderas arenosas, Jan 1937, *G. Orihuella 60* (lectotype: here designated, BAA [barcode (bc)] 00001530!; isolectotypes: BAA [bc] 00001531!, IAN 83043!, US [bc] 00130278! fragment ex IAN). Synonym of *Axonopus argentinus* Parodi, *Notas Mus. La Plata, Bot.* 3(17): 15, f. 1. 1938.

When establishing *Axonopus argentinus* var. *glabriflorus*, Parodi (1938) cited a gathering (*G. Orihuella no. 60*) made in Uruguay, Montevideo (no. 5038, Salto) but, did not specify where the type was lodged. Duplicates of *Orihuella 60* are found at BAA and IAN, plus a fragment ex IAN in the herbarium of the Smithsonian Institution. Salariano *et al.* (2011) cited the duplicate BAA [bc] 00001530 as the “holotype” but, there is no holotype and this statement cannot be corrected to lectotype since it was published after 1 January 2001 (Art. 9.23). Therefore, we here selected the specimen B [bc] 00001530 as the lectotype of *P. argentinus* var. *glabriflorus*, which was consulted by Parodi when describing the new variety.

2. *Axonopus camargoanus* G.A. Black, *Advancing Frontiers Pl. Sci.* 5: 102. 1963. Type: BRAZIL. PARÁ: Maicuru, São Francisco near Limpo dos Alemães, damp area (small open area with damp sandy soil), 16 Aug 1955, *G.A. Black & J. Abbott 55-18676* (holotype: US [bc] 00139616!; isotypes: IAN 89604!, US [bc] 00139615!). Synonym of *Axonopus comans* (Trin. ex Döll) Kuhlmann.

Black (1963) described *Axonopus camargoanus* based on the gathering *G.A. Black & J. Abbott 55-18676* housed at US. He also provided a detailed description and cited an isotype at IAN. However, in the Smithsonian herbarium

we have found two sheets that perfectly match the original data and description in the protologue stored under different catalogue/barcode numbers. Although Black (1963) did not specify a holotype, the specimen US [bc] 00139616 bears the basionym and the annotations “type” and “n. sp.” in his handwriting, indicating that the original description was based on the referred duplicate. The other specimen (US [bc] 00139615), according to its label, seems to be a duplicate ex IAN sent to the US later. So a lectotypification is not required in this situation.

3. *Axonopus derbyanus* G.A. Black, *Advancing Frontiers Pl. Sci.* 5: 127. 1963. Type: BRAZIL. MATO GROSSO DO SUL: Campo Grande, “erect-ascending, panicle nodding, large clumps with stolons; campo”, 7-11 Feb 1930, *A. Chase 10836* (holotype: US [bc] 00139626!; isotypes: IAN 116481!, K [bc] 000643234!, K [bc] 000643235!, K [bc] 000643236!, MO [bc] 016955! fragment ex US, NY [bc] 00346101!, RB [bc] 00612986!, US [bc] 00955585!). Synonym of *Axonopus pressus* (Nees ex Steud.) Parodi, *Notas Mus. La Plata, Bot.* 3 (17): 23. 1938.

This case is similar to the previous one as Black (1963), when describing *Axonopus derbyanus*, also did not specify a holotype. In the protologue he included a detailed description, mentioned a collection (*A. Chase 10836*), a herbarium (US) but, we have found two duplicates of *Chase 10836* in the Smithsonian Institution. Both bear the basionym and the annotation “n. sp.” in Black’s handwriting but, one of them (US [bc] 00139626) is identified as “type” and another (US [bc] 00955585) as “dupl. type”. Therefore, a lectotypification is not required in this situation since it is clear which specimen Black (1963) used to describe his species. The other seven duplicates (at IAN, K, MO, NY, RB) are isotypes.

4. *Axonopus obtusifolius* var. *rolfsii* G.A. Black, *Advancing Frontiers Pl. Sci.* 5: 71. 1963. Type: BRAZIL. MINAS GERAIS: Viçosa, “stoloniferous, dense colony, moist ground”, 11 Apr 1925, *A. Chase 9447* (lectotype: here designated, US [bc] 00130255!; isolectotypes: IAN 116478!, K [bc] 000643272!, MO [bc] 017445!, NY [bc] 00743634!, US [bc] 00130256!).

Black (1963) indicated the US gathering *A. Chase 9447* as the type of *Axonopus obtusifolius* var. *rolfsii*. At US there are also two duplicates of this collection and, differently from aforementioned

cases, he made no distinction which of the two sheets was the holotype. Both specimens bear the basionym and original label annotated, in Black’s handwriting, as “type”, “type collection” and/or “n. var.”. Therefore, the specimen US [bc] 00130255 is here selected as lectotype of the name, satisfying the ICN requirements (Art. 9.23). The remaining duplicates (at IAN, K, MO, NY, and US [bc] 00130256) are isolectotypes.

5. *Axonopus suffultus* var. *pubiflorus* Parodi, *Notas Mus. La Plata, Bot.* 3(17): 23. 1938. *Axonopus argentinus* subsp. *pubiflorus* (Parodi) Roseng., B.R. Arrill. & Izag., *Gram. Urug.* 293. 1970. Type: URUGUAY. MONTEVIDEO: Sayago, 22 Dec 1921, *L.R. Parodi 91* (lectotype: here designated, BAA [bc] 00000691!; isolectotypes: IAN not seen, K [bc] 000643260!, US [bc] 00130274!). Synonym of *Axonopus argentinus* Parodi, *Notas Mus. La Plata, Bot.* 3(17): 15, f. 1. 1938.

There are four duplicates of *Parodi 91*, the original collection of *Axonopus suffultus* var. *pubiflorus*. Salariato *et al.* (2011) discussed this name and its original collection, stating that the “holotype” was lodged at BAA, as well as “isotypes” housed at IAN, SI and US. However, there is no holotype and Salariato’s *et al.* (2011) statement cannot be corrected to lectotype since it was published after 1 January 2001 (Art. 9.23). As Parodi (1938) did not specify a herbarium in the protologue, we selected the specimen BAA [bc] 00000691 as the lectotype for *Axonopus suffultus* var. *pubiflorus*; the other specimens (at IAN, K, and US) are isolectotypes.

6. *Panicum surinamense* Hochst. ex Steud., *Syn. Pl. Glumac.* 1: 42. 1855 [1853]. Type: SURINAME: “In arenosis reg. inter. ad. fl.”, Dec 1842, *F.W. Hostmann & A. Kappler 1283* (lectotype: first-step designated by Judziewicz (1990: 111), P!; lectotype: second-step here designated: P [bc] 00753093!; isolectotypes: BM [bc] 000040516!, IAN 190188!, K [bc] 000643238!, MO [bc] 016830!, P [bc] 00753094!, S-R-4015!, TUB [bc] 008893!, U [bc] 0002288!, US [bc] 00140040! fragment ex P, US [bc] 00140041! fragment ex P, US [bc] 00148050!, W [bc] 0023985!, W [bc] 18890238458!, W [bc] 18890123489!). Basionym of *Axonopus surinamensis* (Hochst. ex Steud.) Henrard, *Blumea* 5(1): 275. 1942.

Steudel (1853) included a short description in the protologue of *Panicum surinamense*, indicated the type locality as “Surinam” and cited one

gathering (*Hrbr. Dr. Hostmann nr. 1283*) without specifying a herbarium acronym. Judziewicz (1990) referred to the P collection as “holotype”, but in such herbarium there are two duplicates of this gathering. His choice was the first-step for lectotypification and the specimen P [bc] 00753093 is here designated as lectotype in the second-step to accomplish the ICN requirements (Art. 9.17). Our designation restricts and specifies Judziewicz’s (1990) choice and results in several isolectotypes for the name *P. surinamense* lodged in 10 different herbaria (at BM, IAN, K, MO, P, S, TUB, U, US, and W).

7. *Paspalum anceps* Mez, Repert. Spec. Nov. Regni Veg. 15: 61. 1917. *Paspalum scoparium* var. *parviflorum* Döll, *Fl. bras.* 2(2): 107. 1877. Type: BRAZIL. AMAZONAS: Manaus, “In vicinibus Barra, Prov. Rio Negro”, Jan 1851, *R. Spruce 1259* (*Pasp. no. 28*) (lectotype: designated by Judziewicz (1990: 85), K [bc] 000643242!; isolectotypes: B [bc] 10 0366195!, G [bc] 00099235!, G-DC [bc] 00099234! GH [bc] 00023154!, GOET [bc] 005644!, NY [bc] 00414205!, NY [bc] 00414208!, P [bc] 00753089!, US [bc] 00140116!, US [bc] 00140379! fragment ex P, US [bc] 00140380! fragment ex B, US [bc] 00955505! fragment ex herb. Pitt. & Dur., W [bc] 18890236511!). Basionym of *Axonopus anceps* (Mez) Hitchc., *Man. Grasses W. Ind.* 190. 1936.

In the protologue of *Paspalum anceps*, Mez (1917) included a detailed description, the type locality as “Brasilia, Prov. Amazonas, prope Barra ad Rio Negro”, and a collection (*Spruce Pasp. no. 28*) without specifying a herbarium. There are 13 specimens matching the description and protologue information housed in nine herbaria, thus indicating all specimens of that gathering as syntypes (Art. 40 Note 1). Judziewicz (1990) discussed this name and its original material, explicitly stating that the “holotype” of *P. anceps* is housed at K, as well as isotypes at B, NY and US. At Kew herbarium there is only a single sheet of *Spruce Pasp. no. 28* (= *R. Spruce 1259*) not conflicting with the protologue; therefore, we considered Judziewicz’s (1990) choice as an inferential lectotypification, satisfying the ICN requirements (Art. 7.11, Art. 9.10, Art. 9.23). The other specimens (at B, G, GH, GOET, NY, P, US, and W) are isolectotypes.

8. *Paspalum arcuatum* Mez, Repert. Spec. Nov. Regni Veg. 15: 61. 1917. Type: BRAZIL: “Minas Gerais, Campos d’Itabira” / Rio de Janeiro, 1888-

1889, *A.F.M. Glaziou 17933* (lectotype: designated by Black (1963: 138), B [bc] 10 0176788!; isolectotypes: BAA [bc] 00002431!, C [bc] 10017126!, C [bc] 10017127!, G [bc] 00099233!, K [bc] 000098432!, P [bc] 00753083!, P [bc] 00753084!, US [bc] 00140397!, W 18980001846!). Basionym of *Axonopus arcuatus* (Mez) G.A. Black, *Advancing Frontiers Pl. Sci.* 5: 137. 1963.

In the original publication of *Paspalum arcuatum*, Mez (1917) cited a collection made by Glaziou (*no. 17933*) and locality notes as follows: “Brasilia, loco accuratiore non indicato”. He also included a detailed description but did not specify a herbarium. Black (1963) explicitly stated that the type of *P. arcuatum* is lodged at B and an “isotype” at US. In addition to these specimens, we have found eight more duplicates under *Glaziou 17933* in six different herbaria. In most of them, the labels refer that “Minas Gerais, Campos d’Itabira” is the locality of collection but, the P and BAA labels indicate “Rio de Janeiro”. Although it is known that Glaziou worked for a long time in Rio de Janeiro (Stafleu & Cowan 1976), it is not possible to determine where he actually gathered the type collection. As Black (1963) assigned a single gathering, specified a herbarium, and used the word “type”, even though he had not actually seen the Berlin specimen, we interpreted his choice (B [bc] 10 0176788) as an inferential lectotypification to accomplish the ICN requirements (Art. 7.11, Art. 9.10, Art. 9.23). The other specimens (at BAA, C, G, K, P, US, and W) are isolectotypes.

9. *Paspalum carinato-vaginatatum* Mez, Repert. Spec. Nov. Regni Veg. 15: 31. 1917. *Axonopus carinato-vaginatatus* (Mez) H. Scholz, *Willdenowia* 8(1): 95. 1977. Type: BRAZIL. GOIÁS: entre le Rio dos Couros et le Rio Piçarrão, 1894-1895, *A.F.M. Glaziou 22406* (lectotype: here designated (or perhaps a holotype), B [bc] 10 0365558!; isolectotypes (or perhaps isotypes): BAA [bc] 00002440! fragment ex P, C [bc] 10016779!, F [bc] 0046974F!, P [bc] 00753085!, S R-4030!, US [bc] 00140433! fragment ex C). Synonym of *Axonopus aureus* P. Beauv., *Ess. Agrostogr.*: 12. 1812.

Mez (1917) described *Paspalum carinato-vaginatatum* based on a collection made by Glaziou (*Glaziou 22406*) in Goiás (Brazil) but, without specifying a herbarium. Seven duplicates, with data matching the protologue, were located in different herbaria (at B, BAA, C, F, P, S, and US). At B and C the duplicates of the type collection bear original labels annotated by Mez with the determination as

“*Paspalum carinato-vaginatatum* n. sp.”. Although it is not clear whether Mez (1917) saw one or more materials and whether he used additional elements when describing the species, it seems that if B, which holds important sets of plants described by him, has a single specimen, it could be the holotype (Art. 40.3), and a duplicate was sent to C later. In such a situation of uncertainty, the B specimen ([bc] 10 0365558) could be a holotype or lectotype (K. Gandhi 2022, personal communication).

10. *Paspalum caulescens* Mez, Bot. Jahrb. Syst. 56(Beibl. 125): 10. 1921. Type: GUIANA: Amazonas Expedition, am Ufer eines Baches beim Dorfe Roraima, 1200 m, Dec 1909, *E.H.G. Ule* 8533 (lectotype: designated by Judziewicz (1990: 91), B [bc] 10 0365557!; isolectotypes: IAN 44184!, K [bc] 000643245!, L [bc] 0043802!, MG 13596!, U [bc] 0002285!, US [bc] 00054040!, fragment ex B, US [bc] 00433403!, fragment ex K). Basionym of *Axonopus caulescens* (Mez) Henrard, Blumea 4(3): 510. 1941.

When *Paspalum caulescens* was established, Mez (1921) provided a short description, cited a gathering (*Ule* n. 8533) and locality notes as “Guyana, Roraima”, but he did not specify a herbarium. There are eight duplicates matching the description and protologue information lodged in seven herbaria. The duplicates of K, L, U and B have original labels and the latter specimen also includes the determination written and signed by Mez. Judziewicz (1990) explicitly stated that the “holotype” of *P. caulescens* is housed in the Berlin herbarium, as well as “isotypes” at IAN, K, L, MG, and U. Therefore, the use of the term “holotype” by Judziewicz (1990) is an error to be corrected to an effective lectotype designation (Art. 7.11, Art. 9.10, Art. 9.23). The other specimens (at IAN, K, L, MG, U, and US) are isolectotypes.

11. *Paspalum comatum* Mez, Repert. Spec. Nov. Regni Veg. 15: 67. 1917. Type: BRAZIL. RIO DE JANEIRO: locality not indicated, s.d., *A.F.M. Glaziou* 15700 (lectotype: here designated, B [bc] 10 0365546!; isolectotypes: B [bc] 10 0365547!; B [bc] 10 0365547!, BAA [bc] 00000944! fragment ex B, C [bc] 10016780!, K [bc] 000643243!, P [bc] 00753098!, US [bc] 00140447! fragment ex B). Basionym of *Axonopus comatus* (Mez) Swallen, Fieldiana, Bot. 28(1): 21. 1951.

In the protologue of *Paspalum comatum*, Mez (1917) provided a detailed description, cited a gathering (*Glaziou* no. 15700) and locality notes

as “Brasilia, loco non indicato”, without specifying a herbarium. We have located seven duplicates, with data matching the protologue, housed in six herbaria (at B, BAA, C, K, P, and US). At C and one of the two duplicates of B ([bc] 10 0365546) bear original labels annotated by Mez with the determination as “*Paspalum comatum* n. sp.”; the second one (B [bc] 10 0365547) includes illustrations of spikelets, which also indicates that it is original material for the name. From among the material available, the specimen B [bc] 10 0365546 is here selected as lectotype of the *Paspalum comatum* (Art. 9.23).

12. *Paspalum erythrochaetum* Mez, Repert. Spec. Nov. Regni Veg. 15: 32. 1917. Type: BRAZIL. GOIÁS: “Inter Porto Imperial et Lunie, ad flum Tocantins”, 7 Mai 1896, *A.F.M. Glaziou* 22478 (lectotype: here designated (or perhaps a holotype), B 10 0365525!; isolectotypes (or perhaps isotypes): BAA [bc] 00000949! fragment ex B, BAA [bc] 00000949! fragment ex B!, BR [bc] 0000006882617!, C [bc] 10016785!, MPU [bc] 024347!, US [bc] 00140637! fragment ex B!). Synonym of *Axonopus marginatus* (Hack.) Chase ex Hitchc., Contr. U.S. Natl. Herb. 17(3): 226. 1913.

Mez (1917) published *Paspalum erythrochaetum* with a detailed description, the locality as “Brasilia, Prov. Goyaz”, and a gathering (*Glaziou* no. 22478) but, he did not specify a herbarium. Seven duplicates of the type collection in agreement with the protologue information were located at B, BAA, BR, C, MPU, and US; however, only the specimen B [bc] 10 0365525 was annotated in Mez’s handwriting as “*Paspalum erythrochaetum* n. sp.”. It is well known that Mez worked at B and his relevant type collection, those that survived the WWII for species described between 1917 and 1921, are lodged mainly there (Stafleu & Cowan 1981). As it is impossible to know whether B had more than one material of this collection (and it is no longer extant there), for such uncertain situation, the B specimen ([bc] 10 0365558) could be a holotype or lectotype (K. Gandhi 2022, personal communication).

13. *Paspalum flexile* Mez, Bot. Jahrb. Syst. 56 (Beibl. 125): 9. 1921. *Axonopus flexilis* (Mez) Henrard, Blumea 4(3): 510. 1941. Type: BRAZIL: “An einem Bache bei der Serra do Mel. Rio Branco, Surumu”, Sep 1909, *E.H.G. Ule* 8020 (lectotype: here designated (or perhaps a holotype), B [bc]

10 0365518!; isolectotypes (or perhaps isotypes): BAA [bc] 00000953! fragment *ex* B!, IAN [bc] 038795!, K [bc] 000643285!, MG [bc] 013107!, US [bc] 00790888!, US [bc] 00140661! fragment *ex* B). Synonym of *Axonopus purpusii* (Mez) Chase, J. Wash. Acad. Sci. 17: 144. 1927.

This case is similar to the previous one since Mez (1921), when describing *Paspalum flexile*, also did not specify a holotype. In the protologue of the species he based the description on the collection *Ule 8020* from Brazil, without specify a herbarium acronym. Seven duplicates of this collection, in agreement with the protologue information, were located in six herbaria (at B, BAA, IAN, K, MG, and US). The materials of B, K and MG bear original labels but, only the specimen B [bc] 10 0365518 was annotated in Mez's handwriting as "*Paspalum flexile* n. sp." and also includes illustrations of spikelets made by him. As it is impossible to know whether B had more than one material of this collection (and it was damaged by WWII), for such uncertain situation, it could be a holotype or lectotype.

14. *Paspalum herzogii* Hack., Repert. Spec. Nov. Regni Veg. 7: 50. 1909. Type: BOLIVIA. SANTA CRUZ: "Charaktergras der höchsten Kämpfe am Cerro San Miserate bei Santiago de Chiquitos", 1905-1907, *T. Herzog s.n.* (holotype: W [bc] 19160031292!; isotypes: SI! fragment *ex* W, US [bc] 00140698! fragment *ex* W). Basionym of *Axonopus herzogii* (Hack.) Hitchc., Contr. U.S. Natl. Herb. 24 (8): 431. 1927.

In the protologue of *Paspalum herzogii*, Hackel (1909) included a detailed description, indicated a locality and provided taxonomic comments, without specifying a specimen seen. We have found only one specimen that perfectly matches the original data and description in the protologue in Hackel Herbarium (W), plus fragments of this this collection at SI and US. Although it is not clear whether Hackel (1909) used additional elements when describing the species, it seems that if W has a single specimen, it is the holotype (Art. 40.2, Art. 40.3), and the existent fragments, clearly labelled as being part of the W specimen, were sent to SI and US later. Therefore, a lectotypification in this case is not required.

15. *Paspalum longispicum* Döll, *Fl. bras.* 2 (2): 105. 1877. *Axonopus longispica* (Döll) Henrard, *Blumea* 5(1): 276. 1942, nom. illeg. hom., non *Axonopus longispicus* (Döll) Kuhlm.

Type: BRAZIL. AMAZONAS: Manaus, "In vicinibus Barra, Prov. Rio Negro", Jan 1851, *R. Spruce 1382* (*Paspalum n. 33*) (lectotype: first-step designated by Judziewicz (1990: 103), K!; lectotype: second-step here designated, K [bc] 000643276!; isolectotypes: BR not seen, GH [bc] 00023159!, K [bc] 000643275!, M not seen, P not seen, US [bc] 00140507!, fragment *ex* B, W [bc] 18890239205!, W [bc] 19160034492!). Basionym of *Axonopus longispicus* (Döll) Kuhlm., *Comm. Lin. Telegr., Bot.* 67(11): 87. 1922.

In the protologue of *Paspalum longispicum*, Döll (1877) included a description and two syntypes: 1. "Habitat in provincial do Alto Amazonas, imprimis prope Manaos (*Spruce n. 1382* "*Paspalum n. 33*")"; and 2. "a Nov. in Jan. florens, nec non a cl. *Pohl (n. 781a)* in Brasilia lectum, loco accuratius non cognito". Judziewicz (1990) explicitly referred to the *Spruce 1382* at K (fragment *ex* US) as "holotype", but in such herbarium there are two duplicates of this gathering and no fragment from US. Judziewicz's (1990) statement is here interpreted as a first-step lectotypification and the sheet K [bc] 000643276 is here selected as second-step lectotype of the name (Art. 9.17). This designation restricts and specifies Judziewicz's (1990) choice and results in several isolectotypes for *P. longispicum* (at BR, GH, K, M, P, and W). For *Pohl 781a*, we have found a specimen lodged in the Vienna herbarium (W [bc] 0024032!).

16. *Paspalum pellitum* Nees *ex* Trin., *Gram. Panic.* 89. 1826. *Paspalum pellitum* Nees, *Fl. bras. Enum. Pl.* 2(1): 29. 1829, nom. illeg. superfl. *Paspalum dolichostachyus* Trin. *ex* Nees, *Fl. bras. Enum. Pl.* 2(1): 30. 1829, nom. inval. *Paspalum barbatum* var. *pellitum* (Nees *ex* Trin.) Döll, *Fl. bras.* 2(2): 108. 1877. Type: BRAZIL: "V. sp. Brasilia", s.d., *F. Sellow s.n.* (lectotype: here designated, LE-TRIN 0507.01!; isolectotypes: B [bc] 10 0367472!, BAA [bc] 00000966! fragment *ex* P, BAA [bc] 00000967! fragment *ex* B, BR [bc] 0000005750238!, BR [bc] 0000005750566!, K [bc] 000004349!, K [bc] 000004350!, K [bc] 000004351!, LE-TRIN 0507.02!, P [bc] 01915781!, SI! fragment *ex* B, US [bc] 00140596! fragment *ex* LE-TRIN, W [bc] 0026501!). Basionym of *Axonopus pellitus* (Nees *ex* Trin.) Hitchc. & Chase, *Contr. U.S. Natl. Herb.* 18(7): 301. 1917.

When established *Paspalum pellitum*, Trinius (1826) provided a brief description and indicated the type locality as "V. sp. Brasil" without

specifying a herbarium. We have located 14 duplicates matching the description and specimen label information included in the protologue in nine herbaria (B, BAA, BR, K, LE-TRIN, P, SI, US, and W). Salariato *et al.* (2011) discussed the original material for the name and cited the specimen LE-TRIN 0507.01 as the “holotype”. However, there is no holotype and their statement cannot be corrected to an effective lectotype designation since it was published after 1 January 2001 (Art. 9.23); therefore, to accomplish the ICN requirements (Art. 9.23), we here designated the specimen LE-TRIN 0507.01 as the lectotype of *P. flexile*.

17. *Paspalum polydactylon* Steud., Syn. Pl. Glumac. 1: 19. 1855 [1853]. *Agrostis polydactyla* Salzm. ex Steud., Syn. Pl. Glumac. 1: 19. 1855 [1853], nom. nud. pro. syn. Type: BRAZIL. BAHIA: “Bahia, in collibus aridis”, 1834, *P. Salzmann s.n.* (lectotype: here designated, P [bc] 02608440!; isolectotypes: BAA [bc] 00002531!, G [bc] 00099230!, HAL [bc] 0134564!, K [bc] 000004322!, K [bc] 000643227!, MPU [bc] 024327!, MPU [bc] 024328!, US 2855750!, US 558295!). Basionym of *Axonopus polydactylus* (Steud.) Dedecca, Bragantia 15: 273, fig. 216. 1956.

Steudel (1853) only mentioned one collection (“*Agrostis polydactyla*. *Salzm. hrbr. Bahia*”) in the protologue of *Paspalum polydactylon*. However, we have found 10 duplicates in seven herbaria matching the description and locality data included in the original publication. The material with barcode P02608440 has been selected as the lectotype, as it has Steudel’s annotations and represents best the species.

18. *Paspalum purpusii* Mez, Bot. Jahrb. Syst. 56(Beibl. 125): 10. 1921. Type: MEXICO. VERACRUZ: Zacualpan, dry soil, May 1907, *C.A. Purpus 2450* (lectotype: designated by Judziewicz (1990: 107), B [bc] 10 0367438!; isolectotypes: F [bc] 0046960F!, GH [bc] 00023152!, MO [bc] 015606!, SI! fragment ex US, US [bc] 00140295!, US [bc] 00140786! fragment ex B). Basionym of *Axonopus purpusii* (Mez) Chase, J. Wash. Acad. Sci. 17: 144. 1927.

In the protologue of *Paspalum purpusii*, Mez (1921) included a brief description, a locality as “Mexico”, and cited a collection (*Purpus n. 2450*) without specifying a herbarium. Seven duplicates in agreement with the diagnosis and the collection cited in the protologue were found in six herbaria. Judziewicz (1990) stated that the “holotype” of

this name is housed at B, as well as an “isotype” at US. Although Judziewicz (1990) did not actually see the B sheet, his statement is here considered as an error to be corrected to an effective lectotype designation (Art. 7.11, Art. 9.4, 9.10, Art. 9.23).

19. *Paspalum triglochinosides* Mez, Repert. Spec. Nov. Regni Veg. 15: 61. 1917. Type: COLOMBIA. GUAINÍA: “Ad flum. Guainia o. Rio Negro supro ostium fluminis Casiquiare”, Nov 1854, *R. Spruce 3756* (lectotype: here designated (or perhaps a holotype), B [bc] 10 0591450!; isolectotypes (or perhaps isotypes): G [bc] 00099227!, G [bc] 00099228!, K [bc] 000643258!, K [bc] 000643259!, NY [bc] 00414248!, US [bc] 00140863! fragment ex B, W [bc] 18890239206!). Basionym of *Axonopus triglochinosides* (Mez) Dedecca, Bragantia 15: 280, fig. 22. 1956.

Mez (1917) published *Paspalum triglochinosides* with a detailed description, the type locality as “Brasilia, Prov. Amazonas ad Casiquiare fluvii ostia”, and a gathering (*Spruce n. 3756*) without specify a herbarium. Eight duplicates that match the protologue information were located in seven herbaria (at B, G, K, NY, US, and W). The specimens at B, G and W bear the basionym and the annotation “n. sp.” in Mez’s handwriting but, it is not clear whether he saw one or more materials and whether used additional elements when describing the species. Still, if B has a single specimen, it could be the holotype (Art. 40.3), and duplicates were sent to G and W later. In such a situation of uncertainty, the B specimen ([bc] 10 0591450) could be a holotype or lectotype.

20. *Paspalum uninode* Hack., Ergebn. Bot. Exp. Sudbras. 1: 67. 1908. Type: BRAZIL. SÃO PAULO: “Inter Pilar et Alto da Serra prope Santos”, 1902, *M. Wacket s.n.* (lectotype: first-step designated by Black (1963: 103), W!; lectotype: second-step here designated, W [bc] 19160031037!; isolectotypes: SI! fragment ex US, MO [bc] 271426! fragment ex W, US [bc] 00140354!, W [bc] 19070012116!). Basionym of *Axonopus uninodis* (Hack.) G.A. Black, Advancing Frontiers Pl. Sci. 5: 102. 1963.

In the original publication of *Paspalum uninode*, Hackel (1908) included a detailed description, taxonomic comments and gathering notes as follows: “Inter Pilar et Alto da Serra prope Santos; 750–800 m s. m. 1902 (W)”. Black (1963), in a taxonomic treatment for the genus *Axonopus*, explicitly stated that the type of *P. uninode* is

lodged in the Vienna herbarium; however, two duplicates that match the protologue information were located there. Given that Black (1963) made no distinction as to which of the two sheets might be intended to be the lectotype, his statement must be considered as a first-step lectotypification. In order to narrow this earlier designation, the specimen W [bc] 19160031037 is here selected as a second-step lectotype (Art. 9.17).

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