



Citation: Yeng W.S., Boyce P.C. (2020) Studies on the Dipterocarpaceae of Borneo, II. Ant stipule-brood sites and extra floral nectary association in saplings of *Shorea macrophylla* [sect. Pachycarpae] in Sarawak, Malaysian Borneo. *Webbia. Journal of Plant Taxonomy and Geography* 75(1): 29-34. doi: 10.36253/jopt-8183

Received: February 26, 2020

Accepted: April 27, 2020

Published: June 30, 2020

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Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Funding: This study is funded by the Ministry of Higher Education, Malaysia through Vote No. FRGS/ST03(03)/1300/2015(17).

Editor: Riccardo M. Baldini, University of Florence, Italy

Studies on the Dipterocarpaceae of Borneo, II. Ant stipule-brood sites and extra floral nectary association in saplings of *Shorea macrophylla* [sect. Pachycarpae] in Sarawak, Malaysian Borneo

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Abstract. The presence of stipular and leaf blade extra floral nectaries and associated ant activity, including brood raising within stipules, is reported for saplings of *Shorea macrophylla* [sect. Pachycarpae] in Kuching Division, Sarawak.

Keywords: Dipterocarpaceae, *Shorea* Section Pachycarpae, *Rubroshorea*, Borneo, Sarawak, ants.

INTRODUCTION

The intricate and mutually beneficial associations existing between ants and tropical forest plants were first described for Asia by Beccari (1884–1886) and elaborated upon by Van Leeuwen (1913, 1923a,b,c). Subsequently an extensive body of literature has been generated for tropical Asia, notably for Euphorbiaceae (*Macaranga* – see for example Fiala et al. 1991), Rubiaceae (Huxley 1978; Razafimandimbison et al. 2005; Jebb & Huxley 2019), Melastomataceae (Clausing 1997), Apocynaceae (Kleijn and van Donkelaar 2001; Peeters & Wiwatwitaya 2014; Weissflog et al. 2017), and for the palm genus *Korthalsia* (Chan et al. 2012; Miler et al. 2016). Good general overviews for one lowland area of Peninsular Malaysia are provided of Fiala and Saw (2003) and Moog et al. 2003.

The Dipterocarpaceae, the dominant family of the canopy layer of lowland and hill forest in tropical Asia has no published reports of ant association on Borneo, despite the fact that the understory saplings of several species are routinely found with accompanying ants, especially at the active