

Tree Composition and Distribution of the Gunung Bubu Virgin Jungle Reserves, Perak Phyto geographical Subprovince

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Abstract

This study aim to identify tree composition and distribution in the Gunung Bubu Virgin Jungle Reserves (VJR), Perak, Malaysia. The methodology used plot study technique where 20 subplots of 20 m x 25 m were established randomly in the Compartment 6 and 7 of Gunung Bubu VJR. The total area enumerated was 1-ha. Tree with diameter at breast height (DBH) of 5 cm and above were censured. The trees vouchers were taken and identified by referring to specimens collections available in the herbarium of Universiti Kebangsaan Malaysia (UNIKEM) and also by using the keys and description of Whitmore (1972; 1973). The family, genus and species distribution data were laid out and displayed. In total 779 individual trees were identified. This number was made up by 45 families, 122 genera and 215 species. The highest number of trees for the families rank is Euphorbiaceae (88 stands), followed by Moraceae (80 stands), Dipterocarpaceae (58 stands), Ebenaceae (40 stands) and Burseraceae (38 stands). The families mentioned described the Gunung Bubu VJR tree family composition. The highest number of trees for genus rank is Shorea (48 stands), Streblus (43 stands), Diospyros (40 stands), Artocarpus (35 stands) and Anisophyllea (25 stands). Shorea, with the highest tree stands illustrated that Gunung Bubu VJR is typically the lowland dipterocarp forest formation. Shorea and Streblus have the highest frequency distribution of the genus rank with a value of 17. The highest number of trees in the species rank is Shorea parvifolia (39 stands), Streblus elongatus (25 stands), Ixonanthes icosandra (17 stands), Diospyros sumatrana (17 stands) and Pellacalyx axillaris (16 stands). Shorea parvifolia (Dipterocarpaceae) with the highest frequency and tree stand in species rank indicated that the Gunung Bubu VJR is well represented with typical lowland dipterocarps forest of Malaysia. The tree composition of Gunung Bubu VJR contributed to the richness and uniqueness of Perak Phyto geographical subprovince.

Keywords: Tree diversity, Tree distribution, Gunung Bubu VJR

1. Introduction

The Perak Phyto geographical subprovince has been recognized as early as 1960 [1], but the floristic data especially on tree composition and distribution are still lacking as the subprovince covers large area, and with the general landscape of hilly terrain and mountain ranges. The northern part of the subprovince is delineated with mountainous area, i.e., the Bintang Range. It lies from the northern of Peninsular of Thailand (southwest of Pattani) and stretch towards the states of Kedah and Perak. The larger part of this range is situated in the state of Perak from the northeast to southwest corner. Thus, the Bintang Range formed one of the three pillars to the Perak Phyto geographical subprovince.

The other two are the Kledang Range and the Main Range. The three ranges were almost parallel to one another (**Figure 1**).

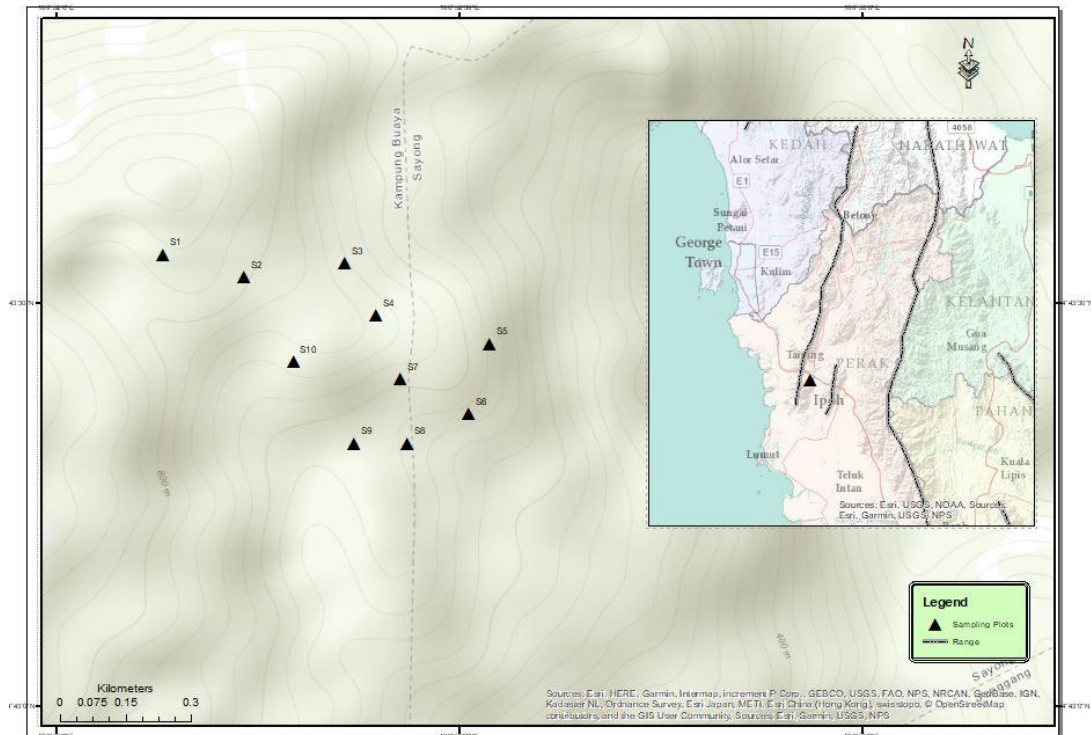


Figure 1. Location of the subplots and study area

The Bintang Range spanned for about hundreds km long [2], and has been associated with the Northern floristic elements, which was influenced with the Thai-Burmese flora especially towards the south of Kangar-Pattani Line [3] [4]. In view of the richness and unique biodiversity profile, two VJRs were established as an *in-situ* conservation sites, i.e., Gunung Bubu VJR and Bintang Hijau VJR. The former sit in the compartment 6 and 7 of the Gunung Bubu Forest Reserve, which is located at the southern end of the Bintang Range [5]. While, the latter is situated almost at the centre of the Bintang Range, in the compartment of 138 and 139 of the Bintang Hijau Forest Reserve. The Gunung Bubu VJR recorded endemic species such as *Ceriscoides perakensis* [6].

The tree floristic diversity and composition in mountain range and hilly areas are varies due to physiographic and edaphic factors including altitude, topography, orientation of slope, nature of soil ([7] [8] [9] [10]). Thus, the tree composition and distribution in area of biodiversity hotspot render special attention to identify any distinctive floristic pattern in taxa rank. Tree composition is also important in providing parameters for vegetation monitoring [11] [12] [25]. This study also contributes to the management and conservation of VJR in the Perak Phytogeographical subprovince.

2. Materials and Methods

Study Area

The Gunung Bubu VJR is located at the southern tip of the Bintang Range and lies at the latitude of 04° 38' - 04° 40' N and longitude of 101° 00' -101° 02' E (**Figure 1**). The Gunung Bubu VJR is described as typical lowland dipterocarps forest which [5] detailed as having Seraya Ridge Forest (the ridges are dominated with *Shorea ovata* (meranti

sarang punai bukit) and a mixture of *Shorea maxwelliana* (balau kumus hitam) *Shorea multiflora* (damar hitam).

Methodology

This study was carried out with the plot-based tree inventories, in which twenty plots with size 20 m x 25 m were laid out randomly in the Gunung Bubu VJR. The total area being censused was 1 ha. All trees with diameter at breast height (DBH) ≥ 5 cm were enumerated and identified. The process of identification was conducted by collecting the fresh voucher samples from the study plots and underwent the process of pressing and drying before being identified. Then, the samples were identified by referring to specimens collections of the herbarium of Universiti Kebangsaan Malaysia (UKM) and also by using the keys and description of [13] [14] [15] [16] [17] [18] [19] [20] [21].

3. Results and Discussion

i. The composition of trees

A total of 779 individual trees with a DBH size 5 cm and above, encompassing of 45 families, 122 genera and 215 species were recorded in the Gunung Bubu VJR. The total number of families, genus and species recorded are within the range of other studies in the proximity. For instance, the study of about 0.5 ha plot size, north to the study site recorded 40 families, 95 genera and 149 species [22] [24].

ii. The floristic pattern in family taxa of the Gunung Bubu VJR, Perak.

The five families with the highest number of trees at Gunung Bubu VJR are shown in **Figure 2(a)**. The highest number of trees for the families is Euphorbiaceae (88 trees) followed by Moraceae (80 trees), Dipterocarpaceae (58 trees), Ebenaceae (40 trees) and Burseraceae (38 trees).

According to [13] and [23], the dominance of Euphorbiaceae family in various forest areas are not surprising as Euphorbiaceae family is the second largest plant family in the Peninsular of Malaysia comprising of 71 genus and 371 species. [22] also reported that Euphorbiaceae are the families with the largest number of species in lowland dipterocarps forest. Similarly, the highest frequency distribution of the families is Euphorbiaceae with a value of 20 as shown in **Figure 2(b)**. The distribution pattern of Euphorbiaceae is shown in **Figure 2(a)**. This distribution indicates that the Euphorbiaceae family has been found in all the 20 plots set out in this study and the highest number of Euphorbiaceae found in Plots 8 and 9. The Euphorbiaceae is consistently and uniformly distributed throughout the Gunung Bubu VJR.

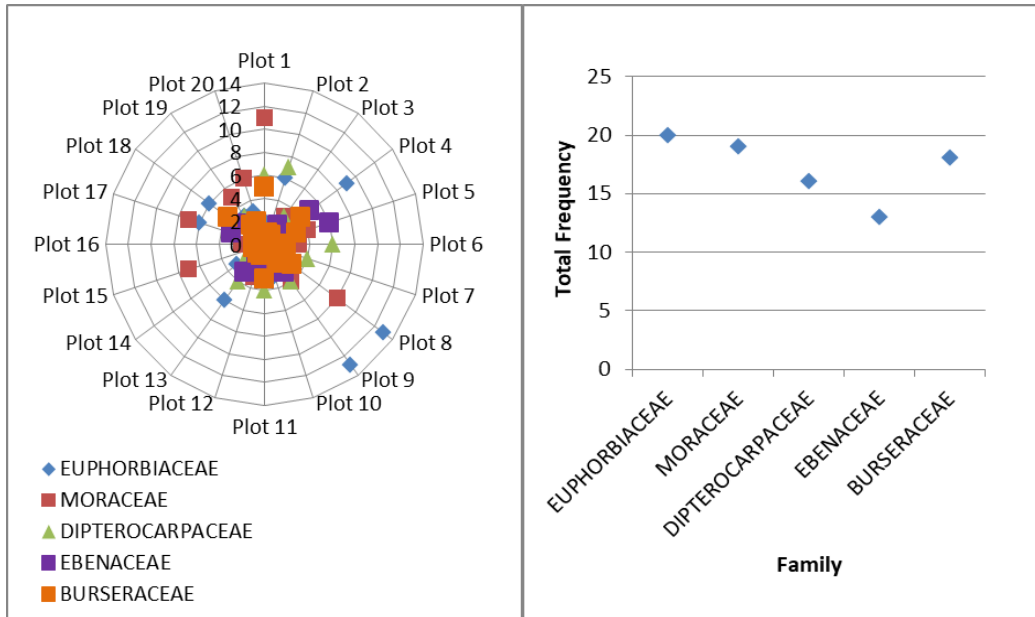


Figure 2. (a) Number of trees and (b) frequency distribution for the highest family at Gunung Bubu VJR.

iii. *The floristic pattern in genus taxa of the Gunung Bubu VJR*

The five highest number of trees for the genus are *Shorea* (48 trees), *Streblus* (43 trees), *Diospyros* (40 trees), *Artocarpus* (35 trees) dan *Anisophyllea* (25 trees). **Figure 3(a)** shows the five genera which has the highest number of trees in Gunung Bubu VJR. Meanwhile, the highest frequency distribution of the genus is *Streblus* with a value of 17 as shown in **Figure 3(b)**. This value indicates that this genus was found in 17 plots and missing in plot 2, plot 3 and plot 14. However, *Shorea* showed a slightly higher number of trees, compared to *Streblus*, and missing only in 4 study plots.

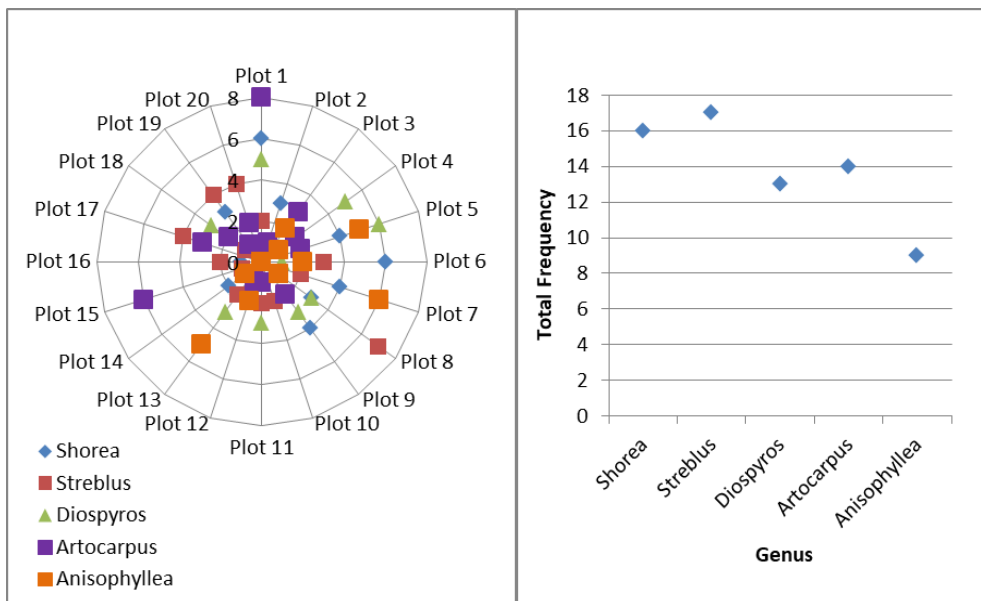


Figure 3. (a) Number of trees and, (b) frequency distribution for the highest genus at Gunung Bubu VJR.

iv. *The floristic pattern in species taxa of the Gunung Bubu VJR*

The five species with the highest number of trees in Gunung Bubu VJR are shown in **Figure 4(a)**. The highest number of trees for the species is *Shorea parvifolia* (39 trees), *Streblus elongatus* (25 trees), *Ixonanthes icosandra* (17 trees), *Diospyros sumatrana* (17 trees) and *Pellacalyx axillaris* (16 trees). Meanwhile, the highest frequency distribution of the species is *Shorea parvifolia* with a value of 16 as shown in **Figure 4(b)**. This value indicates that this species was only found in 16 plots and was missing in plot 4, plot 10, plot 18 and plot 20. In general *Shorea parvifolia* is found in the lowland to hill forests and in seasonally dry tropical rain forest. In Peninsular Malaysia, the species could be found up to 800 m altitude.

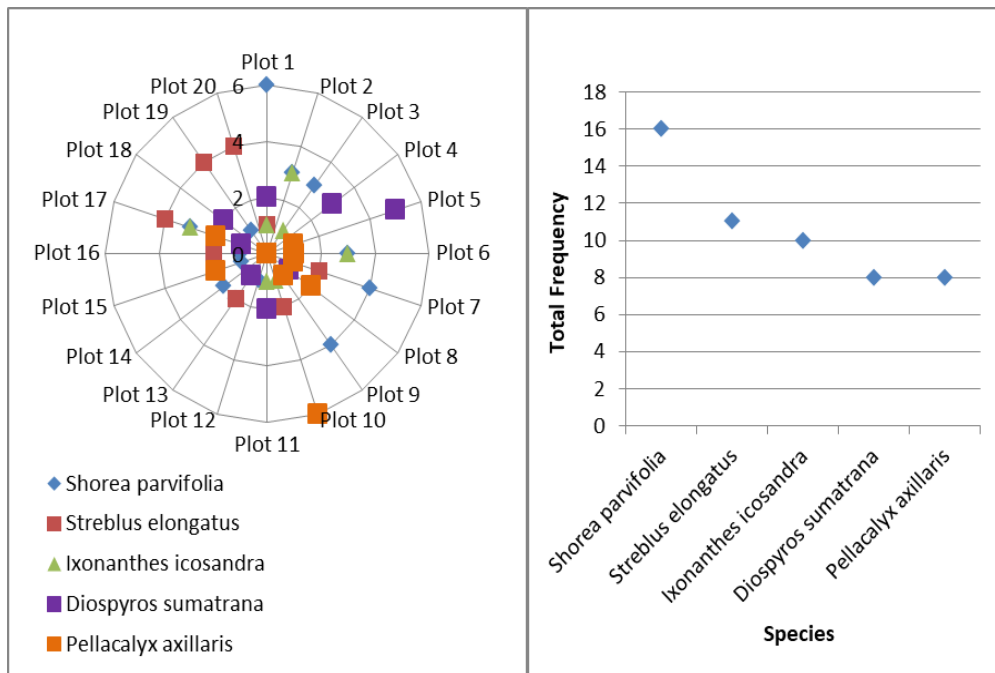


Figure 4. (a) Number of trees and (b) frequency distribution for the highest species at Gunung Bubu VJR.

4. Conclusions

The Gunung Bubu VJR, Perak Phytogeographical Subprovince showed a unique floristic pattern in the distribution of family, genus and species. This study recorded a total of 779 individual trees with a DBH size 5 cm and above, and the floristic diversity consists of 45 families, 122 genus and 215 species. The most distributed family was represented by Euphorbiaceae and followed by Moraceae and Dipterocarpaceae. The five highest number of trees for the genus are *Shorea* (48 trees), *Streblus* (43 trees), *Diospyros* (40 trees), *Artocarpus* (35 trees) and *Anisophyllea* (25 trees). The high number of tree species contributed to the richness and uniqueness of Perak Phytogeographical subprovince.

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