

***Mayaca fluviatilis* Aubl. (Mayacaceae), a new record of a naturalised aquatic monocotyledon in Singapore**

Matti A. Niissalo\* and Jana Leong-Škorničková

Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569, Republic of Singapore; Email: [matti.niissalo@gmail.com](mailto:matti.niissalo@gmail.com)  
(\*corresponding author)

**Abstract.** *Mayaca fluviatilis* is first recorded as a naturalised species in Singapore. The species was repeatedly seen by the authors in reservoirs of the Central Catchment Nature Reserve between 2014 and 2018. It has been mentioned in online accounts of Singapore's plants, but its presence as a naturalised species had not been previously recorded.

**Key words.** aquatic plant, *Mayaca fluviatilis*, Mayacaceae, new record, naturalised, Poales

## INTRODUCTION

The upcoming Flora of Singapore and a revised checklist of the flora (Middleton, 2018) have resulted in renewed efforts to re-collect and taxonomically examine native and exotic (i.e., non-native) species. These extensive botanical explorations in Singapore regularly bring new records which were missing in previously published checklists (Chong et al., 2009; Chong et al., 2012). Here we report *Mayaca fluviatilis* Aubl., a new record of a naturalised species for Singapore. While the presence of the species in Singapore's reservoirs has been known to the authors and other researchers for many years, there have been no collections or published records of this species until now. There have been online records of the species (Anonymous, 2005; Ong, 2012; National Parks Board, Singapore, 2013), and an unpublished record of a survey of Singapore's Reservoirs by National University of Singapore, but otherwise the species is missing from formal or peer-reviewed records and until now there were no herbarium specimens of it from Singapore. A single paper mentions the presence of the species as an invasive in Singapore as well as Sri Lanka and Australia (Madigan & Vitelli, 2012), with no cited references or voucher specimens. The same article discusses the invasive nature of this species in Australia. The Sri Lankan records were discussed by Yakandawala & Dissanayake (2010). Here we clarify the status of the species and report the first collection of it in Singapore. This is also the first record of the family Mayacaceae (Poales) in Singapore.

Mayacaceae is a poorly understood family. Currently only the genus *Mayaca* is widely accepted, and according to different authors, the genus includes 4–6 species (de Carvalho & Machado, 2015). The genus is native mostly to Tropical Americas, with one species (*Mayaca baumii* Gürke, easily distinguishable from *Mayaca fluviatilis* by its white flowers) in Africa. *Mayaca fluviatilis* is the earliest name in the family and the type species of the genus. Originally described from French Guiana, it is widespread across South America, south to central Argentina and north to eastern United States (de Carvalho, 2007). *Mayaca fluviatilis* has anthers with terminal pores that do not extend from the anther by more than 0.1 mm, therefore resembling a crevice; in other New World species the pore is extended by marginal flaps, giving them a tubular shape (de Carvalho, 2007).

*Mayaca fluviatilis* is abundant in at least two localities in MacRitchie Reservoir and Lower Peirce Reservoir. It occurs as a submerged aquatic near grassy banks, emerging in sunny situations as an emergent marginal herb. We have only observed flowers in the emergent stems of the species. The flowers are small (~10 mm across), pink and white, trimerous with differentiated petals and sepals. They are unmistakable in Singapore's flora. The vegetative parts are similar in appearance to some Lycopodiaceae: the leaves are scale- or needle-like, 3.5 mm long, thin, similar in both submerged and emerged stems. The only other aquatic plant recorded from Singapore with which the vegetative stems can be easily confused is the fully submerged aquatic *Hydrilla verticillata* (L.f.) Royle. *Mayaca* lacks teeth in leaf blade margins that are present in *Hydrilla*.

## VOUCHER SPECIMEN DETAILS AND STATUS IN SINGAPORE

We checked the Singapore Botanic Gardens' Herbarium (SING) and Herbarium, Lee Kong Chian Natural History Museum, National University of Singapore (SINU) for records of *Mayaca fluviatilis*. The voucher specimens are listed below. We have also observed the species in MacRitchie Reservoir, from where previous records also originate (H.T.W. Tan, personal communication), but have seen no vouchers from that locality. The plants in habitat are illustrated in Fig. 1.



Fig. 1. *Mayaca fluviatilis* in Lower Peirce Reservoir (SING2015-057). Plant with emergent stems and flowers (insets). Flowers are ~10 mm across. (Photographs by: Jana Leong-Škorničková).

**Voucher specimens.** Singapore: Leong-Škorničková, J. & Niissalo, M.A., SING2015-057, Lower Peirce Reservoir, towards the Nee Soon side; close to outflow drain, growing at wet banks in full sun forming large dense colonies, 11 March 2015, herbarium: SING [SING0213800]; Tang, E. & Sidek, Hj., *Tang & Sidek 716*, Guan Soon Aquatic Plants & Aquarium, 4 July 1995, herbarium: SING; Peninsular Malaysia: Anthonysamy, S., *s.n.*, Selangor, Taman Botany Putra Jaya, near Exit Plaza, 19 August 2004, herbarium: SING.

**National conservation status assessment.** The species is introduced, possibly via the aquarium plant trade (there is a voucher of a cultivated specimen at SING from 1995) or as a weed along with aquatic animals or plants and requires no conservation action. Its invasive potential is unclear as yet. In Singapore it only occurs in man-made habitats, but similar natural habitats may occur elsewhere in the region and thus it may pose a threat regionally. It is not clear if it is yet to naturalise in other parts of Southeast Asia; however a single collection from a park in Peninsular Malaysia housed at SING suggests that it is at least present in Peninsular Malaysia.

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