



RESEARCH ARTICLE

Carpenter Bees and the Orchid of a Princess: Natural Pollination of *Sirindhornia monophylla* in Thailand

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ABSTRACT: Research on the pollination of *Sirindhornia monophylla* (Collett & Hemsl.) H. A. Pedersen & Suksathan was carried out in W Thailand, 2010–2012. The orchid is a nectariferous, non-autogamous and self-compatible terrestrial. During 120 man-hours of flower watching, three species of *Ceratina* were found to be the main pollinators, viz. *C. (Ceratinidia) lieftincki* van der Vecht, *C. (C.) collusor* Cockerell, *C. (Pithitis) smaragdula* (Fabricius), males and/or females. *Braunsapis hewitti* (Cameron) was a minor pollinator. *Ceratina* acquired pollinia on their forehead and in some cases they subsequently deposited massulae on the stigma of other *S. monophylla* flowers. Three further species, viz. *Ceratina (Ceratinidia) accusator* Cockerell, *C. (C.) chiangmaiensis* W., M. & L. and *C. (C.) bryanti* Cockerell, did not acquire pollinia; but in these cases all pollen in the visited flowers had already been removed by previous pollinators. *Ceratina* belongs to family Apidae, subfamily Xylocopinae, tribe Ceratinini, whereas *Braunsapis* belongs to tribe Allodapini. Fruit set was nearly 50%. This is the first detailed account on the pollination of a *Sirindhornia* species, a recently described genus with three species, all included in the Thai redlist.

KEY WORDS: Apidae, *Braunsapis*, *Ceratina*, Orchidaceae pollination, *Sirindhornia*, Xylocopinae.

INTRODUCTION

The genus *Sirindhornia* H. A. Pedersen & Suksathan, named after H.R.H. Princess Maha Chakri Sirindhorn of Thailand, was described in 2003; it belongs to subfamily Orchidoideae, tribe Orchideae, subtribe Orchidinae and accommodates three terrestrial species that occur in open limestone habitats at 800–2200 m altitude (Pedersen et al., 2003). *Sirindhornia mirabilis* H. A. Pedersen & Suksathan and *S. pulchella* H. A. Pedersen & Indham. are narrow endemics from northern Thailand, whereas *S. monophylla* (Collett & Hemsl.) H. A. Pedersen & Suksathan is more widespread; its only population in Thailand is sympatric with *S. mirabilis*. All three species are included in the National Thai redlist (Santisuk et al., 2006) – *S. monophylla* being classified as "rare" (R), the other two species as "endangered" (EN). Srimuang et al. (2010a, 2010b) provided comprehensive information on aspects of demography, recruitment, breeding system, flowering phenology, male and female reproductive success and patterns of fruit set in all three species. In contrast, very little and fragmentary information on their pollination biology has been published up to now (Srimuang et al., 2010a; Watthana et al., 2013). This is a serious gap, since

knowledge of the pollination biology of individual orchid species is widely acknowledged as being highly important for their long-term conservation (Roberts, 2003; Pemberton, 2010). In this paper, we contribute to fill the information gap for *S. monophylla*.

Sirindhornia monophylla (Fig. 1) is fully self-compatible, but non-autogamous, as demonstrated experimentally by Srimuang et al. (2010a). Consequently, it depends on pollinators for fruit production in its natural habitat. With its zygomorphic, more or less horizontal, mainly white to purple flowers that exude nectar hidden in a spur and offer an enlarged lip as a landing platform (provided with tufts of coloured papillae that serve as nectar guides), the species fits the bee pollination syndrome of van der Pijl and Dodson (1966). In the study covered by this paper, we attempted: (1) to identify its legitimate pollinators, (2) to reveal the pollination mechanism and (3) to observe and describe the behaviour of pollinators in relation to *S. monophylla*. This is the full paper underlying an oral presentation given by K.S. at The 8th International Symposium on Diversity and Conservation of Asian Orchids, held in Shenzhen, China in 2012 (abstract: Srimuang et al., 2013).

MATERIALS AND METHODS