



Supplementary file of research article:

# Boesenbergia Kuntze (Zingiberaceae) in Cambodia: Four New Records with Notes on Their Potential Horticultural Significance, Cultivation Guidelines, and Lectotypification of *B. xiphostachya* (Gagnep.) Loes

Additional specimens examined of *Boesenbergia* in Cambodia:

## 1. *Boesenbergia parvula* (Wall. ex Baker) Kuntze var. *parvula*

Laos: Luang Prabang, Leong-Skornickova 1694 (SING!); Pha Tad Ke Botanical Garden, 15 July 2014, Mood and Chalermglin 3488 (BKF!).

Malaysia: Perak, Belum Forest Reserve, 25 August 2007, Meekiong MK1388 (UKMB!).

Myanmar: Shan State, Goke Hteik Gorge, 2 August 1908, Lace 4153 (E!); Tanintharyi, August–September 1961, Keenan 738, 829, 971, 1008, 1399 (E!); Northeast of Baungdaw, c. 15 km, 11 July 2014, Mood and Chalermglin 3460 (BKF!).

Thailand: Northern floristic region: Chiang Mai Province: Den Ya Khat, Doi Chiang Dao, Chiang Dao, 4 August 2007, Watthana 2423 (QBG!); Doi Chiang Dao, 15 August 1963, Smitinand et al. 1016 (BKF!); Doi Pui, 29 September 2005, Tillich 5055 (BKF!); Doi Sa Kap, 3 August 1953, Kerr s.n. (P01764011)(P!); Doi Sutep, 8 August 1927, Garrett 414 (C!, P!); Doi Sutep, 8 July 1948, Soradet 28 (BKF!); Doi Sutep, 17 June 1958, Larsen 3639 (C!); Doi Sutep, 8 July 1958, Larsen 3937 (C!); Doi Sutep, 3 July 1958, Larsen 3869 (C!); Doi Sutep, 2 September 1958, Larsen 4666 (C!); Doi Sutep, 20 September 1967, Shimizu and Hutoh 10554 (BKF!); Doi Sutep, 12 August 1968, Phengnaren s.n. (BKF!); Doi Sutep, 22 June 1988, Maxwell 88-791 (BKF!, CMUB!); Doi Sutep, 4 August 1988, Maxwell 88-960 (BKF!); Doi Sutep, 8 August 1988, Tamura et al. T-60675 (BKF!); Doi Sutep, 8 August 1988, Tamura et al. T-60709 (BKF!); Doi Sutep, 3 September 1992, Maxwell 71 (BKF!, CMUB!); Doi Sutep, Monthathan Waterfall, 17 August 2004, Nielsen et al. 1712 (BKF!); Doi Sutep, 17 September 2008, Middleton et al. 4458 (BKF!); Doi Sutep-Pui National Park, 15 June 2012, Norsaengsri et al. 9419 (QBG!); Doi Sutep-Pui National Park, Tham Ruesi, 26 July 2013, Newman et al. 2557 (QBG!); Doi Sutep, August 2014, Mood 3406 (BKF!); Doi Inthanon, along Mae Aep River, 20 July 1988, Tsugaru T-61647 (QBG!); Doi Inthanon, 22 July 1988, Phengklai et al. 6758 (BKF!); Doi Inthanon, 23 July 1988, Phengklai et al. 6839 (BKF!); Doi Inthanon, 15 September 1995, Larsen 46443 (BKF!); Doi Lahn, Mae Lie Village, 17 June 2005, Maxwell 05-403 (BKF!, CMUB!); Doi Nang Non, Mae Fa Luang, 27 August 2000, Watthana 852 (QBG!); Fang District, 10 km west of Fang, 23 July 1968, Larsen 2601 (BKF!); Hang Dong District, Nahm Soom village, 19 August 2004, Maxwell 04-380 (CMUB!); Huei Cork Maa, 22 September 1998, Pongamornkul 315 (QBG!); Mae-On, Huai Kaeo Trail, 7 September 2011, Pooma et al. 7787 (BKF!); Mae Pan Waterfall, 2 August 1988, Tamura T-60371 (BKF!); Pa Pae, July 2013, Mood and Vacharakorn 3350 (BKF!). Chiang Rai Province: Doi Chong, Tham Luang-Khu Nam Nang Non, Mae Sai, 10 July 2012, Norsaengsri and Tathana 9745 (QBG!); Khun Nam Nang Norn FP, Mae Sai, 4 July 2011, Norsaengsri and Tathana 7940 (QBG!); Pong District, Phu Lung Ka, 30 December 1954, Royal Forest Dept. 9569 (BKF!). Lampang Province: Jae Sawn National Park, 23 August 1995, Maxwell 95-544 (BKF!); Ngao District, near Tham Pha Thai, 24 September 2008, Middleton et al. 4582 (BKF!, E!). Lamphun Province: Doi Kuhn Tan National Park, 17 July

1993, Maxwell 93-777 (BKF!, CMUB!). Mae Hong Son Province, Mueang District, Pha Suea Waterfalls, 21 August 2013, Norsaengsri 10538 (QBG!). Nan Province, Na Noi District, Sisaket Subdistrict, Sri Nan National Park, 11 August 2004, Maxwell 04-345 (CMUB!); Pha Luak, Ban Pha Luck, Yod Subdistrict, Song Khwae, 16 July 2012, La-ongsri et al. 2418 (QBG!); Pua District, Doi Phu Kha National Park, 24 August 2001, Srisanga and Maknoi 2099 (QBG!); Pua District, Tham Pha Kong, Doi Phu Kha National Park, 26 June 2002, Srisanga 2530 (QBG!). Phitsanulok Province: Phu Soi Dao National Park, Chat Trakan, 25 July 2001, Maknoi 171 (QBG!); Nakorn Thai, Ban Nam Sai, Pha Lad Waterfall, 21 July 2001, Maknoi 157 (QBG!); Borpak, Phumiang-Phuthong WS, Chat Trakan, 19 August 2012, Romklao Botanical Garden 0589/2555 (QBG!). Tak Province: Chao Pho Phawo, 13 July 1999, Newman 905 (E!). Uttaradit Province, Nam Pat, Phu Soi Dao National Park, 7 August 2013, Newman et al. 2622 (QBG!).

Thailand: Northeastern floristic region: Phetchabun Province: Thung Salaeng Luang National Park, 25 July 1966, Larsen 893 (E!). Loei Phu Suan Sai National Park, Na Haew, route to Tadpa Waterfall, 11 July 2008, Maknoi 2611 (QBG!); Phu Suan Sai National Park, Na Haew, 22 Aug. 2006, Maknoi 1015 (QBG!); Phu Suan Sai National Park, Na Haew, route to Tadpa Waterfall, 11 July 2008, Maknoi 2621 (QBG!).

Thailand: Eastern floristic region: Chaiyaphum Province: near Ban Rai, 22 July 2013, Mood and Vatcharakorn 3324 (BKF!). Nakhon Ratchasima Province: Kao Soi Dao, 21 July 2013, Mood and Vatcharakorn 3316 (BKF!). Ubon Ratchathani Province: Korat, Kao Sisiket, Chan Tuk, 1 September 1924, Kerr 9107 (BKF!).

Thailand: Southwestern floristic region: Kanchanaburi Province: Between Kritee and Mueng Chah, 9 July 1973, Geesink and Phengkhilai 6209 (BKF!); East of Wang Krachae, Mood and Vatcharakorn 3374 (BKF!); Huai Lam Khut Ngu, Si Sawal, 7 July 1973, Suthesoen 2522 (BK!); Khao Yai, 9 August 1968, B.N. and S.P. 258 (BKF!); Northwest of Tha Ka-nun, 21 August 2011, Mood and Vatcharakorn 3070 (BKF!); Sai Yok, 12 December 1961, Larsen 8685 (C!); Si Sawat District, Khao Po Teng, 15 June 2001, van de Bult 432 (BKF!); Si Sawat District, 11 August 1968, Prayad 1498 (BK!); Thung Yai Naresuan WS, Lai Wo Subdistrict, 17 June 1993, Maxwell 93-654 (BKF!, CMUB!); Thong Pha Phum District, Maeklong Watershed Res. Station, 24 August 1999, Wongprasert s.n. (BKF!); Thong Pha Phum National Park, 12 August 2004, Nielsen et al. s.n. (BKF!); Thong Pha Phum National Park, 22 August 2004, Nielsen 1867 (BKF!). Phetchaburi Province: Kaeng Kra Chan National Park, on road to Thor Thip Waterfall trail entrance, July 2014, Mood and Trisarasri 3464 (BKF!).

Thailand: Central floristic region: Nakhon Nayok Province: Mueang District, Nang Rong Falls, 13 August 1968, Larsen 3365 (AAU!, BKF!); Mueang District, Nang Rong Falls, 16 September 1972, Maxwell 72-380 (BK!); Mueang District, Khao Yai National Park, Mo Singto area, Chongko 124 (BKF!); Mueang District, Hin Tang District, 23 August 2012, Middleton 5647 (E!); Near Mu Si, 21 July 2013, Mood and Vatcharakorn 3316 (BKF!); Mueang District, 8 August 2022, T.Boonma NY020 (MSU!). Saraburi Province: Kaeng Khoi, 14 August 2023, T.Boonma SB0015 (MSU!).

Thailand: Southeastern floristic region: Chanthaburi Province: Kao Sabap, 6 July 1927, Put 919 (BK!); Pliew Waterfalls, Lam Sing District, 27 July 1969, Maxwell s.n. (BK!); Lam Sing District, Pliew Waterfalls, 13 August 1972, Maxwell 72-314 (BK!); Khao Khitchakut NP, Khao Phra Bat, 17 August 2008, Phonsena 6180 (BKF!); Near Pliew Waterfalls, Mood and Vatcharakorn 3282 (BKF!). Chachoengsao Province: Wang Nam Yen, Sap Khanun, 19 July 1999, Newman 922 (BKF!, E!). Sa Kaew Province: near Pangside National Park, July 2013, Mood and Vatcharakorn 3315/3316 (BKF!). Trat Province: Huai Raeng Dong Maduae, Smitinand 1324 (BK!); Ko Chang, 4 September 1992, Niyomdham 3209 (BKF!); Ko Chang, 2 August 1973, Murata et al. T-17405 (BKF!).

Thailand: Peninsular floristic region: Ranong Province, East of Khao Niwet, 24 August 2011, Mood and Vatcharakorn 3112 (BKF!). Songkhla Province: Ban Rainuea, Bahoy, Sabayoi, 27 July 1999, Maknoi T33 (QBG!); Ban Rainuea, Bahoy, Sabayoi, 25 July 2000, Maknoi T91 (QBG!). Trang Province: Hat Chao Mai National Park, Nam Ron Hot Spring area, 28 August 1996, Wilkin 807 (BKF!). Yala Province, Betong, 1 August 1928, Kerr 7448 (BK!); Betong, July 2013, Mood and Vatcharakorn 3309 (BKF!).

Vietnam: Đắk Nong Province: Draysap Waterfall, 27 July 2009, Trần et al. 160 (E!, SING!, VMN!).

## 2. *Boesenbergia petiolata* Sirirugsa

Laos: Champasak Province, Mood M96P82 (AAU!, BKF!).

Thailand: Northern floristic region: Kamphaeng Phet Province: Klong Lan Waterfall, 6 August 2003, Maknoi 452 (QBG!). Phitsanulok Province: Thung Salaeng Luang, 19 July 1966, Larsen 463 (AAU!, BKF!); Thung Salaeng Luang, 24 July 1966, Larsen 837 (AAU!, BKF!); Thung Salaeng Luang National Park, Bahn Mung, 9 August 2008, Sreepoowiang K44 (BKF!, PNU!); Thung Salaeng Luang, c. 250 m asl, Aug 2012, Vatcharakorn s.n., M3300 (BKF!); Thung Salaeng Luang, 245 m asl, 24 Jul 2013, Mood and Vatcharakorn 3332 (BKF!); Ban Chom Phu, Noen Maprang, 28 Jul 2001, Maknoi 158 (QBG!); Tham Pha Tha Phon Non-hunting Area, Noen Maprang, 7 Sep 2011, Norsaengsri and Insea 8149 (QBG!). Sukhothai Province: Khao Luang, 13 Sep 1994, Niyomdham 3850 (BKF!); Ram Kham Haeng National Park, Khiri Mat, Khao Luang, 700 m, 11 Aug 2012, Middleton et al. 5563 (BKF!). Uttaradit Province: Nam Pat, Phu Soi Dao National Park, 680 m, 7 Aug 2013, Newman 2620 (QBG!).

Thailand: Northern floristic region: Khon Kaen Province: Phaphuang Cave, Phu Pha Man National Park, 14 Aug 2012, Norsaengsri 9883 (QBG!); Phu Pha Man National Park, 16 Aug 2012, Norsaengsri 9971 (QBG!). Sakon Nakhon Province: Phu Phan National Park, 31 July 1999, Newman 950 (E!).

Thailand: Central floristic region: Nakhon Nayok Province: Eastern part, Khao Yai National Park, 10 August 1968, Larsen 3252 (AAU!, BKF!). Ban Na District, 9 August 2022, T.Boonma NY021 (MSU!). Saraburi Province: Hin Lap, 20 August 1929, Put 2419 (BK!); Kao Ngob, 21 August 1945, Din 10 (BKF!); Nam Tok Sam Lan, 9 August 2015, Mood and Harwood 3501 (BKF!); Kaeng Khoi, 14 August 2023, T.Boonma SB0016 (MSU!).

Thailand: Peninsular floristic region: Surat Thani Province: Ban Thakhun District, Khlong Saeng Wildlife Sanctuary, 6 September 2008, Middleton 4306 (E!).

Vietnam: Bạc Liêu Province: Giá Rai District, September 1917, Chevalier 36458 (P!). Đắk Nong Province: Draysap Waterfall, 27 July 2009, Trần 161 (E!, SING!, VNM!).

## 3. *Boesenbergia rotunda* (L.) Mansf.

China: Yunnan: Mengla County, cultivated at Xishuangbanna Botanical Garden, 10 Aug 2017, Chen J., Li S., and Q. M. Qin 17081005 (IBSC!).

India: Meghalaya: Umran, Way towards RRTC, 27 May 2008, Thomas V.P. and Prasanth Kumar M.G. 115304 (CALI!); Andaman: South Andaman, 23 September 1869, Kurz, S. s.n. (K! acc. no. K000481252!).

Indonesia: Sulawesi. South Sulawesi Province. Bangkesakiang village, 24 January 2009, A.D. Poulsen with Marlina Ardiyani, Firdaus and Iqbal 2766, E00320156 (E!). Aceh Province, Ketambe Research Station, Alluvial terrace by river in shade of lowland rain forest, 16 January 1999, G. Argent 9901, E00287260 (E!). South Sulawesi Province, Bangkesakiang village, Graden area, 2009, A.D.Poulsen 2766 (AAU!).

Laos: Xaiyabuli, C. Maknoi, W. Pongamornkul and P. Yadee L4-199, QBG87357 (QBG!); C. Maknoi, W. Pongamornkul and P. Yadee L4-382, QBG87540 (QBG!); Luang

Prabang, C. Maknoi, W. Tanming, N. Muangyen and W. Khattiyot L9-118, QBG111170 (QBG!).

Myanmar: Pegu: Myanmar.—Sagaing, Kani Township, 15 July 1997, Kress W.J., Bell D.A. and Htun T. 97-5804 (US!). Shan State, Nawngkhio Township, 2 July 1999, Kress W.J., Bordelon M., Williams K.J. and Htun T. 99-6502 (John Kress No. 99-6502a)(US!). Mandalay, Pyin Oo Lwin Township, 3 July 1999, Kress W.J., Bordelon M., Williams K.J. and Htun T. 99-6511 (US!). Sagaing, Kani Township, 14 April 2000, Kress W.J., Bordelon M., Tun T. and Win U.H. 00-6648 (US!). Mandalay, Thabeikyin Township, 11 June 2001, Kress W.J., Htun T., Bordelon M., Williams K.J. and Rehse, T. 01-6896 (US!). Sagaing, 19 June 2001, Kress W.J., Htun T., Bordelon M., Williams K.J. and Rehse T. 01-6935 (WJK 01-6935 vouchered by WJK 02-7231)(US!). Taninthayi Region, Mainmapan, Taninthayi Reserved Forest, Yephyu Township, 31 July 2015, Tanaka N., Aung M.M., Latt M.M. and Thu A.K. MMA133, TNS01249066 (TNS!). Taninthayi Region, Mainmapan, Taninthayi Reserved Forest, Yephyu Township, 31 July 2015, Tanaka N., Aung M.M., Latt M.M. and Thu, A.K. MMA137, TNS01249063 (TNS!). Kayah State, 30 km SW of Loikaw, toward the border of Kayin State, Demotho District, Loikaw Township, 21 August 2017, Nobuyuki T., Ito Y., Aung M.M. and Hnin P.P. 2666, TNS01300876 (TNS!). Bago Region, Nat Thamee Thuye Taung reserved forest compartment No. 7, Pyay District, 8 Aug 2019, Nobuyuki T., Sugawara T., Aung L.M. and Aung M.M. MY5135, TNS01351049 (TNS!). Kayin State, 15 miles east of Taungoo, along the Thaundaungyi Road, Thaundaung Township, elevation 360 m, 5 August 2018, Nobuyuki T., Aung M.M. and Win, A.K. 3396, TNS01317370 (TNS!). Bago Region, Shin Pin Kyet Thouk, Oktwin Township, Taungoo, 18 August 2017, Nobuyuki T., Ito Y., Aung M.M. and Hnin P.P. 2519, TNS01300779 (TNS!).

Thailand: Northern floristic region: Chiang Mai Province: W. Nanakorn 11594, QBG11594 (QBG!); W. Nanakorn 9325, QBG9325 (QBG!); W. Pongamornkul 352, QBG12297 (QBG!); Warintorn K. 07-019, QBG33035 (QBG!); J.F. Maxwell 09-260, QBG43156 (QBG!); W. Nanakorn 4152, QBG4152 (QBG!); P. Chanpet, P. Tinams and T. Jindawong 37, QBG107210 (QBG!); Jatupol K. 08-214, QBG35873 (QBG!); C. Glamwaewwong 262, QBG23241 (QBG!); Natcha Sutjaritjai ZB236, QBG93496 (QBG!); C. Maknoi 1582, QBG31555 (QBG!); W. Nanakorn 1465, QBG1465 (QBG!); C. Maknoi 354, QBG27771 (QBG!); W. Nanakorn 1197, QBG1197 (QBG!); W. Pongamornkul 1908, QBG30400 (QBG!); C. Glamwaewwong 263, QBG23242 (QBG!); Kiw Hung, Doi Pha Hom Pok, 22 July 2003, S.Saensouk 148, KKKU no 13844 (KKU!). Chiang Rai Province: S. Watthana 2356, QBG30085 (QBG!). Mae Hong Son Province: M. Norsaengsri 10495, QBG 67815 (QBG!); M. Norsaengsri 10483, QBG67803 (QBG!); M. Norsaengsri 10389, QBG66791 (QBG!); W. Pongamornkul 3221, QBG66187 (QBG!); M. Norsaengsri 10486, QBG67806 (QBG!). Payao Province: W. La-ongsri, P. Panyachan, P. Tatiya, and S. Satatha 3065, QBG68701 (QBG!). Phetchabun Province: C. Maknoi 6152, QBG104994 (QBG!); C. Maknoi 5743, QBG104867 (QBG!); C. Maknoi 5913, QBG104677 (QBG!); C. Maknoi 4978, QBG72743 (QBG!); C. Maknoi 6945, QBG105752 (QBG!); C. Maknoi 3900, QBG45988 (QBG!); C. Maknoi 303, QBG25766 (QBG!). Phitsanulok Province: C. Maknoi 4341, QBG68236 (QBG!); C. Maknoi 151, QBG21084 (QBG!); Romklao Botanical Garden 0106/2553, QBG59500 (QBG!); Romklao Botanical Garden 0592/2555, QBG62305 (QBG!). Sukhothai Province: C. Maknoi 8166, QBG85467 (QBG!); C. Maknoi 8298, QBG85599 (QBG!). Uttaradit Province: M. Norsaengsri and N. Tathana 9678, QBG58643 (QBG!); Romklao Botanical Garden 0471/2555, QBG62531 (QBG!).

Thailand: Northeastern floristic region: Khon Kaen Province: M. Norsaengsri and P. Thongson 6900, QBG54452 (QBG!); M. Norsaengsri 4012, QBG38139 (QBG!); W. Boonprakop and M. Norsaengsri 007, QBG48203 (QBG!); Khon Kaen, 28 July 2006, Narasak 03 (KKU!). Loei Province: W. Nanakorn 9459, QBG9459 (QBG!); C. Maknoi 1097, QBG29776 (QBG!); C. Maknoi 2486, QBG38816 (QBG!); Phu Rua National Park, 23 June

2004, S.Bunwong 238, KKKU no. 12077 (KKU!). Sakon Nakhon Province: Phu Phan National Park, 9 July 2006, Narasak 09 (KKU!). Phetchabun Province, Nam Nao National Park, 14 June 2003, P. Chantaranothai KKKU no.8069 (KKU!).

Thailand: Eastern floristic region: Buriram Province: C. Maknoi 282, QBG25745 (QBG!). Chaiyaphum Province: C. Maknoi 5903, QBG104667 (QBG!). Si Sa Ket Province: C. Maknoi 286, QBG25749 (QBG!); C. Maknoi 290, QBG25753 (QBG!).

Thailand: Central floristic region: Nakhon Nayok Province: Ban Na District, Boonma T. NY022 (MSU!). Saraburi Province: Kaeng Khoi District, Boonma T. SB0017 (MSU!).

Thailand: Southeastern floristic region: Trat Province: Koh Chang Island, Perimeter Road along S side of island. Sii Tor waterfall, Wet tropical forest, flat area on floodplain, 6 July 2022, H.Balslev 10148 (AAU!, AU!).

#### 4. *Boesenbergia siphonantha* (King ex Baker) M.Sabu, Prasanthk., & Škorničk.

India: Andaman Islands, 1884, King's Collector 372 (lectotype CAL! [CAL0000000916]; isolectotypes CAL [CAL0000000912, CAL0000000913], K! [K000640517]).

Myanmar: Myanmar, Kayin State, Htet N.M. and Boonma T. 2402 (FOF!). Myanmar, Mon State, Mawlamyine, Htway N.N. and Boonma T. 2403 (MSU!).

Thailand: Mae Hong Son: Baan Bo Khai, 12 September 1999, Srisanga, P. and Puff, C. 1067 (QBG!); Baan Bo Khai, 12 September 1999, Srisanga, P. and Puff C. 1069 (QBG!); Tak: North of Ban Ta Song Yang, 28 July 2013, Mood J. and Vatcharakorn P. 3366 (BKF!). Kanchanaburi: Sai Yok, Wangkamen, 29 January 2000, Phengklai 14098 (BKF!); West of Chong Sadao 20 km, 21 August 2011, Mood J. and Vatcharakorn P. 3081 (BKF!).

Vietnam: Đồng Nai: Cát Tiên National Park, August 2008, Trần et al. 123 (SING!, VNM!).

#### 5. *Boesenbergia xiphostachya* (Gagnep.) Loes.

Laos: Champasak Province, Thorel C. 2159 (P!).

Thailand: Mueang Sakhon Nakhon: Phu Phan National Park, Kham Hom Waterfall, Dry evergreen forest on sandstone bedrock, 8 August 2015, Hemrat, C.; Karaket, P.; Suddee, S.; Triboun, P.; Middleton, D.J. 5976, K002428346 (AAU!, K!); Phu Phan National Park, Pha Nang Moen, 31 July 1999, M.F.Newman 950, E00137247 (E!); Phu Phan National Park – Sakon Nakhon side, August (no year recorded), P.Yuktathat 139, E00097829 (E!); Phu Phan National Park, 9 July 2006, Narasak 10, KKKU no. 13448 (KKU!).

Vietnam: South Central Coast, Binh Thuan Province, Bac Binh District, Phan Son Commune., 5 November 2013, Leong-Skornickova, J.; Nguyen, Q.B.; Aung Thame; Ong, E.; Tran, H.D. JLS 2630, K001589276 (K!).