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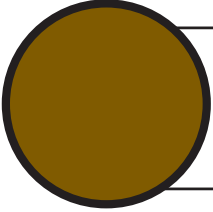
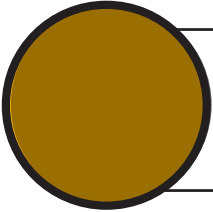
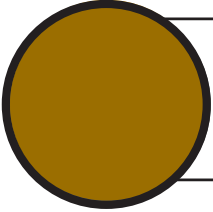
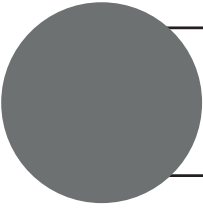
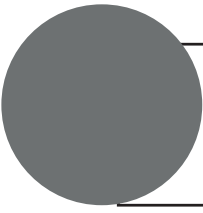
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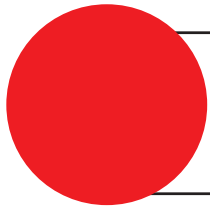




Contents

	Congratulations, Prof. Azlan and Assoc. Prof. Dr Sam!	Page 4
	IBEC OPEN DAY	Page 6
	Bowling Competition	Page 8
	Stilla Naica Digital PCR System	Page 10
	Visit to Sabal Agroforest Centre, Simunjan	Page 12

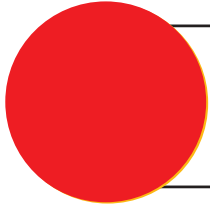
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Wong Sin Yeng

Untangling the oil-nuts – Genomics of Engkabang

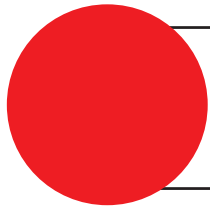
Page 13



Emmanuelle Usun Stephen

Boesenbergia stenophylla (Jerangau Merah) from the Bario Highlands

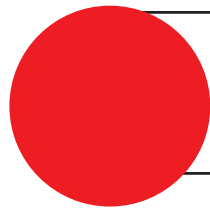
Page 16



Sally Soo Kaicheen

Wildlife Connectivity

Page 17



Publications

Page 20

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IBEC

Untangling the oil-nuts – Genomics of Engkabang

Wong Sin Yeng

Shorea macrophylla (engkabang jantung) in its typical expression with glossy glabrous maroon or green caducous stipules and thinly chartaceous leaf blades is largely confined to NW Borneo west of the Lupar, occurring gregariously along riverbanks and adjacent flood plains in the lowlands. In the westerly part of its range *S. macrophylla* is often admixed with *S. splendida*. Both species, together with podzol-restricted *S. stenoptera*, are important sources of the fat-rich engkabang nuts that provide valuable periodic income to local people, and which potentially are a significant element of sustainable indigenous agroforestry – see IBEC Bulletin 3(3): 9–15 (2022).

During preliminary fieldwork towards an SRDC-funded project (RDCRG02/THM02/2020/_1: Chloroplast genome, reproductive success, and damar defence of *Shorea macrophylla* and for other Engkabang species in Sarawak) it became evident that the further east of the Lupar one ventured the populations of *S. macrophylla* began to show a shift in morphological characteristics from their westerly counterparts, and that while retaining typical sect. *Pachycarpae* morphology, such as extensively spreading plagiotropic branches and innovations with extrafloral nectaries (Wong & Boyce 2021) the eastern trees had densely scabrid-tomentose stout stipules, and much thicker rigid leaf blades, often approaching those of *S. stenoptera*. Since a major component of the project is to determine population genetics of *S. macrophylla* in the narrow sense it is necessary to attempt to draw some taxonomic demarcation at between these populations, which clearly cannot be done arbitrarily. Thus, over the Christmas break I sampled from east to west – starting beyond the most easterly known populations of ‘true’ *S. macrophylla*, to determine the geographical point at which the easterly element became morphologically stable without any sign of the vegetative characteristics that define *S. macrophylla*. The work involved sampling in the Julau, Pakan, Kanowit, Song,

and Kapit valleys and fortuitously coincided with a lull in the landas making possible river access on foot.

A total of 110 individual trees were sampled in the five drainage systems, representing 20 discrete populations, these additional to sampling undertaken in Julau and Kanowit and to the north of the Batang Rejang earlier this year. Although too early to draw firm conclusions it looks increasingly likely that *S. macrophylla* is effectively replaced by another species in Central Sarawak, with the populations of the replacement becoming completely uniform beyond the Song. The taxonomy of these populations is yet to be clarified, not least because there has been no flowering / fruiting for the last three years. There is also the need to investigate the possibility of hybrid swarms at the interface of the western and eastern expressions – a subject for a future study. It is interesting to note that the late Mitsuru Hotta was aware of ‘problems’ with the taxonomy of the species around *S. macrophylla* (Hotta 1992a,b, 1997).

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Venerable old tree of the eastern expression of *Shorea macrophylla*



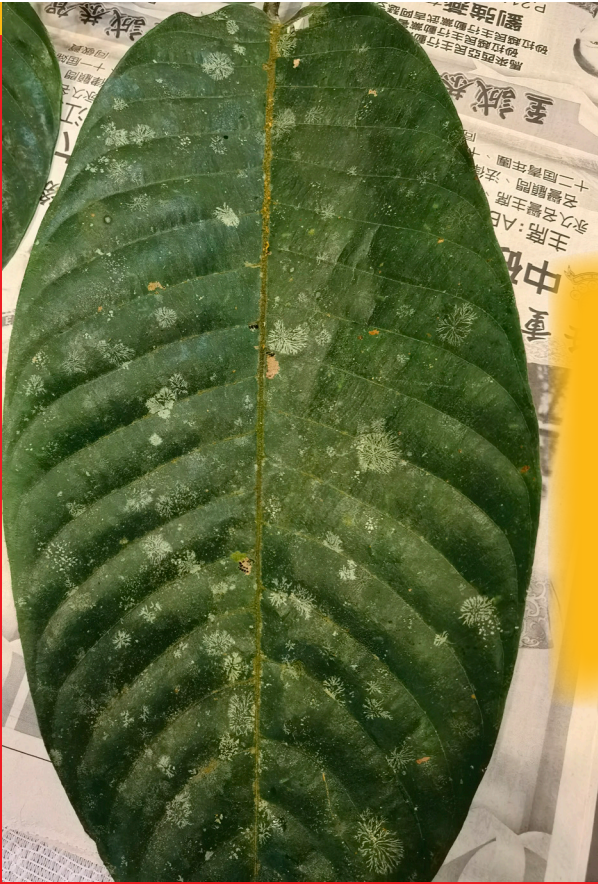
Gregarious saplings of the eastern expression of *Shorea macrophylla*



Young tree (probably 10 years old) of the eastern expression of *Shorea macrophylla*



Innovations of the eastern expression of *Shorea macrophylla* showing the characteristic densely scabrid-tomentose stouter stipules.



Mature leaf blade from a plagiotropic branch of the eastern expression of *Shorea macrophylla* - the stiff rigid texture is typical. Note the epicuticular cryptogams



Shoot of a plant intermediate between the western and eastern expression of *Shorea macrophylla*



Shorea macrophylla, the western expression. Note the glossy glabrous stipules and thinly chartaceous leaf blades.



Immature leaf blade of the eastern expression of *Shorea macrophylla*. Like all species in section *Pachycarpae* the new leaves have abundant extrafloral nectaries

The western expression of *Shorea macrophylla* with ants feeding on secretions from the extrafloral nectaries



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