

Flora of Singapore: Checklist and bibliography

S. Lindsay¹, D.J. Middleton¹, B.C. Ho¹, K.Y. Chong^{1,2}, I.M. Turner^{1,3}, Ali Ibrahim¹, M. Alonso-García⁴, W.F. Ang¹, P.S. Ashton³, P. Athen¹, S. Atkins⁵, Bazilah Ibrahim¹, H.J. Beentje³, C.M. Boo⁶, P.C. Boyce⁷, G.L.C. Bramley³, S. Buerki⁸, M.W. Callmander⁹, S. Chantanaorrapint¹⁰, M. Cheek³, C.-W. Chen^{11,12,13}, J. Chen¹, L.M.J. Chen¹, Chew, P.T.¹, R. Chong^{1,2}, L.M. Choo¹, R.C.K. Chung¹⁴, M.J.E. Coode⁵, S.C. Chua², D. Cicuzza^{15,16}, R.P.J. de Kok¹, G.W.H. Davison¹, W.J.J.O. de Wilde^{17†}, H. Duistermaat¹⁷, A. Dubéarnès¹⁸, B.E.E. Duyfjes¹⁷, L.T. Ellis¹⁹, H.-J. Esser²⁰, P.R. Gajurel²¹, S.W. Gale²², S.K. Ganesan¹, E.M. Gardner^{1,23,24}, D.L. Geiger^{25,26}, R.K. Harwood²⁷, Hassan Ibrahim¹, S. He²⁸, A. Henderson²⁹, P.H. Hovenkamp^{17†}, M. Hughes⁵, Zaki Jamil¹, M.H.P. Jebb³⁰, D.M. Johnson³¹, A. Kartonegoro³², R. Kiew¹⁴, S. Knapp¹⁹, S.L. Koh¹, H. Kurzweil¹, S. Lee¹, P.K.F. Leong¹, J. Leong-Škorničková¹, G.A. Levin³³, D.C.H. Liew¹, R.C.J. Lim¹, W.H. Lim¹, A.H.B. Loo¹, Y.W. Low¹, H.K. Lua¹, S. Lum³⁴, D.J. Mabberley^{35,36,37}, R. Mahyuni³², B. Maslin^{1,38}, N.A. Murray³¹, L. Neo¹, X.Y. Ng¹, K.M. Ngo³⁴, M.A. Niissalo¹, P.T. Ong¹⁴, C.M. Pannell^{3,39,40}, A. Phang^{1,5,41}, G.T. Prance³, C. Promma⁴², C. Puglisi^{1,3}, M.L. Rodda¹, S.C.K. Rubasinghe⁴³, R.M.K. Saunders⁴⁴, I.A. Savinov⁴⁵, L.G. Saw¹⁴, A. Schuiteman³, W.W. Seah¹, D.A. Simpson³, J.S. Strijk^{15,46}, P. Sukkharak⁴⁷, M. Sugumaran⁴⁸, S. Syahida-Emiza¹⁴, J.P.C. Tan¹, N.P. Taylor⁴⁹, Y.K.L. Teo³⁴, D.C. Thomas¹, A. Trias-Blasi³, T. Utteridge³, P.C. van Welzen¹⁷, J.F. Veldkamp^{17†}, J. Vermeulen⁵⁰, R. Wang⁵¹, P. Wilkie⁵, Y.-M. Wei⁵², S.Y. Wong^{53,54}, K.M. Wong¹, S. Yaakub⁵⁵, T.W. Yam¹, S. Yang¹, T.L. Yao¹⁴, W. Ye⁵⁶, A.T.K. Yee¹, C.K. Yeo¹, Y.S. Yeoh¹, C. Yong¹, K.T. Yong⁴⁸, N.J.C. Zerega⁵⁷, R.-L. Zhu⁴², K.B.H. Er¹

ABSTRACT. A checklist of all species of bryophytes, lycophytes, ferns, gymnosperms and angiosperms that are found in the wild (native, naturalised and casual) in Singapore is presented. We have attempted to account for all names of species and infraspecific taxa that have ever been recorded for Singapore, along with the pertinent publications that reported each of these names. For each currently accepted name, the synonyms of relevance for Singapore are included. The native or non-native status for all taxa is given, along with the most recent national conservation assessment applied to each native taxon. If we were aware that the most recent assessment required an update, the taxon is newly assessed here. The checklist includes 2654 native taxa, 479 naturalised/casual taxa and 101 cryptogenic taxa.

ACKNOWLEDGEMENTS. Although compiled primarily by the first five authors in collaboration with the remaining authors, this checklist is based on the field work, specimen curation, taxonomic research and accumulated knowledge of very many people who are all gratefully acknowledged. We thank management within the National Parks Board (NParks) for their support for this work, in particular Leong Chee Chiew, Executive Director of the National Parks, Gardens and Nature Reserves Cluster, Tan Puay Yok of the Singapore Botanic Gardens, and Lilian Kwok and Ng Cheow Kheng of the Horticulture and Community Gardens Division. We also thank the many colleagues from NParks who have aided in various ways and without

whom this checklist would not have been possible. Kenneth Er and Chong Kwek Yan would like to acknowledge Hugh Tan of the National University of Singapore for his many years of research on the plant diversity of Singapore. Our work has been greatly aided by online resources such as the International Plant Names Index (IPNI), Plants of the World Online (POWO), World Checklist of Selected Plant Families (WCSP), the Biodiversity Heritage Library (BHL), JStor Global Plants, Taxonomic Literature II (TL-2), Tropicos, and The Wallich Catalogue Online. We thank the various institutions behind these initiatives. Lastly, we thank John McNeill (E), Kanchi Gandhi (A/GH), Nicholas Turland (B) and the staff of IPNI for nomenclatural advice and/or comments on particular names.

AUTHOR AFFILIATIONS.

¹National Parks Board, 1 Cluny Road, Singapore 259569, Singapore

²Department of Biological Sciences, National University of Singapore, 16 Science Drive 4, Singapore 117558, Singapore

³Royal Botanic Gardens Kew, Richmond TW9 3AE, England, UK

⁴Département de Biologie, Institut de Biologie Intégrative et des Systèmes, 1030 Avenue de la Médecine, Université Laval, Québec G1V 0A6, Canada

⁵Royal Botanic Garden Edinburgh, 20a Inverleith Row, Edinburgh EH3 5LR, Scotland, UK

⁶Camphora Pte Ltd, 4 Ean Kiam Place, Singapore 429105, Singapore

⁷CSET - Centro Studi Erbario Tropicale, Via La Pira 4, 50121 Firenze, Italy

⁸Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID, 83725, USA

⁹Conservatoire et Jardin botaniques de Genève, ch. de l'Impératrice 1, 1292 Chambésy, Switzerland

¹⁰Division of Biological Science, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand

¹¹Biodiversity Program, Taiwan International Graduate Program, Academia Sinica and National Taiwan Normal University, Taipei 115, Taiwan

¹²Biodiversity Research Center, Academia Sinica, Taipei 115, Taiwan

¹³Department of Life Science, National Taiwan Normal University, Taipei 106, Taiwan

¹⁴Forest Research Institute Malaysia, 52109 Kepong, Selangor, Malaysia

¹⁵Institute for Biodiversity and Environmental Research, Universiti Brunei Darussalam, Jalan Tungku Link, BE1410, Brunei Darussalam

¹⁶Faculty of Science, Universiti Brunei Darussalam, Jalan Tungku Link, BE1410, Brunei Darussalam

¹⁷Naturalis Biodiversity Center, Research group Tropical Botany, P.O. Box 9517, 2300 RA Leiden, The Netherlands

¹⁸Herbarium, Botany Department, Trinity College Dublin, Dublin 2, Ireland

¹⁹Herbarium, The Natural History Museum, Cromwell Road, London SW7 5BD, England, UK

²⁰Botanische Staatssammlung München, Menzinger Straße 67, 80638 München, Germany

²¹Department of Forestry, North Eastern Regional Institute of Science & Technology, Nirjuli-791109, Arunachal Pradesh, India

²²Flora Conservation Department, Kadoorie Farm and Botanic Garden, Lam Kam Road, Tai Po, New Territories, Hong Kong, China

²³International Center for Tropical Botany, Institute of Environment, Department of Biological Sciences, Florida International University, Miami, Florida, USA

²⁴National Tropical Botanical Garden, Kalāheo, Hawai'i, USA

- ²⁵Santa Barbara Museum of Natural History, 2559 Puesta del Sol, Santa Barbara, CA 93105, USA
- ²⁶Visiting Research Scholar, Huntington Library, Art Museum and Botanical Gardens - Botany Division, 1151 Oxford Street, San Marino, California 91108, USA
- ²⁷Northern Territory Herbarium, Department of Land Resource Management, P.O. Box 496, Palmerston, Northern Territory 0831, Australia
- ²⁸Herbarium, Missouri Botanical Garden, 4344 Shaw Blvd., Saint Louis, Missouri 63110-2291, USA
- ²⁹Institute of Systematic Botany, The New York Botanical Garden, 2900 Southern Blvd., Bronx, New York 10458-5126, USA
- ³⁰National Herbarium, National Botanic Gardens of Ireland, Glasnevin, Dublin D09 VY63, Ireland
- ³¹The Jason Swallen Herbarium, Department of Biological Sciences, Ohio Wesleyan University, Delaware, Ohio 43015-2370, USA
- ³²Herbarium Bogoriense, Research Centre for Biosystematics and Evolution, National Research and Innovation Agency (BRIN), Jl. Raya Jakarta-Bogor, KM. 46, Cibinong Science Center, Cibinong 16911, Indonesia
- ³³Canadian Museum of Nature, P.O. Box 3443 Stn "D", Ottawa, Ontario N K1P 6P4, Canada
- ³⁴Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798, Singapore
- ³⁵Royal Botanic Garden Sydney, Royal Botanic Gardens & Domain Trust, Mrs Macquaries Road, Sydney, New South Wales 2000, Australia
- ³⁶Wadham College, University of Oxford, Parks Road, Oxford OX1 3PN, UK
- ³⁷School of Natural Sciences, Macquarie University, Balaclava Road, North Ryde, New South Wales 2109, Australia
- ³⁸Western Australian Herbarium, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983, Australia
- ³⁹Department of Plant Sciences, University of Oxford, South Parks Road, Oxford, England OX1 3RB, UK
- ⁴⁰Queen's University Belfast, Marine Laboratory, 12–13 The Strand, Portaferry, Co Down BT22 1PF, Northern Ireland, UK
- ⁴¹School of Biological Sciences, University of Aberdeen, Aberdeen AB24 3UU, Scotland, UK
- ⁴²Bryology laboratory, School of Life Sciences, East China Normal University, 500 Dongchuan Road, Shanghai 200241, China
- ⁴³Department of Botany, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka 20400
- ⁴⁴Division of Ecology & Biodiversity, School of Biological Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong, China
- ⁴⁵Department of Botany, Breeding and Seed Technology of Horticultural crops, Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, Moscow 127550, Russia
- ⁴⁶Alliance for Conservation Tree Genomics, Pha Tad Ke Botanical Garden, P.O. Box 959, 06000 Luang Prabang, Lao PDR
- ⁴⁷Department of Biology, Faculty of Science, Burapha University, Chonburi 20131, Thailand
- ⁴⁸Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia
- ⁴⁹University of Gibraltar, Gibraltar Botanic Gardens Campus, PO Box 843, Red Sands Road, Gibraltar GX1 1AA
- ⁵⁰jk.artandscience, Lauwerbes 8, 2318 AT Leiden, The Netherlands

⁵¹South China Botanical Garden, Chinese Academy of Sciences, China

⁵²Guangxi Key Laboratory of Plant Conservation and Restoration Ecology in Karst Terrain, Guangxi Institute of Botany, Guilin 541006, Guangxi, China

⁵³Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

⁵⁴Research Associate, Harvard University Herbaria, 22 Divinity Avenue, Cambridge, MA 02138, USA

⁵⁵DHI Water & Environment (S) Pte Ltd, 2 Venture Drive, #18-18, Vision Exchange, Singapore 608526, Singapore

⁵⁶State Key Laboratory of Cellular Stress Biology, School of Life Sciences, Xiamen University, Xiamen 361102, China

⁵⁷Northwestern University and Chicago Botanic Garden, 1000 Lake Cook Road, Glencoe, IL 60022, USA