Phytotaxa 174 (1): 187–205
www.mapress.com/phytotaxa/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

http://dx.doi.org/10.11646/phytotaxa.174.4.1

A new genus and a major temperate bamboo lineage of the Arundinarieae (Poaceae: Bambusoideae) from Sri Lanka based on a multi-locus plastid phylogeny

LAKSHMI ATTIGALA[1], JIMMY K. TRIPLETT[2], HASHENDRA-SUVINI KATHRIARACHCHI[3] & LYNN G. CLARK[4]

[1] *Department of Ecology Evolution and Organismal Biology, Iowa State University, Ames IA 50011. email: lakshmi@iastate.edu*
[2] *Department of Biology, 144B Martin Hall, Jacksonville State University, 700 Pelham Rd. Jacksonville, AL 36265. email:jtriplett@jsu.edu*
[3] *Department of Plant Sciences, University of Colombo, PO Box 1490, Colombo 03, Sri Lanka. email: hashi@pts.cmb.ac.lk*
[4] *Department of Ecology Evolution and Organismal Biology, Iowa state University, Ames IA 50011. email: lgclark@iastate.edu*

Abstract

Kuruna, a new temperate woody bamboo (Poaceae, Bambusoideae, Arundinarieae) genus from Sri Lanka, is recognized based on chloroplast sequence data from five markers (coding: *ndhF* 3' end; non-coding: *rps16-trnQ*, *trnC-rpoB*, *trnD-trnT*, *trnT-trnL*). This genus represents the twelfth major lineage of temperate woody bamboos and is characterized by pachymorph culm bases with short necks, unicaespitose clumps, culm leaf girdles ca. 1 mm wide, usually abaxially hispid culm leaves with non-irritating hairs, persistent foliage leaf sheaths, complete branch sheathing and acute to biapiculate palea apices. Maximum Parsimony, Bayesian Inference and Maximum Likelihood analyses of a combined data set consistently strongly supported the monophyly of this Sri Lankan temperate woody bamboo clade. Although the Kishino-Hasegawa test is unable to reject the alternative hypothesis of monophyly of the Sri Lankan clade plus *Bergbambos tessellata* from South Africa, *Kuruna* and *Bergbambos* are distinguishable by a combination of morphological characters. A few additional cpDNA markers not previously used in phylogenetic analyses of Arundinarieae were tested to evaluate their utility in this taxonomically difficult tribe.

Introduction

Bamboos are important components of forest and tropical high altitude grassland ecosystems worldwide (Soderstrom & Calderón 1979, Judziewicz *et al.* 1999). The bamboos (Poaceae subfamily Bambusoideae) include approximately 1,450 species (Bamboo Phylogeny Group [BPG] 2012) classified into two tribes of woody bamboos (the tropical Bambuseae and the temperate Arundinarieae) and one tribe of herbaceous bamboos (the Olyreae). Significant animal biodiversity is associated with bamboo-dominated ecosystems (Judziewicz *et al*. 1999, Bystriakova *et al*. 2003, Mutschler & Tan 2003 & others cited in BPG 2012) and bamboos play important roles in forest dynamics (e.g., Li & Xue 1997, Judziewicz *et al*. 1999). Despite the ecological and economic importance of bamboos, basic knowledge of the biology and genetics of woody bamboos is still lacking due in part to their unusual life cycle, with the vegetative phase ranging from a few to 120 years (McClure 1966). Furthermore, the generic classification of bamboos is in a fluctuating state, although the supra-generic classification of bamboo has been improved based on recent phylogenetic analyses (BPG 2012).

The indigenous flora of Sri Lanka has about 7,000 species of mosses, ferns and flowering plants (Abeywicrama 1986). Nearly one fourth of the angiosperms of Sri Lanka are endemic and highly concentrated in the humid southwestern quarter of the country, which includes moist low country and the montane zone (Gunatilleke & Gunatilleke 1990). Bamboos occur naturally in all three major climatic zones (wet, dry and intermediate) in Sri Lanka and no native bamboo is found in extremely dry areas (Kariyawasam 1998). Bamboo, in general, is an economically and culturally important plant for Sri Lanka (De Zoysa & Vivekanandan 1994, Gunatilleke *et al*. 1994) and a series of studies have been conducted mainly focusing on bamboo reproductive ecology (Ramanayake & Yakandawala 1995, 1998, Ramanayake & Weerawardene 2003), vegetative propagation (Ramanayake *et al*. 2006) and bamboo growth and development (Ramanayake *et al*. 2001). These studies were carried out before the widespread use of molecular sequence data to establish evolutionary relationships and confirm the generic classification of these species.

Accepted by Maria S. Vorontsova: 10 Jun. 2014; published: 16 Jul. 2014

Lanka. We would also like to thank Nuwan De Silva and Abayapala De Silva for their generous help during field work. We thank the curators of the herbaria (ISC, K, MO, PDA, US) that loaned specimens for this study. We also thank Kara Grupp, Hathairat Chokthaweepanich, Chakkrapong Rattamanee and the laboratory of Dr. Jonathan Wendel, Iowa State University for technical assistance, laboratory assistance and access to laboratory facilities.

References

Abeywicrama, B.A. (1986) *The threatened plants of Sri Lanka*. UNESCO and MAB National Committee for Sri Lanka, Publication No 16.NARESA, Colombo, Sri Lanka, 56 pp.

Bamboo Phylogeny Group (2005) *Bamboo Biodiversity*, Iowa State University. Available from: http://www.eeob.iastate.edu/research/bamboo/ (accessed on: 12/06/2011).

Bamboo Phylogeny Group (2012) An updated tribal and subtribal classification for the Bambusoideae (Poaceae). *In*: Gielis, J. & Potters, G. (eds.) *Proceedings of the 9th World Bamboo Congress*. Antwerp, Belgium, pp. 3–27.

Bystriakova, N., Kapos, V., Stapleton, C. & Lysenko, I. (2003) *Bamboo biodiversity: information for planning conservation and management in the Asia-Pacific region*. UNEP-WCMC/INBAR, Biodiversity Series 14. UK: Swaingrove Imaging. Available from: http://www.ourplanet.com/wcmc/14.html (accessed: 19 May 2011).

Camus, E.-G. (1913) *Les Bambuseés - Monographie, biologie, culture, principaux usages*. Paris, Lechevalier 2, 215 pp. http://dx.doi.org/10.5962/bhl.title.15463

Chao, C.S. & Chu, C.D. (1981) *Journal of Nanjing Technological College of Forest Products*. Nanjing 3, 43 pp.

Chao, C.S. & Chu, C.D. (1983) A new species of Genus *Ampelocalamus*. *Acta Phytotaxonomica Sinica* 21: 204–206.

Dassanayake, M.D. & Fosberg, F.R. (1994) *A revised handbook to the flora of Ceylon.* Amerind publishing company (pvt.) Ltd., New Delhi, VXII, 458 pp.

De Zoysa, N.D. & Vivekanandan, K. (1994) *Field guide to the rattans of Sri Lanka.* Forestry Information Service, Forest Department of Sri Lanka, Sri Lanka, 83 pp.

Demesure, B., Sodzi, N. & Petit, R.J. (1995) A set of universal primers for amplification of polymorphic non-coding regions of mitochondrial and chloroplast DNA in plants. *Molecular Ecology* 4: 129–131.

Doyle, J.J., Davis, J.I., Soreng, R.J., Garvin, D. & Anderson, M. (1992) Chloroplast DNA inversions and the origin of the grass family (Poaceae). *Proceedings of the National Academy of Sciences USA* 89: 7722–7726. http://dx.doi.org/10.1073/pnas.89.16.7722

Dransfield, S. (2003) Poaceae, Bambuseae, Bamboos. *In*: Goodman, S.M. & Benstead, J. (Eds.) *The Natural History of Madagascar*. University of Chicago Press, Chicago, pp. 467–471.

Fisher, A.E., Triplett, J.K., Ho, C.-S., Schiller, A.D., Oltrogge, K.A., Schroder, E.S., Kelchner, S.A. & Clark, L.G. (2009) Paraphyly in the bamboo subtribe Chusqueinae (Poaceae: Bambusoideae) and a revised infrageneric classification for *Chusquea*. *Systematic Botany* 34: 673–683. http://dx.doi.org/10.1600/036364409790139790

Franchet, A. (1893) *Fargesia* - nouveau genre de Bambusées de la Chine. *Bulletin Mensuel de la Société Linnéenne de Paris* 2: 1067–1069.

Gaut, B.S., Clark, L.G., Wendel, J.F. & Muse, S.V. (1997) Comparisons of the molecular evolutionary process at rbcL and ndhF in the grass family (Poaceae). *Molecular Biology and Evolution* 14: 769–777. http://dx.doi.org/10.1093/oxfordjournals.molbev.a025817

Giribert, G. & Wheeler, W.C. (1999) On gaps. *Molecular Phylogenetics and Evolution* 13: 132–143.

Guindon, S. & Gascuel, O. (2003) A simple, fast and accurate method to estimate large phylogenies by maximum-likelihood. *Systematic Biology* 52: 696–704. http://dx.doi.org/10.1080/10635150390235520

Gunatilleke, I.A.U.N. & Gunatilleke, C.V.S. (1990) Distribution of floristic richness and its conservation in Sri Lanka. *Conservation Biology* 4: 1–31. http://dx.doi.org/10.1111/j.1523-1739.1990.tb00262.x

Gunatilleke, I.A.U.N., Gunatilleke, C.V.S. & Abeygunawardena, P. (1994) An interdisciplinary research initiative towards sustainable management of forest resources in lowland rain forests of Sri Lanka. *Journal of Sustainable Forestry* 1: 95–114. http://dx.doi.org/10.1300/j091v01n04_05

Hance, H.F. (1876) A new Chinese *Arundinaria*. *Journal of Botany, British and Foreign* 14: 339–340.

Handel-Mazzetti, H. (1936) *Symbolae Sinicae: Botanische Ergebnisse der Expedition der Akademie der Wissenschafien in Wien nach*

Südwest China 1914/1918. Julius Springer, Vienna, 1450 pp.

Hayata, B. (1907) Supplements to the Enumeratio Plantarum Formosanarum. *Botanical Magazine Tokyo* 21: 49–55.

Fürarohr, A. E. (1855) *Flora oder allgemeine botanische Zeitung, Flora 38*. Botanischen Gesellschaft in Regensburg, Germany, 782 pp.

Hodkinson, T.R., Ní Chonghaile, G. Sungkaew, S., Chase, M. W., Salamin, N. & Stapleton, C.M.A. (2010) Phylogenetic analyses of plastid and nuclear DNA sequences indicate a rapid late Miocene radiation of the temperate bamboo tribe Arundinarieae (Poaceae, Bambusoideae). *Plant Ecology and Diversity* 3: 109–120.
http://dx.doi.org/10.1080/17550874.2010.521524

Janzen, D.H. (1976) Why bamboos wait so long to flower. *Annual Reviews Ecology and Systematics* 7: 347–391.
http://dx.doi.org/10.1146/annurev.es.07.110176.002023

Judziewicz, E.J., Clark, L.G., Londoño, X. & Stern, M.J. (1999) *American Bamboos*. Smithsonian Institution Press, Washington, D.C., 392 pp.

Kariyawasam, D. (1998) Bamboo resources and utilization in Sri Lanka. *In*: Rao, A.N. & Rao, R. (Eds.) *Bamboo - Conservation, Diversity, Ecogeography, Germplasm, Resource Utilization and Taxonomy. Proceedings of training course cum workshop*. IPGRI, Italy, 275 pp.

Kelchner, S.A. & Bamboo Phylogeny Group (2013) Higher level phylogenetic relationships within the bamboos (Poaceae: Bambusoideae) based on five plastid markers. *Molecular Phylogenetics and Evolution* 67: 404–413.
http://dx.doi.org/10.1016/j.ympev.2013.02.005

Keng, P.C. (1957) One new genus and two new species of Chinese bamboos, *Acta Phytotaxonomica Sinica* 6: 355–360.

Kishino, H. & Hasegawa, M. (1989) Evaluation of the maximum likelihood estimate of the evolutionary tree topologies from DNA sequence data, and the branching order in Hominoidea. *Journal of Molecular Evolution* 29:170–179.
http://dx.doi.org/10.1007/bf02100115

Kunth, C.S. (1822) *Synopsis Plantarum*. I. F. G. Levrault, Paris, 491 pp.

Li, D.-Z., Hsueh, C.-J. & Xia, N.-H. (1995) *Gaoligongshania*, a new bamboo genus from Yunnan, China. *Acta Phytotaxonomica Sinica* 33: 597–601.

Li, D.-Z., Wang, Z.-P., Zhu, Z.-D., Xia, N.-H., Jia, L.-Z., Guo, Z.-H., Yang, G.-Y. & Stapleton, C.M.A. (2006) Bambuseae. *In*: Wu, Z.-Y., Raven, P.H. & Hong, D.-Y. (Eds.) *Flora of China Vol. 22, Poaceae*. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis, pp. 7–180.

Li, D.-Z. & Xue, J.-R. (1997) The biodiversity and conservation of bamboos in Yunnan, China. *In*: G.P. Chapman (Ed.) *The Bamboos*. New York Academic Press, pp. 83–94.

Linder, H.P., Verboom, G.A. & Barker, N.P. (1997) Phylogeny and evolution in the *Crinipes* group of grasses (Arundinoideae: Poaceae). *Kew Bulletin* 52: 91–110.
http://dx.doi.org/10.2307/4117843

Maddison, W.P. & Maddison, D.R. (2005) *MacClade: analysis of phylogeny and character evolution. Version 4.08*. Sunderland: Sinauer Associates.

Majumdar, R.B. (1989) *Florae Indicae Enumeratio: Monocotyledonae*. Botanical Survey of India, Calcutta, 283 pp.

Makino, T. (1912) Take no ichi shinzoku (A new genus of Bambusaceae), *Shibataea* Makino. *Botanical Magazine Tokyo* 26: 236–237.

Makino, T. (1914) Observations on the flora of Japan. *Botanical Magazine Tokyo* 28: 153–155.

Mason-Gamer, R.J. & Kellogg, E.A. (1996) Chloroplast DNA analysis of the monogenomic Triticeae: phylogenetic implications and genome specific markers. *In*: Jauhar, P.P. & Raton, B. (Eds.) *Methods of genome analysis in plants*. CRC Press, pp. 301–325.

McClure, F.A. (1966) *The bamboos, a fresh perspective*. Harvard University Press, Cambridge, Massachusetts, 347 pp.

McClure, F.A. (1973) Genera of bamboos native to the New World (Gramineae: Bambusoideae). *Smithsonian Contributions to Botany* 9: 1–148.
http://dx.doi.org/10.5479/si.0081024x.9

Michaux, A. (1803) *Flora Boreali-Americana, sistens caracteres plantarum quas in America septentrionali collegit et detexit*. Paris and Strasbourg, 330 pp.
http://dx.doi.org/10.5962/bhl.title.50919

Muhlenberg, G.H.E. (1813) *Catalogus Plantarum Americae Septentrionalis iv*. William Hamilton Lancaster, Pennsylvania, 112 pp.

Munro, W. (1868) A monograph of the Bambusaceae, including descriptions of all the species. *Transactions of the Linnean Society of London* 33: 1–157.
http://dx.doi.org/10.1111/j.1096-3642.1968.tb00502.x

Muroi, L.H. (1963) *Guide Book of the Fuji Bamboo Garden [H. Muroi]*. Fuji bamboo garden, Nagahara, Gotemba, Japan, 76 pp.

Mutschler, T. & Tan, C.L. (2003) *Hapalemur*, bamboo or gentle lemurs. *In*: Goodman, S.M. & Benstead, J.P. (Eds.) *The Natural History of Madagascar*. The University of Chicago Press, Chicago, pp. 1324–1329.

Nakai, T. (1925) Two new genera of Bambusaceae, with special remarks on the related genera growing in eastern Asia. *Journal of the*

Arnold Arboretum 6: 145–153.

NCBI Genbank (2011) Available from: http://www.ncbi.nlm.nih.gov/genbank (accessed: 10 January 2011).

Nees von Esenbeck, C.G.D. (1834) Bambuseae brasilienses. Recensuit, et alias in India orientali provenientes adjecit. *Linnaea* 9: 461–494.

Ohrnberger, D. (1999) *The bamboos of the world: annotated nomenclature and literature of the species and the higher and lower taxa.* Elsevier, 585 pp.

Olmstead, R.G. & Sweere, J.A. (1994) Combining data in phylogenetic systematics: an empirical approach using three molecular data sets in the Solanaceae. *Systematic Biology* 43: 467–481.
http://dx.doi.org/10.1093/sysbio/43.4.467

Palisot de Beauvois, A.M.F.J. (1812) Essai d'une Nouvelle Agrostographie ou Nouveaux Genres des Graminées. *In*: Palisot de Beauvois A.M.F.J. (Ed.) *Essai d'une Nouvelle Agrostographie*. Imprimerie de Fain, Paris, pp. 1–182.

Posada, D. (2008) jModelTest: Phylogenetic Model Averaging. *Molecular Biology and Evolution* 25: 1253–1256.
http://dx.doi.org/10.1093/molbev/msn083

Ramanayake, S.M.S.D., Meemaduma, V.N. & Weerawardene, T.E. (2006) In vitro shoot proliferation and enhancement of rooting for the large-scale propagation of yellow bamboo (*Bambusa vulgaris* 'Striata'). *Scientia Horticulturae* 110: 109–113.
http://dx.doi.org/10.1016/j.scienta.2006.06.016

Ramanayake, S.M.S.D., Wanniarachchi, W.A.V.R. & Tennakoon, T.M.A. (2001) Axillary shoot proliferation and in vitro flowering in an adult giant bamboo, *Dendrocalamus giganteus* Wall. ex Munro. *In vitro Cellular and Developmental Biology- Plant* 37: 667–671.
http://dx.doi.org/10.1007/s11627-001-0116-9

Ramanayake, S.M.S.D. & Weerawardene, T.E. (2003) Flowering in a bamboo, *Meloccana* (Bambusoideae: Poaceae). *Botanical Journal of the Linnaean Society* 143: 287–291.

Ramanayake, S.M.S.D. & Yakandawala, K. (1995) Some observations in the flowering in *Dendrocalamus giganteus* and *Bambusa vulgaris*. *In*: Gunasena, H.P.M., (Ed.) *Multipurpose Tree Species in Sri Lanka. Proceedings of the 6th Regional Workshop on Multipurpose Tree Species In Sri Lanka*. MPTS Research Network, Faculty of Agriculture, Peradeniya, Sri Lanka. pp. 116–120.

Ramanayake, S.M.S.D. & Yakandawala, K. (1998) Incidence of flowering, death and the phenology of the giant bamboo (*Dendrocalamus giganteus* Wall. Ex Munro). *Annals of Botany* 82: 779–785.

Rambaut, A. (2001) *Se-Al: sequence alignment editor, version v2.0a11*. Department of Zoology, University of Oxford. Oxford, U. K.

Rendle, A.B. (1914) Gramineae, Tribus Bambuseae, *In*: Wilson, H. & Sargent, C.S. (Eds.) *Plantae Wilsonianae; an enumeration of the woody plants collected in western China for the Arnold Arboretum of Harvard University*. Publications of the Arnold Arboretum 4, pp. 63–65.

Ronquist, F., Huelsenbeck, J.P. & van der Mark, P. (2005) *MrBayes 3.1 Manual. Draft 26/05/2005*. Available at: http://mrbayes.csit.fsu.edu/manual.php (accessed: 25 May 2011).

Schreber, J.C.D. (1789) *Carolia Linnéenne Genera Plantarum editio octava post Reichhardianam secunda prioribus Ionge auctior atque emendatior 2 (xxxii)*, Frankfurt, Germany, 872 pp.

Seethalakshmi, K.K. & Muktesh Kumar, M.S. (1998) *Bamboos of India –a Compendium*. Bamboo Information Centre –India, Kerala Forest Research Institute, Peechi and International Network for Bamboo and Rattan, Beijing. Eindhoven, New Delhi, 342 pp.

Shaw, J., Lickey, E.B., Beck, J.T., Farmer, S.B., Liu, W., Miller, J., Siripun, K.C., Winder, C.T., Schilling, E.E., Small, R.L. (2005) The tortoise and the hare. II: Relative utility of 21 noncoding chloroplast DNA sequences for phylogenetic analysis. *American Journal of Botany* 92: 142–166.
http://dx.doi.org/10.3732/ajb.92.1.142

Shaw, J., Lickey, E.B., Schilling, E.E. & Small, R.L. (2007) Comparison of whole chloroplast genome sequences to choose noncoding regions for phylogenetic studies in angiosperms: the tortoise and the hare III. *American Journal of Botany* 94: 275–288.
http://dx.doi.org/10.3732/ajb.94.3.275

Smith, S.A. & Donoghue, M.J. (2008) Rates of molecular evolution are linked to life history in flowering plants. *Science* 322: 86–89.
http://dx.doi.org/10.1126/science.1163197

Soderstrom, T.R. & Calderón, C.E. (1979) Ecology and phytosociology of bamboo vegetation. *In*: Numata, M. (Ed.) *Ecology of grasslands and bamboo lands of the world*. VEB Gustav Fisher Verlag, Jena, pp. 223–236.

Soderstrom, T.R. & Ellis, R.P. (1982) Taxonomic status of the endemic South African bamboo, *Thamnocalamus tessellatus*. *Bothalia* 14: 53–67.

Soderstrom, T.R. & Ellis, R.P. (1988) The woody bamboos (Poaceae: Bambuseae) of Sri Lanka: a morphological-anatomical study. *Smithsonian Contributions to Botany* 72: 1–75.
http://dx.doi.org/10.5479/si.0081024x.72

Stamatakis, A. (2006) RAxML-VI-HPC: maximum likelihood-based phylogenetic analyses with thousands of taxa and mixed models. *Bioinformatics* 22: 2688–2690.

http://dx.doi.org/10.1093/bioinformatics/btl446

Stapleton, C.M.A. (2013) *Bergbambos* and *Oldeania*, new genera of African bamboos (Poaceae, Bambusoideae). *PhytoKeys* 25: 87–103. http://dx.doi.org/10.3897/phytokeys.25.6026

Stapleton, C.M.A., Hodkinson, T.R. & Ní Chonghaile, G. (2009) Molecular phylogeny of Asian woody bamboos: Review for the Flora of China. *Bamboo Science and Culture, Journal of the American Bamboo Society* 22: 5–25.

Swofford, D.L. (2002) *PAUP*. Phylogenetic analysis using parsimony, ver. 4.0b10*. Sunderland: Sinauer Associates.

Taberlet, P., Gielly, L., Pautou, G., & Bouvet, J. (1991) Universal primers for amplification of three non-coding regions of chloroplast DNA. *Plant Molecular Biology* 17: 1105–1109. http://dx.doi.org/10.1007/bf00037152

Thwaites, G.H.K. (1864) *Enumeratio plantarum Zeylaniae: an enumeration of Ceylon plants, with descriptions of the new and little-known genera and species, observation on their habitats, uses, native names, etc.* John Edward printers, London, 483 pp.

Triplett, J.K. & Clark, L.G. (2010) Phylogeny of the temperate woody bamboos (Poaceae: Bambusoideae) with an emphasis on *Arundinaria* and allies. *Systematic Botany* 35: 102–120. http://dx.doi.org/10.1600/036364410790862678

Triplett, J.K., Oltrogge, K. & Clark, L.G. (2010) Phylogenetic relationships and natural hybridization among the North American woody bamboos (Poaceae: Bambusoideae: *Arundinaria*). *American Journal of Botany* 97: 471–492. http://dx.doi.org/10.3732/ajb.0900244

Triplett, J.K., Weakley, A.S. & Clark, L.G. (2006) Hill cane (*Arundinaria appalachiana*), a new species of bamboo (Poaceae: Bambusoideae) from the southern Appalachian Mountains. *Sida* 22: 79–95.

Walter, T. (1788) *Flora Caroliniana*. J. Fraser publishers, London, 263 pp.

Watts, C.D., Fisher, A.E., Shrum, C.D., Newbold, W.L., Hansen, S., Liu, C. & Kelchner, S.A. (2008) The D4 set: primers that target highly variable intron loops in plant chloroplast genomes. *Molecular Ecology Resources* 8: 1344–1347. http://dx.doi.org/10.1111/j.1755-0998.2008.02229.x

Wendland, J.C. (1808) *Collectio Plantarum 2*. Hannover, Germany, 26 pp.

Wilcox, T.P., Zwickl, D.J., Heath, T.A., & Hillis, D.M. (2002) Phylogenetic relationships of the dwarf boas and a comparison of Bayesian and bootstrap measures of phylogenetic support. *Molecular Phylogenetics and Evolution* 25: 361–371.

Xue, J.-R. & Yi, T.-P. (1979) Two new genera of Bambusoideae from S.W. China. *Acta Botanica Yunnanica* 1: 75–76.

Yamane, K. & Kawahara, T. (2005) Intra- and interspecific phylogenetic relationships among diploid *Triticum-Aegilops* species (Poaceae) based on base-pair substitutions, indels, and microsatellites in chloroplast noncoding sequences. *American Journal of Botany* 92: 1887–1898. http://dx.doi.org/10.3732/ajb.92.11.1887

Yang, H.-M., Zhang, Y.-X., Yang, J.-B. & Li, D.-Z. (2013) The monophyly of *Chimonocalamus* and conflicting gene trees in Arundinarieae (Poaceae: Bambusoideae) inferred from four plastid and two nuclear markers. *Molecular Phylogenetics and Evolution* 68: 340–356. http://dx.doi.org/10.1016/j.ympev.2013.04.002

Yi, T.-P. (1983) New species of *Fargesia* Franchet and *Yushania* Keng f. from Tibet. *Journal of Bamboo research* 2: 18–51.

Yi, T.-P., Shi, J.-Y., Ma, L.-S., Wang, H.-T. & Yang, L. (2008) *Iconographia Bambusoidearum Sinicarum*. Science Press, Beijing, 766 pp.

Zeng, C.-X., Zhang, Y.-X., Triplett, J.K., Yang, J.-B. & Li, D.-Z. (2010) Large multi-locus plastid phylogeny of the tribe Arundinarieae (Poaceae: Bambusoideae) reveals ten major lineages and low rate of molecular divergence. *Molecular Phylogenetics and Evolution* 56: 821–839. http://dx.doi.org/10.1016/j.ympev.2010.03.041