



Extinction risks and conservation status of *Corybas* (Orchidaceae; Orchidoideae; Diurideae) in Peninsular Malaysia

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Abstract

Corybas is an elusive terrestrial orchid genus mostly inhabiting the high peaks in Peninsular Malaysia, which is the most vulnerable habitat to climate change. Nine species, of which seven are endemic, were studied based on natural populations, whereas information on another two was obtained from herbarium collections. *Corybas caudatus* was excluded from the study due to insufficient materials, and the type was not located. The species investigated were growing in small populations in the remaining moss-covered forests in the highlands. Human activities and temperature rise are two major threats to the wild populations. Our field observations revealed that *Corybas* species are good indicators of climate change as they are highly sensitive to temperature rise and drop in relative humidity. Judging from the current small number of specimens recollected, the small population sizes and degraded habitats where they grow, *Corybas* species in Peninsular Malaysia are all threatened by extinction in the wild.

Key words: climate change, endemic species

INTRODUCTION

Orchidaceae is one of the most evolutionarily advanced groups among angiosperms, and in addition has a remarkably great number of species. There are 910 species in 146 genera known in Peninsular Malaysia of which 198 (21.8%) are endemic (Go and Hamzah, 2008; Go *et al.*, 2010). One of the most peculiar genera is *Corybas*, a genus of tuberous, one-leaved and single-flowered herbs. In Peninsular Malaysia, the species are terrestrial and can only be found in montane moss forest above 1000 meters in humid, wet limestone outcrops. Out of approximately 131 known species in the world, one is distributed throughout the tropics and subtropics of Asia to Pacific including the Subantarctic Islands (Govert *et al.*, 2014), and eleven species are recorded in Peninsular Malaysia (Ridley, 1925; Holttum, 1964; Royen, 1983; Dransfield *et al.*, 1986; Seidenfaden & Wood, 1992; Turner, 1995; Schuiteman *et al.*, 2008), of which eight species (including the incompletely known species *Corybas caudatus*) are endemic.

The fascinating flower colour and unusual morphology of *Corybas* have contributed to its common names “spider orchid” and “helmet orchid”. The species has a slender stem and bears one flower just above the single small heart-shaped leaf with its pale green, white or red veins. *Corybas* forms small plants of only a few centimetres in height. Among the three sepals, the dorsal sepal is large and erect from the base with a broad hooded apex. The lateral sepals and petals are narrow and thread-like and sometimes longer than the whole flower, spreading like whiskers. The lip is erect from a tubular base and has two short spurs. As noted by Holttum (1964), the pedicel of *Corybas* is short during flowering but elongates in fruit, which putatively provides the seeds with a better chance of dispersal.

Species of the genus *Corybas* prefer the highlands and mountains to provide a suitable environment for their growth. In Peninsular Malaysia, the montane forests with their great accumulation of moisture on moss-covered trees and thick forest floor litter support the growth of *Corybas* species. Most species grow on mossy banks, rocks or ridge-tops. Some of the species, like *C. ridleyanus*, *C. holttumii* and *C. villosus*, often grow among carpets of *Sphagnum*, which may assist in their propagation and growth.