

1 Nomenclatural update of *Dalechampia* sect. *Dioscoreifoliae* (Euphorbiaceae)

2

3 **Sarah Maria Athiê–Souza<sup>1</sup>, Rafaela Alves Pereira–Silva<sup>1</sup>, Margareth Ferreira de**

4 **Sales<sup>1</sup> & W. Scott Armbruster<sup>2</sup>**

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25 <sup>1</sup> Programa de Pós-Graduação em Botânica, Departamento de Biologia, Universidade Federal Rural de

26 Pernambuco, 52171–900, Recife, PE, Brazil. e-mail: sarah\_athie@yahoo.com.br

27 <sup>2</sup> School of Biological Sciences, University of Portsmouth, Portsmouth, PO1 2DY, United Kingdom;

28 Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska 99775

29 **Summary.** For the ongoing revision of *Dalechampia* sect. *Dioscoreifoliae* we here  
30 proceed with lectotypification of *D. juruana*, *D. luetzelburgii*, *D. schottii* and *D. schottii*  
31 var. *trifoliolata*.

32

33 **Key words.** Acalyphoideae, Dalechampiinae, taxonomy, typification.

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54 **Introduction**

55

56 *Dalechampia* L. is included in subfamily Acalyphoideae (Euphorbiaceae) and is placed  
57 within subtribe Dalechampiinae, in tribe Plukenetieae (Webster 2014). The genus  
58 comprises almost 130 species, among which approximately 90 occur in the tropical  
59 Americas. The genus is characterized morphologically by an unusual inflorescence type  
60 in Euphorbiaceae: a bisexual, bilaterally symmetrical pseudanthium subtended by two,  
61 sometimes colorful, involucre bracts. The pseudanthium contains a staminate  
62 pleiochasium with four to almost 50 staminate flowers and a separate subinflorescence  
63 of 1–3 pistillate flowers (Pax & Hoffman 1919; Armbruster *et al.* 1993; Webster 2014).  
64 Another striking feature of *Dalechampia* is associated with the ecology of pollination  
65 systems mainly because of the production of resins by resiniferous glands inside the  
66 staminate pleiochasium; the resin serves as floral attractant (Armbruster & Steiner 1992;  
67 Armbruster 1993; Armbruster *et al.* 2009).

68 Taxonomic treatments of *Dalechampia* have been published by Müller Argoviensis  
69 (1873) and Pax & Hoffman (1919). More recently, Webster & Armbruster (1991)  
70 updated the taxonomy of *Dalechampia*, delimited species, and addressed nomenclatural  
71 issues in this genus. This is the most complete and comprehensive taxonomic revision  
72 of Neotropical species of *Dalechampia* available, with 92 species clearly defined, and  
73 placed in six sections: *D.* sect. *Coriaceae* Pax & K. Hoffm., *D.* sect. *Cremophyllum*  
74 Baill., *D.* sect. *Dalechampia*, *D.* sect. *Dioscoreifoliae* Pax & K. Hoffm., *D.* sect.  
75 *Rhopalostylis* Pax & K. Hoffm. and *D.* sect. *Tiliifoliae* G.L. Webster & Armbruster.  
76 Subsequently, Armbruster (1994) has updated this number to almost 120 species.

77 *Dalechampia* sect. *Dioscoreifoliae* was established by Pax & Hofmann (1919)  
78 based on *D. dioscoreifolia* Poeppig. According the authors' concept this section

79 included 16 species, sharing entire leaves, rarely slightly lobate with venation palmate,  
80 ovate involucral bracts, 8–12 pistillate sepals with pinnatipartite or dentate margins.

81 Webster & Armbruster (1991) proposed a reconfiguration of *D.* sect.  
82 *Dioscoreifoliae* through the synonymization of *D.* sect. *Sylvaticae*, also established by  
83 Pax & Hoffman (1919) and originally characterized by having only three species  
84 represented by compound leaves, these having the middle leaflets with penninerved  
85 venation and the lateral ones palmately nerved, deeply lacinate bractlets of staminate  
86 pleiochasia, and 5–12 pistillate sepals with entire or pinnatifid, eglandular margins.

87 *Dalechampia* sect. *Dioscoreifoliae* sensu Webster & Armbruster (1991) is the  
88 second largest section (after *D.* sect. *Dalechampia*), with 24 species included in five  
89 informal groups (defined as Groups 1 – 5) which are differentiated mainly by division  
90 of leaves (ranging from lobed to unlobed), shape of the stylar column, number and  
91 margins of pistillate sepals, and texture of seeds. Considering the great variation in both  
92 vegetative and reproductive morphologies, Webster & Armbruster (1991) pointed out  
93 this section as the most morphologically diverse in *Dalechampia*.

94 From a nomenclatural point of view, Webster & Armbruster (1991) performed  
95 effective typifications for 21 names in *Dalechampia* sect. *Dioscoreifoliae*. However,  
96 four untypified names persist. As part of research into the *Dalechampia* conducted by  
97 the authors of this present manuscript, all names belonging to the genus have been  
98 investigated following the International Code of Nomenclature (ICN) (McNeill *et al.*  
99 2012). In this sense, the nomenclature of the species included in *Dalechampia* sect.  
100 *Dioscoreifoliae* was reviewed in order to fix the current application of each name.

101 In this manuscript, we contribute to the nomenclatural stabilization of *Dalechampia*  
102 sect. *Dioscoreifoliae* by providing typifications for four taxa.

103

104 **Material and Methods**

105

106 In the present study we analyzed the protologue, specimens in the field, and herbarium  
107 specimens, including images stored at the JSTOR Global Plants portal  
108 (<http://plants.jstor.org/>), types and historical collections from the herbaria: ALCB, B,  
109 BHCB, BM, ESA, F, G, GOET, HBG, HUEFS, HUEM, HVASF, IAN, ICN, INB, IPA,  
110 INPA, K, M, MBM, MG, P, PEUFR, R, RB, SP, UC, UEC, UFRN, TO (acronyms from  
111 Index Herbariorum, <http://sweetgum.nybg.org/ih/>). All herbaria containing collections  
112 of authors and collectors of the names studied were contacted (Stafleu & Cowan 1986).

113

114 **Taxonomic treatment**

115

116 ***Dalechampia juruana*** Ule (1909: 83). Type: Brazil. Amazonas, lower Rio Juruá, Oct.  
117 1900, *E. Ule* 5256 (lectotype HBG516386!, selected here; isoelectotypes photo from B at  
118 F! 0BN005344, G00434757!, MG005228!).

119

120 **NOTES.** When describing *Dalechampia juruana*, Ule (1909) cited his own collection  
121 (*Ule* 5256) “Amazonas: Am unteren Juruá bei Bom Fim und Marary, September und  
122 Oktober 1900” without mentioning any herbarium. After a long search in several  
123 herbaria listed as housing collection by Ule some duplicates were found in G, HBG and  
124 MG, allowing lectotypification. Ricardo Secco (specialist in Euphorbiaceae of Brazil)  
125 designated the specimen deposited in MG (MG005228) as a lectotype, however, this  
126 decision was not published. Considering this, we chose to elect the material deposited in  
127 the HBG (HBG516386) as lectotype since duplicates of the specimens collected by him

128 during October 1900 and February 1907 (nos. 5001–7575) including those from  
129 Amazonas (Brazil) were deposited in HBG (Harms 1916; Prance 1971).

130

131 **Dalechampia luetzelburgii** Pax & Hoffmann (1924: 188). Type: Brazil. Bahia, São  
132 Bento das Lages, 1913, *Lützelburg* 132 (lectotype M0233664!, selected here;  
133 isolectotype M! M0233665, photo at F). Remaining syntype: Brazil. Paraíba, Serra do  
134 Araripe, March 1921, *Lützelburg* 12682 (M0233663!).

135

136 **NOTES.** Pax & Hoffmann (1924) published *D. luetzelburgii* based on two syntypes. In  
137 the description, these authors used several features to define the new species some of  
138 them (e.g. filiform stipel and cylindrical stigma). In this case, we designate as lectotype  
139 *Lützelburg* 132 because it is compatible with the protologue and is in a better state of  
140 conservation, comprising flowers and fruits. Besides that, two duplicates of this  
141 specimen are present in M, and M 0233664 is chosen as lectotype.

142

143 **Dalechampia schottii** Greenman (1907: 255). Type: Mexico. Yucatan, Merida, 3 Aug.  
144 1865, A. Schott 956 (lectotype F0294592!, selected here). Remaining syntype: Mexico,  
145 Yucatan, Merida, 3 Aug. 1865, A. Schott 534 (F294499!). Mexico. Yucatan,  
146 Chichankanab, *Geo. F. Gaumer* 1430 in part (F, not found). Mexico. Yucatan,  
147 Chichankanab, *Geo. F. Gaumer* 1463 (F, not found). Mexico. Yucatan, Merida, Feb.  
148 1903, C. & E. Seler 3836 (F, not found). Mexico. Yucatan, Izamal, 22 Feb. 1906, J.M.  
149 *Greenman* 422 (F, not found).

150 *Dalechampia schottii* var. *trifoliolata* Greenman (1907: 255–256). Type: Mexico.

151 Yucatan, Chichankanab, *Geo. F. Gaumer* 1512 (lectotype F294515!, selected here).

152 Remaining syntype: Mexico. Yucatan, Chichankanab, *Geo. F. Gaumer* 1430 in part  
153 F, (not found).

154

155 **NOTES.** Greenman (1907) described *Dalechampia schottii* with two varieties, *D.*  
156 *schottii* var. *schottii* and *D. schottii* var. *trifoliolata*. According to the author, *D. schottii*  
157 var. *trifoliolata* was based on the syntypes *Gaumer* 1430 (in part) and *Gaumer* 1512. On  
158 the other hand, *Dalechampia schottii* was based on six syntypes. Webster and  
159 Armbruster (1991) decided to subordinate this variety as synonymous with  
160 *Dalechampia schottii*. However, these authors did not proceed with the lectotypification  
161 of the two taxa.

162 In the herbarium F, were found only two sheets of *Schott* (534 and 956). The  
163 specimen *Schott* 956 (F 0294592) was selected as the lectotype of *D. schottii* since it is  
164 the only one that has seeds in the envelope showing to be more compatible with the  
165 original description. The specimen of *D. schottii* var. *trifoliolata* collected by *Gaumer*  
166 1512 and deposited in F (294515) was elected as lectotype, since it is in accordance  
167 with the protologue and because it consists of the only material located.

168 Webster & Armbruster (1991) stated that the placement of *D. schottii* in sect.  
169 *Dioscoreifoliae* was provisional, given it's divergence from other taxa. However,  
170 molecular analysis (Armbruster *et al.* 2009) shows that its placement in sect.  
171 *Dioscoreifoliae* is clearly warranted.

172

### 173 **Acknowledgements**

174

175 The authors are grateful to Coordenação de Pessoal de Nível Superior (CAPES) for  
176 providing a postdoctoral grant to the first author and for providing the scholarship for

177 the second author. We also thank to the project titled “Filogenia, Diversidade e  
178 Distribuição Geográfica de Euphorbiaceae, com ênfase em Hippomaneae, Manihoteae e  
179 Plukenetieae” (CNPq 440459/2015-0), and the curators of the herbaria where the  
180 collections were analyzed. In particular, Christine Niezgoda (F) and Robert Vogt (B) for  
181 assisted us in searching for specimens.

182

### 183 **References**

184

185 Armbruster, W. S. (1993). Evolution of plant pollination systems: hypotheses and tests  
186 with the neotropical vine *Dalechampia*. *Evolution* 47: 1480–1505.

187 Armbruster, W. S. & Steiner, K. E. (1992). Pollination ecology of four *Dalechampia*  
188 species (Euphorbiaceae) in northern Natal, South Africa. *Am. J. Botany* 79: 306–  
189 313.

190 Armbruster, W. S., Edwards, M., Hines, J., Mahunnah, R. & Munyenyembe (1993).  
191 Evolution and pollination of Madagascan and African *Dalechampia*. *Res.*  
192 *Explor.* 9: 460–474.

193 Armbruster, W. S. (1994). Early evolution of *Dalechampia* (Euphorbiaceae): insights  
194 from phylogeny, biogeography, and comparative ecology. *Ann. Missouri Bot.*  
195 *Gard.* 81: 302–316.

196 Armbruster, W. S., Lee, J. & Baldwin, B. G. (2009). Macroevolutionary patterns of  
197 defense and pollination in *Dalechampia* vines: Adaptation, exaptation, and  
198 evolutionary novelty. *PNAS* 106 (43): 18085–18090.

199 Greenman, J. M. (1907). New or noteworthy Spermatophytes from Mexico, Central  
200 America and the West Indies. *Field Mus. Nat. Hist. Bot. Ser.* 2(6): 247–287.

- 201 Harms, H. (1916) Ernst Ule: Nachruf von H. Harms. *Verhandlungen des Botanischen*  
202 *Vereins der Provinz Brandenburg* 57: 150–184.
- 203 McNeill, J., Barrie, F. R., Buck, W. R., Demoulin, V., Greuter, W., Hawksworth, D. L.,  
204 Herendeen, P. S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.  
205 F., Smith, G. F., Wiersema, J. H. & Turland, N. J. (2012). International Code of  
206 Nomenclature for algae, fungi, and plants (Melbourne Code). *Regnum Veg.* 154.
- 207 Müller Argoviensis, J. (1873). Euphorbiaceae. In: C. F. P. Martius & A. W. Eichler  
208 (eds.), *Flora Brasiliensis* 11(2): 1–752. F. Fleischer, Leipzig.
- 209 Pax, F. & Hoffman, K. (1919). Euphorbiaceae–Dalechampiaeae. In: H. G. A. Engler  
210 (ed.), *Das Pflanzenreich*. IV. 147. XII (Heft 68), pp. 1–59. Leipzig: Engelmann.
- 211 Pax, F. & Hoffmann, K. (1924). Euphorbiaceae-Crotonoideae-Acalypheae-Acalyphinae.  
212 In: H. G. A. Engler (ed.), *Das Pflanzenreich*. IV. 147. XVII (Heft 85), pp. 188–  
213 193. Leipzig: Engelmann.
- 214 Prance, G.T. (1971). An Index of Plant Collectors in Brazilian Amazonia. *Acta Amaz.* 1:  
215 25–65.
- 216 Stafleu, F.A. & Cowan, R.S. (1986). Taxonomic literature, vol. 6:6. Sti–Vuy. Bohn,  
217 Scheltema & Holkema Publishers, Boston.
- 218 Webster, G. L. (1994). Classification of the Euphorbiaceae. *Ann. Missouri Bot. Gard.*  
219 81: 3–32.
- 220 Webster, G. L. & Armbruster, W. S. (1991). A synopsis of the neotropical species of  
221 *Dalechampia* (Euphorbiaceae). *Bot. J. Linn. Soc.* 105: 137–177.
- 222 Webster, G. L. (2014). Flowering Plants, Eudicots. Euphorbiaceae. In: K. Kubitzki  
223 (ed.), *The Families and Genera of Vascular Plants. Malpighiales*, Vol. XI, pp.  
224 51–216. Springer-Verlag, Berlin.

- 225 Ule, E. (1909). Beiträge zur Flora der Hylaea nach Sammlungen von Ules Amazonas -  
226 Expedition. *Verhandlungen des Botanischen Vereins der Provinz Brandenburg,*  
227 83 pp.