DIVERSITY OF ARACEAE IN MARAI PARAI TRANSECT LINE, KINABALU PARK, SABAH

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ABSTRACT

The Araceae is one of the plant families that can be found in the Kinabalu Park area, which has a diverse number of species. This study aims to observe the species diversity of Araceae along the main route from Kinapasuwon (which is located in Kiau) to Marai Parai, and from Marai Parai to Suminungkad. The transect sampling method with a width of 2 metres on both sides of the transect was carried out on the main route, based on five different pit stop; Kiau – Kem Lanting (T1) (850 - 1010 m.a.s.l.), Kem Lanting – Kinotoki (T2) (1010 – 1420 m.a.s.l.), Kinotoki – Marai Parai (T3) (1420 - 1530 m.a.s.l.), Marai Parai – Suminungkad (T4) (1530 - 1800 m.a.s.l.), and Kem Nunuk – Kinotoki (T5) (1010 – 1530 m.a.s.l.). From the observations, 13 genera were identified along the transect: *Alocasia, Amorphophallus, Amydrium, Arisaema, Bucephalandra, Colocasia, Homalomena, Nabalu, Ooia, Pothos, Rhaphidophora, Schismatoglottis*, and *Scindapsus*. The Kiau – Kem Lanting transect at an altitude of 850 – 1010 metres above sea level showed the highest species diversity of Araceae. Similarity analysis conducted indicated that the transects have low similarity in Araceae species. Therefore, the main route to Marai Parai via Kiau has a unique and high diversity of Araceae species, which is distinct based on altitude differences.

Keywords: *Aroids, Borneo, protected areas, species distribution.*

INTRODUCTION

Marai Parai is a highland area located within Kinabalu Park at an altitude of 1,684 metres above sea level. The forest here is classified as a submontane forest (Rafiqpoor & Nieder, 2006). The soil around Marai Parai is acidic and has a high-water retention capacity due to its consistently moist condition (van der Ent *et al.*, 2015). Therefore, the vegetation around Marai Parai is dominated by graminoid shrubs (van der Ent *et al.*, 2018). However, the route to Marai Parai consists of high hill dipterocarp forest and hosts a variety of vegetation, including the Araceae family (Hay & Herscovitch, 2003; Wong & Boyce, 2010).

The diversity of Araceae in Sabah is high, with a recorded 114 species across 29 genera (Wong & Joling, 2021). Of these, 38 species can be found within Kinabalu Park (Harisin *et al.*, 2021; Wong & Joling, 2021). This study aims to observe the species variation of Araceae that can be found along the main route from Kinapasuwon to Marai Parai, and from Marai parai to Suminungkad.

METHODOLOGY

Sampling was conducted from 7 to 12 October 2023 at Marai Parai, Kinabalu Park (850 - 1800m asl; 6.08167 N, 116.52333 E). The transect sampling method was applied along the main route as shown in Figure 1, with a width of 2 metres on each side of the trail (Harisin *et al.*, 2021). This route was divided into five main transects applied on existing hiking trail with different altitudes; metres above sea level (m.a.s.l.), as follows: Kinapasuwon – Lanting Camp (T1) (850 - 1010 m.a.s.l.), Lanting Camp – Kinotoki (T2) (1010 – 1420 m.a.s.l.), Kinotoki – Marai Parai (T3) (1420 - 1530 m.a.s.l.), Marai Parai – Suminungkad (T4) (1530 - 1800 m.a.s.l.), and Tahubang – Kinotoki (T5) (1010 – 1530 m.a.s.l.). The recorded observations included a list of Araceae species, that could be found along these transects.

A total of 50 live individual specimens were brought to the Faculty of Tropical Forestry (FPT), Universiti Malaysia Sabah (UMS) for further processing. From the collection, there were five individuals in flowering (Plate 1: A-E), thus were made into voucher specimens following the method of Bridson & Forman (1998). The rest of the specimens were planted in the faculty's greenhouse and wait for flowering, which the flower will give better species identification. Species identification in the field was carried out according to

Boyce (2004); Boyce et al. (2002 & 2010); Mayo et al. (1998); and Wong & Joling (2021).

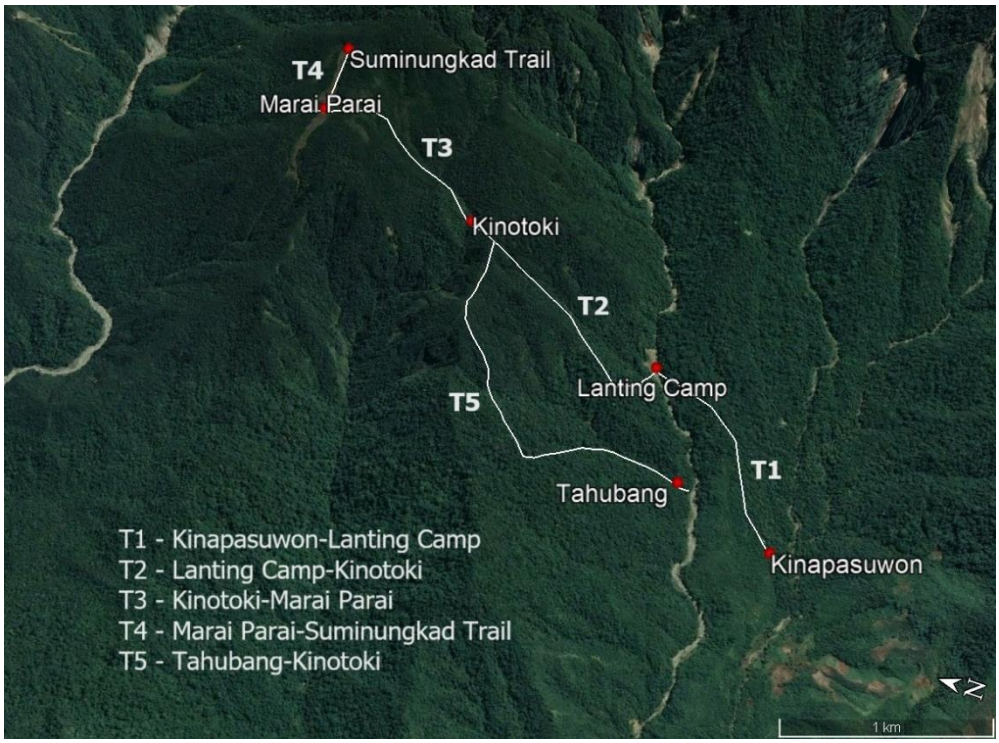

Figure 1. The location of the study area.

Species similarity analysis between transects was performed using the Sorenson Coefficient method, S_S (Magurran, 2004) to show if these transects have similar Araceae species based on existence.

RESULTS & DISCUSSION

List of Genus

From the initial identification in the field and the sorting at UMS, there are only 48 species present in the Marai Parai area, out of 50 individual that brought to UMS. Out of this number, 13 genera have been identified: *Alocasia*, *Amorphophallus*, *Amydrium*, *Arisaema*, *Bucephalandra*, *Colocasia*, *Homalomena*, *Nabalu*, *Ooia*, *Pothos*, *Rhaphidophora*, *Schismatoglottis*, and *Scindapsus*. Figure 2 shows the number of species based on the genus that can be found in Marai Parai. Plate 1 (F) shown the flower of *Alocasia cuprea*.

From Figure 2, the genus *Schismatoglottis* has the highest number of species, which are 16 species. Wong & Joling (2021) stated that genus *Schismatoglottis* has the greatest number of species and is a widespread genus in Sabah. The genera *Homalomena* and *Scindapsus* each have six species, followed by the genus *Alocasia* with five species. Transect 1 has the highest species richness, with a total of 26 species. Meanwhile, the Transect 4 has the lowest number of species, with only two species (Table 1). Only the genus *Schismatoglottis* can be found in every transect. On the other hand, the genera *Nabalu*, *Bucephalandra*, and *Amorphophallus* can only be found in one transect each, as shown in Table 1.

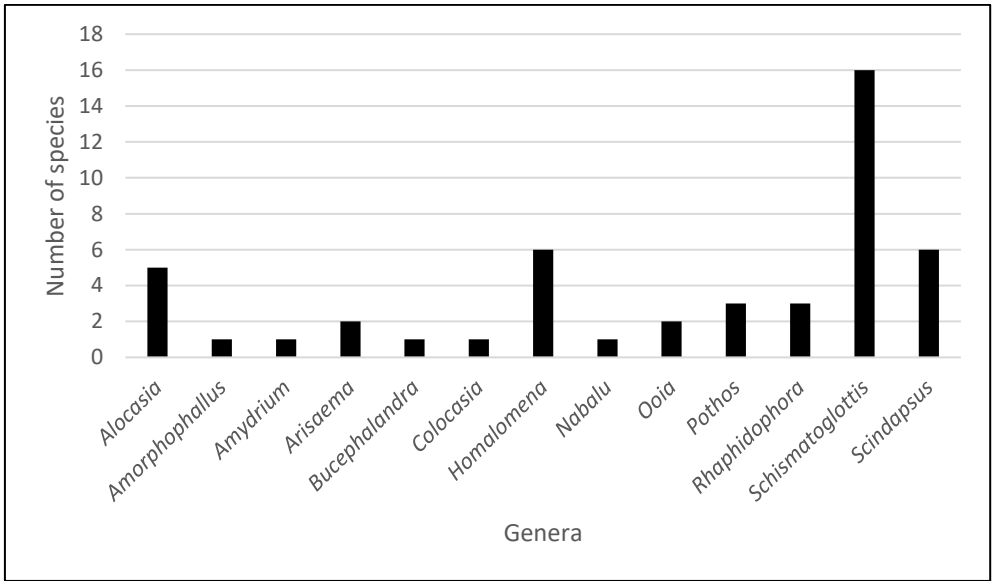

Figure 2. The number of species of Araceae in Marai Parai according to genus.

Currently, the Kinabalu Park Araceae herbarium collection has 12 genera recorded in Kinabalu Park as summarised by Wong & Joling (2021), and this study managed to add one new genus, which is *Bucephalandra*, to the herbarium record. Based on previous records from Wong *et al*. (2018) and Wong & Boyce (2014), *Bucephalandra* genus, only contains two species in Sabah: *B. danumensis* and *B. ultramafica*. These two species were found in Lahad Datu and Sandakan respectively. Thus, the discovery of *Bucephalandra* genus in Kinabalu Park represents a new distribution record for the genus. However, the actual species identity of this live specimen can only be confirmed once the specimen produced flower part give better identification.

Table 1: List of Araceae species based on transect from Kinapasuwon to Suminungkad.

Species	T1	T2	T3	T4	T5
Alocasia cuprea	/	/			
Alocasia sp.1	/	/			/
Alocasia sp.2		/			
Alocasia sp.3		/		/	/
Alocasia wongii	/				
Amorphophallus sp.1	/				
Amydrium medium		/			/
Arisaema sp.1	/				
Arisaema sp.2					/
Bucephalandra sp.			/		
Colocasia arbiri	/				/
Homalomena sp.1	/				
Homalomena sp.2	/	/			/
Homalomena sp.3	/	/			/
Homalomena sp.4					/
Homalomena sp.5	/				
Homalomena sp.6	/				
Nabalu corneri	/				
Ooia kinabaluensis			/		
Ooia sayapensis	/				
Pothos ovatifolius	/				/
Pothos sp.1					/
Pothos sp.2		/			
Rhaphidophora fluminea	/				
Rhaphidophora korthalsii	/				
Rhaphidophora sp.1					/
Schismatoglottis ahmadii	/		/		
Schismatoglottis asparata complex sp.1	/				/
Schismatoglottis asparata complex sp.2		/			
Schismatoglottis asparata complex sp.3		/			
Schismatoglottis nervosa complex sp.1	/				
Schismatoglottis nervosa complex sp.2	/				
Schismatoglottis patentinervia complex sp.1	/		/		
Schismatoglottis sp.1			/		
Schismatoglottis sp.2		/			
Schismatoglottis sp.3		/			
Schismatoglottis sp.4	/				

Schismatoglottis sp.5			/		
Schismatoglottis sp.6		/	/		/
Schismatoglottis sp.7					/
Schismatoglottis sp.8				/	
Schismatoglottis trifasciata complex sp.1	/				
Scindapsus longistipitatus	/				
Scindapsus pictus	/	/			/
Scindapsus sp.1					/
Scindapsus sp.2			/		/
Scindapsus sp.3	/				
Scindapsus treubii					/
TOTAL NUMBER OF SPECIES	**26**	**14**	**8**	**2**	**18**

Note: T1 = Kinapasuwon – Lanting Camp, T2 = Lanting Camp – Kinotoki, T3 = Kinotoki – Marai Parai, T4 = Marai Parai – Suminungkad, T5 = Tahubang – Kinotoki.

Species Similarity Between Transect

Overall, the Sorenson Coefficient of similarity (S_S) between transects is low, as the S_S values obtained are close to 0, indicating that there are different number of species in each transect (Nizam *et al.*, 2012). From Table 2, it is noted that transects T2 and T5 have the highest species similarity compared to the others, with an S_S value of 0.3043 or 30.43%. Several transects have no species similarity between them at all, indicated with S_S values of zero, which are T1 and T4, T3 and T4, and T4 and T5. Therefore, it is understood that each transect has its own unique Araceae species.

The differences in Araceae species found between the transect lines can be influenced by several factors, including the types of soil present along these transect lines (Nizam *et al.*, 2012). This is because transects at higher altitudes contain decreasing soil nutrient content (van der Ent *et al.*, 2015). Additionally, altitude differences also affect the plant species that can grow at certain heights, as they are influenced by several abiotic factors (Whitman *et al.*, 2021).

Table 2. Species similarity using Sorenson Coefficient, Ss.

	T2	T3	T4	T5
T1	0.2	0.1053	0	0.2414
T2	-	0.0833	0.1111	0.3043
T3	-	-	0	0.1333
T4	-	-	-	0

CONCLUSION

From this study, it is known that the Marai Parai area has a high diversity of Araceae species. Additionally, the Marai Parai area possesses unique Araceae species that can be observed across different altitudes.

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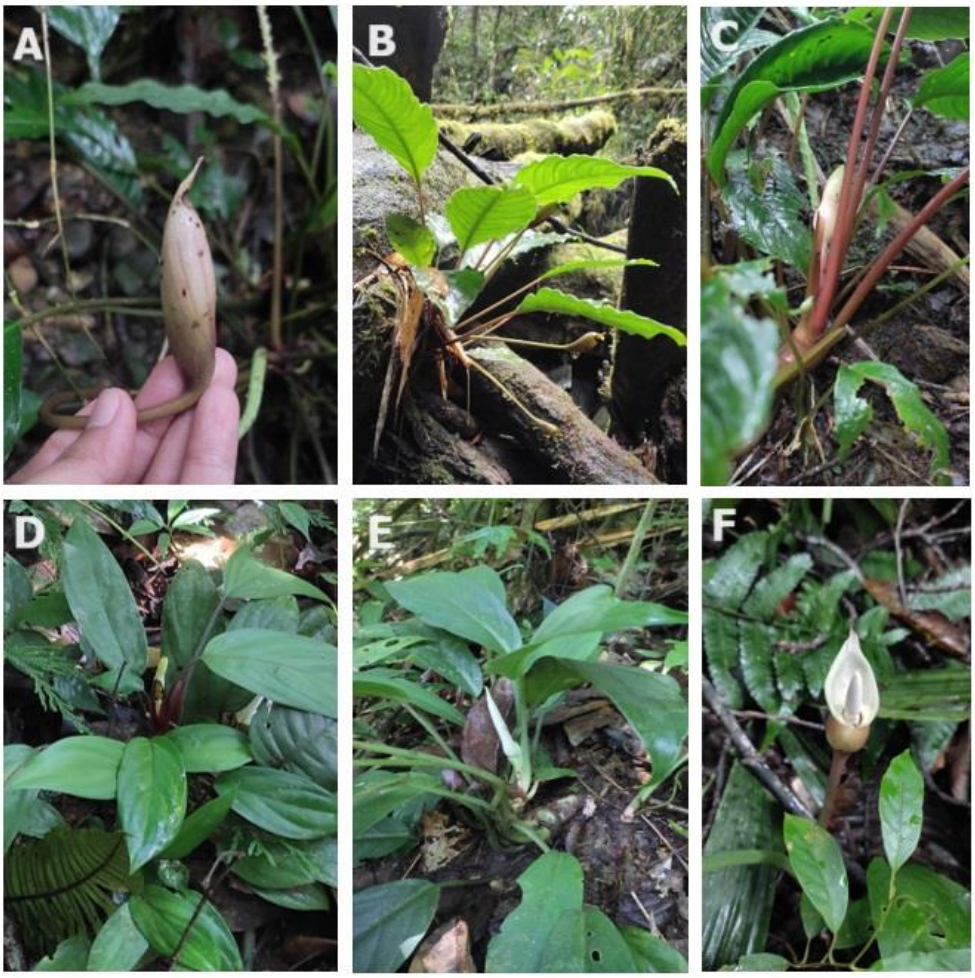
APPENDIX

Plate 1:



List of species:

A – *Ooia sayapensis* Kartini
B – *Ooia kinabaluensis* (Bogner) S.Y.Wong & P.C.Boyce
C – *Schismatoglottis* sp. 5 Zoll. & Moritzi
D – *Homalomena* sp. 3 Schott
E – *Schismatoglottis* sp. 3 Zoll. & Moritzi
F – *Alocasia cuprea* (C.Koch & Bouche) C.Koch