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EPIPHYTE DIVERSITY ON PHOROPHYTES IN AMBROSE ALLI UNIVERSITY MAIN CAMPUS, EKPOMA, EDO STATE, NIGERIA

E.A. Ogie-Odia, D.A. Eseigbe, F.N. Imade, M.N. Oseremen, O.E. Ehilen, M.O. Lawani and B.B. Edaferokpa

Department of Plant Science and Biotechnology, Ambrose Alli University, Ekpoma, Nigeria

Correspondence: oeehilen@aauekpoma.edu.ng

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ABSTRACT

This study assessed epiphyte diversity on phorophytes across seven faculties at Ambrose Alli University, Ekpoma, Edo State, Nigeria. Data collected included phorophyte species, individual counts, height, diameter at breast height (dbh), types and quantities of epiphytes, growth habits and attachment locations. Eight epiphyte species from six families were identified, showcasing significant ecological diversity. The Faculty of Environmental Sciences exhibited the highest diversity (Simpson 1-D = 1; H = 1.1), followed by Engineering (Simpson 1-D = 0.68; H = 1.13) and Management Sciences (Simpson 1-D = 0.6; H = 0.69). The Faculty of Agriculture displayed moderate diversity, while the Faculties of Physical and Life Sciences showed no diversity. Species richness was highest in Faculty of Law (five species) and lowest in Physical Sciences (one species). Families Polypodiaceae, Moraceae and Polytrichaceae were the most prominent, reflecting adaptability to campus microhabitats. *Ficus aurea* (Moraceae) was abundant in a single faculty, while *Platycerium bifurcatum* and *Polytrichum commune* were prevalent across multiple faculties. Epiphytes were classified as non-stranglers or stranglers, with stranglers like *Ficus audrey* potentially overtaking hosts. This research underscores the ecological role of epiphytes in urban environments and highlights the importance of conservation strategies to maintain biodiversity on university campuses.

Key words: Biodiversity conservation; epiphyte diversity; phorophytes; urban ecology

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INTRODUCTION

Epiphytes, plants that grow non-parasitically on other plants (typically trees or shrubs), are an essential component of tropical and sub-tropical ecosystems (Zotz, 2013; Getaneh and Gamo, 2016). Unlike parasitic plants, epiphytes derive support and anchorage from their host plants, referred to as phorophytes, without extracting nutrients or water from them. Commonly found attached to the trunks and branches of lianas, shrubs and forest trees, epiphytes can sometimes grow even on the surfaces of living leaves. These unique organisms thrive predominantly in humid tropical forests (Freitas *et al*., 2016). Non-vascular epiphytes, such as bryophytes, mosses and lichens, co-exist with vascular epiphytes like ferns, orchids and certain flowering plants (Mendieta-Leiva *et al*., 2020).

Approximately 30,000 species, accounting for 10% of all vascular plants globally, are classified as vascular epiphytes, most of which are native to tropical and sub-tropical forests (Wang *et al*., 2016). These forests are distinguished by their abundant vascular epiphyte populations, which, in some montane rainforests, contribute over 50% of the local vascular plant species richness (Kelly *et al*., 2004). Epiphytes also make up 25% of the total flora in lowland rainforests (Barthlott *et al*., 2007). Their ecological roles are significant, providing food and habitats for various insects and birds (Stuntz *et al*., 2002; De la Rosa-Manzano *et al*., 2017). Additionally, epiphytes are valued for their horticultural, medicinal and agricultural uses. They enhance species diversity, biomass and water retention and play critical roles in primary productivity and litter fall (Gotsch *et al*., 2016).

Furthermore, epiphytes are key bioindicators of environmental changes, including pollution, ecological degradation and climate change, due to their sensitivity to atmospheric conditions (Lugo and Scatena, 1992; Benzing, 2004). They also contribute to nitrogen-fixation by offering substrates for nitrogen-fixing bacteria (Getaneh and Gamo, 2016). The significance of epiphytes extends beyond local ecosystems, influencing global plant diversity and supporting the dynamic processes critical for forest ecosystem function (Batke, 2012; Cummings *et al*., 2006).

Vascular epiphytes possess specialised vascular systems, while non-vascular epiphytes lack these features. Factors such as dispersal limitation and the characteristics of the phorophyte, including age and species composition, can influence epiphyte diversity (Woods, 2013). Microhabitat variations within individual phorophytes, as well as host-specific differences, also affect epiphyte assemblages (Cardelús and Chazdon, 2005). Studies have shown that factors like bark texture, host size, elevation and vertical stratification impact the distribution and diversity of vascular epiphytes (Vanderpoorten *et al*., 2004; Mohamed *et al*., 2017). For example, larger phorophytes with rough bark are generally more conducive to epiphyte colonisation than smaller or smoother-barked trees.

Although epiphyte-phorophyte interactions have been extensively studied in tropical rainforests globally, there is limited knowledge about their diversity and distribution in urban environments, particularly in Nigeria (Fudali, 2012; Bhatt *et al*., 2015; Adhikari *et al*., 2017). The few studies conducted have predominantly focused on tropical rainforests or partially disturbed ecosystems (Adubasim *et al*., 2018), overlooking the ecological significance of epiphytes in urban settings (Markos and Michael, 2023; Mondragón and Mora-Floresa, 2024).

This study aimed to assess the diversity and phorophyte preference of epiphytes in an urban environment, specifically on the Ambrose Alli University campus, Ekpoma, Edo State, Nigeria. By examining the distribution of epiphytes across different faculties, this research could provide critical insights into the biodiversity of urban epiphytes and contribute to a deeper understanding of their ecological roles in the region.

MATERIALS AND METHODS

Study area

This study was carried out at Ambrose Alli University, which is situated in Ekpoma, Edo State, southwest Nigeria. Figure 1 shows the map of Ambrose Alli University main campus in Ekpoma. Latitude 6° 44' 34.80" N and longitude 6° 08' 25.04" E are the locations of the university. With a rainy season from April to October and a dry season from January to March, the region experiences a tropical climate. The faculties of Agriculture (FAG), Engineering and Technology (FET), Environmental Studies (FES), Law (FLW), Management Sciences (FMS), Physical Sciences (FPS) and Life Sciences (FLS) were the chosen study areas within the university.

Data Collection

First, a reconnaissance field survey was conducted throughout the University to identify the various vegetation types that were present there. Samples were taken from seven faculties at the Ambrose Alli University Main Campus in Ekpoma between January and February, 2023. In the aforementioned study areas, field surveys were conducted to investigate the species diversity of epiphytes on phorophytes (epiphyte host plant). Epiphytes and the species of their hosts were identified in the enumeration. The basal area of each tree comprising phorophytes (hosts) was determined by measuring its diameter at breast height (DBH) and total height. To assess if the host was sub-canopy (≤ 21 m), canopy level (21 m) or emergent canopy (≥ 40 m), the height of the host was measured. Each phorophyte's epiphyte species were identified down to the individual level, and the number of individuals in each species was tallied and documented. In any area of the phorophyte where they were found to grow, or throughout the entire phorophyte where they were found to stretch from its base to the canopy, species of epiphytes that clumped and climbed were counted as a single individual. Additionally, each phorophyte's points of attachment and the amount of epiphyte present were noted and observed.

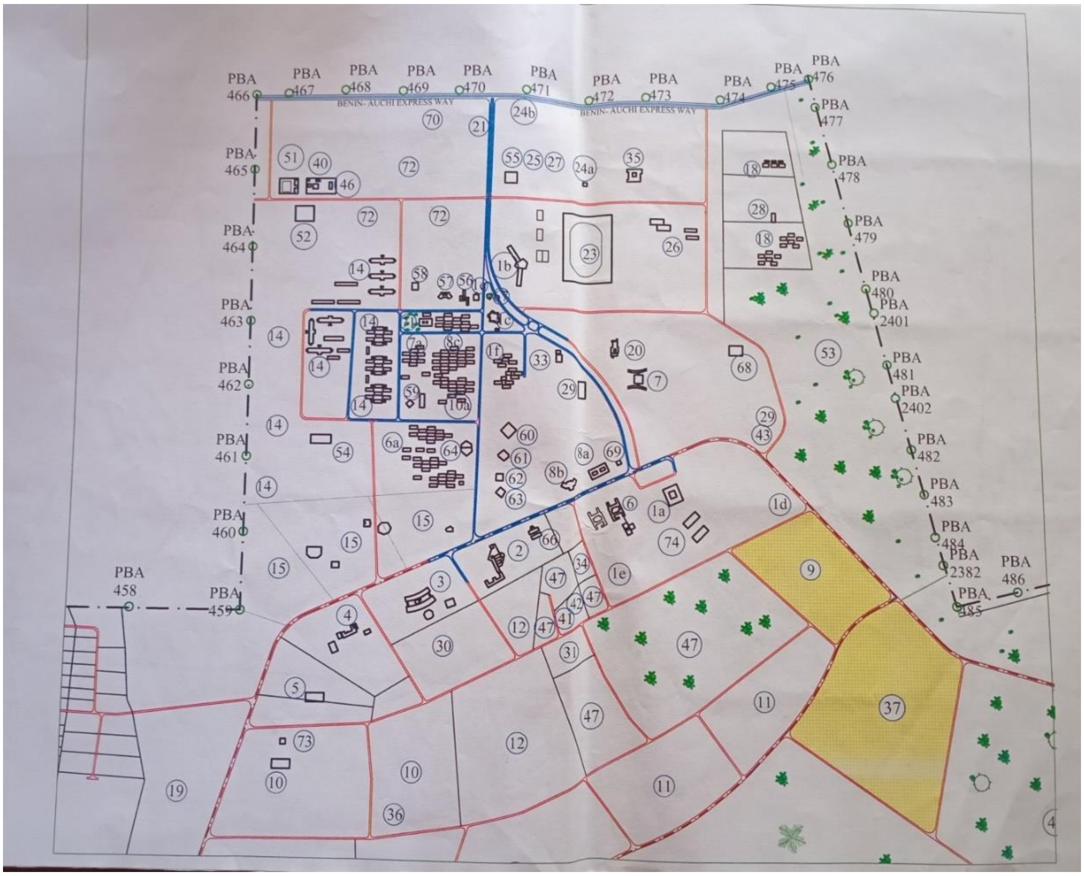

Figure 1: Sketch map of Ambrose Alli University Main Campus, Ekpoma, Nigeria

Legend showing study areas:
2- Faculty of Environmental Studies; 3- Faculty of Law; 5- Faculty of Management Sciences; 8a- Faculty of Life Sciences; 8b- Faculty of Physical Sciences; 10- Faculty of Engineering and Technology; 13- Faculty of Agriculture

Data Analysis
Equation (1) was used to calculate the relative abundance of epiphytes in each of the seven faculties in relation to the overall abundance of epiphytes in the faculties.

$$RA = \frac{a}{TA} \times \frac{100}{1} \qquad (1)$$

Where:
a=Abundance of epiphytes in a faculty
TA=Total Abundance of epiphytes in the seven faculties
RA=Relative Abundance (%)
The number of species of epiphytes observed in each faculty was counted to determine the species richness of epiphytes in that faculty. The Simpson index (Simpson, 1949) and the Shannon-Wiener index (Kent and Coker, 1992) were used to quantify the alpha (within-campus) diversity of epiphytes. Other researchers have also measured alpha diversity using both indices (e.g., Chima *et al*., 2013; Leishangthem and Singh, 2018; Rahman *et al*., 2019).

The expression for the Shannon-Wiener Index (H) is:

$H= \sum^{s} i=1\ Pi\ \text{In}\ Pi$ ——————————————— (2)

Where,

pi=the proportion of individuals of the species of epiphyte in a faculty

s=the total number of species of epiphytes enumerated in a faculty

The Simpson Index was used in the following form to enable a direct correlation between the index and diversity:

$$\text{Simpson } (1-D) = 1-\frac{\sum n(n-1)}{N(N-1)} \quad (3)$$

Where,

N is the total number of epiphyte individuals; n=number of individuals of each species in a faculty.

RESULTS

A total of eight distinct epiphyte species were identified across eight phorophytes, as shown in Figures 2a and 2b. Table 1 shows the types of epiphytes, their specific locations and growth habits within the seven faculties. The Faculty of Law (FLW) recorded the highest epiphyte diversity, followed by the Faculty of Engineering (FET), Environmental Studies (FES), Agriculture (FAG), Management Sciences (FMS) and Physical Sciences (FPS). Notably, the Faculty of Life Sciences (FLS) did not show any epiphyte species.

Across the faculties surveyed, eight epiphyte species from six families were observed (Table 2). FLW hosted five species from five families, FMS two species from two families, FPS had one species, FET contained four species from three families, and FES had three species from three families. FLS showed no epiphytes, indicating a notable absence of epiphyte activity in that faculty. Figure 3 shows the number of species as well as the abundance of epiphytes across the seven study sites.

In terms of species composition, *Platycerium bifurcatum* (staghorn fern) and *Polytrichum commune* (hair moss) were the predominant species in FAG and FET, while *Ficus aurea* (strangler fig) was the most abundant species in FLW. FLW accounted for the highest overall epiphyte abundance, contributing 46.4% of the total, followed by FET (21.4%), FAG (14.3%), FMS (10.7%), FES (5.4%) and FPS (1.9%). FLS, by contrast, recorded no epiphytes, as shown in Table 3.

The vertical distribution of epiphytes on phorophytes was categorised into high canopy and sub-canopy levels. FET showed the highest number of high-canopy phorophytes, followed by FAG and FMS, while the remaining faculties had more sub-canopy-level phorophytes. Tables 4 and 5 show the specific sections of the phorophytes where epiphytes were located. Epiphyte richness was highest on the trunk, followed by the canopy/trunk interface and the tree base.

Epiphyte presence in tree canopies was observed across all faculties except FLS. FLW showed the highest canopy occupancy, followed by FAG, FET, FES, FMS and FPS. Notably, only FET and FLW had epiphytes covering the entire phorophyte, including the base. In contrast, the epiphytes in FAG, FES, FLW, FMS and FPS were primarily located on the trunk, with FAG and FES also showing significant epiphyte presence on both the canopy and trunk.

Table 6 shows the species diversity of epiphytes across study sites. FES showed the highest species diversity, with a Simpson index (1-D) of 1 and Shannon index (H) of 1.1. In contrast, FLW had the lowest diversity, with a Simpson index of 0.41 and a Shannon index of 0.83. FET showed moderate diversity (Simpson 1-D = 0.68; H = 1.13), followed by FMS (Simpson 1-D = 0.6; H = 0.69) and FAG (Simpson 1-D = 0.57; H = 0.69). Species richness was highest in FLW (n = 5), followed by FET (n = 4), FES (n = 3), FAG (n = 2) and FMS (n = 2), while FPS exhibited the lowest richness (n = 1).

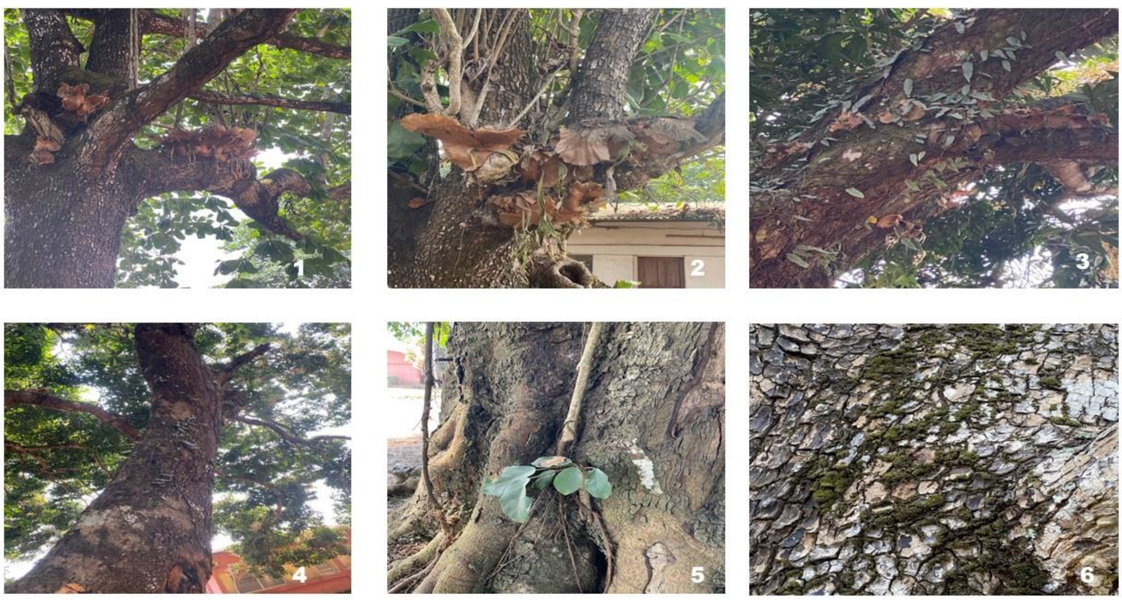

Figure 2a: Cross-section of epiphytes on phorophytes
1-2: *Platycerium bifurcatum* on *Terminalia cattapa*; 3-4: *Microgramma owariensis* on *Mangifera indica*; 5-6: *Polytrichum commune* on *Mangifera indica* and *Terminalia cattapa*

Figure 2b: Cross- section of epiphytes on phorophytes
7-8: *Ficus aurea* (strangler fig) on *Ficus benjamina;* 9-10: *Ficus audrey* on *Pentaclethra macrophylla;* 11-12: *Gongronema latifolium* on *Ficus benjamina*; 13: *Monechma incanum* on *Ficus benjamina;* 14: *Dioscorea dodecaneura* on *Pinus*

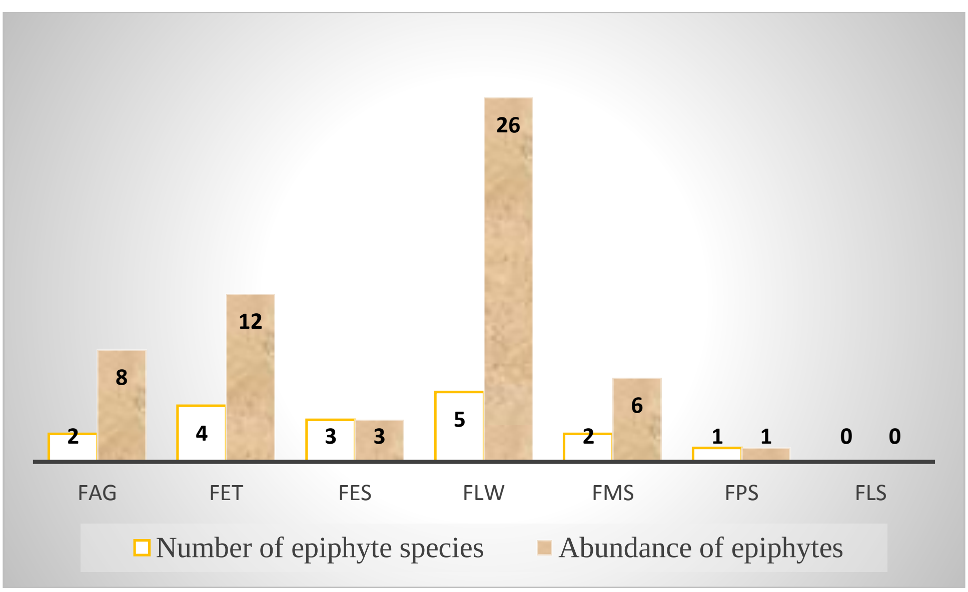

Fig. 3: Variation in number of species and abundance of epiphytes across study sites

Table 1: Checklist of epiphytes in seven faculties at Ambrose Alli University

S/N	EPIPHYTE	LOCATION	HABIT
1	*Platycerium bifurcatum*, *Polytrichum commune*	Agriculture Faculty	Herb and Moss
2	*Polytrichum commune*, *Platycerium bifurcatum*, *Microgramma owariensis*, *Ficus Audrey*	Engineering Faculty	Herb, Moss and Tree
3	*Dioscorea dodecaneura*, *Platycerium bifurcatum*, *Polytrichum commune*	Environmental Science Faculty	Shrub, Herb and Moss
4	*Gongronema latifolium*, *Monechma incanum*, *Polytrichum commune*, *Platycerium bifurcatum*, *Ficus aurea* (strangler fig)	Law Faculty	Herb, shrub, moss and tree
5	*Platycerium bifurcatum* *Polytrichum commune*	Management Science Faculty	Herb and Moss
6	*Polytrichum commune*	Physical Sciences Faculty	Moss
7	Nil	Life Sciences	-

Table 2: Abundance of epiphytes in the seven faculties at Ambrose Alli University

S/N	Species	Family	FAG	FET	FES	FLW	FMS	FPS	FLS	Entire
1	*Platycerium bifurcatum*	Polypodiaceae	4	4	1	1	3	__	__	13
2	*Polytrichum commune*	Polytrichaceae	4	6	1	1	3	1	__	16
3	*Ficus Audrey*	Moraceae	__	1	__	__	__	__	__	1
4	*Dioscorea dodecaneura*	Dioscoreaceae	__	__	1	__	__	__	__	1
5	*Monechma incanum*	Acanthaceae	__	__	__	1	__	__	__	1
6	*Gongronema latifolium*	Apocynaceae	__	__	__	3	__	__	__	3
7	*Ficus aurea*	Moraceae	__	__	__	20	__	__	__	20
8	*Microgramma owariensis*	Polypodiaceae	__	1	__	__	__	__	__	1
	Total abundance		8	12	3	26	6	1	0	56
	Relative abundance (%)		14.3	21.4	5.4	46.4	10.7	1.9	0	100.1

KEY: FAG-Faculty of Agriculture; FET–Faculty of Engineering Technology; FES–Faculty of Environmental Sciences/; FLW–Faculty of Law; FMS-Faculty of Management Sciences; FPS–Faculty of Physical Sciences; FLS–Faculty of Life Science

Table 3: Height of phorophytes bearing epiphytes

S/N	PHOROPHYTE	LOCATION	CANOPY TYPE	HEIGHT OF PHOROPHYTES
1	*Terminalia cattapa*	FAG	High canopy Beneath the canopy Sub-canopy	24.23m 79ft 6in 20.86m 72ft 9in 18.91m62ft 0.4in
2	*Terminalia ivorensis*	FAG	High	28.2m 92ft 6In
3	*Cola* sp.	FAG	Beneath the canopy	12.80m 42ft 8In
4	*Terminalia cattapa*	FET	High canopy	21.2m 69ft 6.6In
6	*Mangifera indica*	FET	High canopy level High canopy level	30.44m 98ft 5In 26.2m 85ft 11in
7	*Pinus* sp.	FET	Elevated canopy level	26.97m 88ft 6In
8	*Pentaclethra macrophylla*	FET	Beneath the canopy	15.48m 50ft 9in
9	*Pinus* sp.	FES	Elevated canopy level	22.67m 74ft 4in
10	*Mangifera indica*	FES	Beneath the canopy	18.46ft 60ft 6in
11	*Ficus benjamina*	FLW	Beneath the canopy Sub-canopy Beneath the canopy	16.72m 54ft 10in 18.91m 62ft 2in 11.21m 36ft 9in
12	*Endiadra sieberi*	FMS	High canopy Elevated canopy level Sub-canopy	26m 85ft 3.6in 22m 72ft 2.1in 15m 49ft 2.6in
13	*Mangifera indica*	FPS	Beneath the canopy	20m 65ft 7.4in

FAG-Faculty of Agriculture; FET–Faculty of Engineering and Technology; FES–Faculty of Environmental Sciences; FLW–Faculty of Law; FMS-Faculty of Management Sciences; FPS–Faculty of Physical Sciences; FLS–Faculty of Life Sciences

Table 4: The positions of epiphytes on the phorophytes

S/N	EPIPHYTE	LOCATION	PHOROPHYTES	Growth Position
1	*Platycerium bifurcatum, Polytrichum commune*	FAG	*Terminalia cattapa*	Growing at the trunk line to the canopy
2	*Platycerium bifurcatum Polytrichum commune*	FAG	*Terminalia ivorensis*	Growing at the trunkline
3	*Platycerium bifurcatum, Polytrichum commune*	FAG	*Terminalia cattapa*	Growing at the trunk line to the canopy
4	*Platycerium bifurcatum, Polytrichum commune*	FAG	*Cola spp*	Growing at the trunk line to the canopy
5	*Platycerium bifurcatum, Polytrichum commune*	FET	*Terminalia cattapa*	Growing at the trunkline to the canopy
6	*Polytrichum commune, Platycerium bifurcatum, Microgramma owariensis*	FET	*Mangifera indica*	Growing at the base to the canopy (Whole tree)
7	*Platycerium bifurcatum, Polytrichum commune*	FET	*Pinus spp*	Growing at the tree base to the trunkline
8	*Platycerium bifurcatum, Polytrichum commune*	FET	*Mangifera indica*	Growing at the base to the canopy (Whole tree)
9	*Ficus audrey, Polytrichum commune.*	FET	*Pentaclethra macrophylla*	Growing from the tree base to the canopy (Whole tree)
10	*Discorea dodecanuera*	FES	*Pinus spp*	Growing at the trunkline
11	*Platycerium bifurcatum. Polytrichum commune.*	FES	*Mangifera indica*	Growing at the trunkline
12	*Monechma incanum*	FLW	*Ficus benjamina*	Growing few meters above the base
13	*Gongronema latifoIium*	FLW	*Ficus benjamina*	Expanding from the base of the tree to the canopy (entire tree)
14	*Platycerium bifurcatum, Polytrichum commune*	FLW	*Ficus benjamina*	Growing at the trunkline
15	*Ficus aurea* (strangler fig)	FLW	*Ficus benjamina*	Expanding from the base of the tree to the canopy (entire tree)
16	*Platycerium bifurcatum*	FMS	*Endiadra sieberi*	Growing at the trunkline
17	*Polytrichum commune*	FPS	*Mangifera indica*	Growing at the trunkline

FAG-Faculty of Agriculture; FET–Faculty of Engineering Technology; FES–Faculty of Environmental Sciences; FLW–Faculty of Law; FMS-Faculty of Management Sciences; FPS–Faculty of Physical Sciences; FLS–Faculty of Life Sciences

Table 5: Epiphyte attachment sites on phorophytes in the areas under investigation

Epiphyte position	Total	FAG	FET	FES	FLW	FMS	FPS	FLS
Whole tree	30	—	7(23.3%)	—	23(76.7%)	—	—	—
Tree base	1	—	—	—	1(100%)	—	—	—
Trunk	13	4(30.8%)	—	3(23.1%)	2(15.4%)	3(23.1%)	1(7.7%)	—
Canopy and trunk	12	8(66.7%)	—	4(33.3%)	—	—	—	—
Total	**56**	**12**	**7**	**7**	**26**	**3**	**1**	**0**

FAG-Faculty of Agriculture; FET–Faculty of Engineering Technology; FES–Faculty of Environmental Sciences; FLW–Faculty of Law; FMS-Faculty of Management Sciences; FPS–Faculty of Physical Sciences; FLS–Faculty of Life Sciences

Table 6: Diversity Index of epiphytes in seven faculties at Ambrose Alli University

Variable	FAG	FET	FES	FLW	FMS	FPS	FLS
Simpson1-D	0.57	0.68	1	0.41	0.6	-	-
Shannon H	0.69	1.13	1.1	0.83	0.69	0	-

FAG-Faculty of Agriculture; FET–Faculty of Engineering Technology; FES–Faculty of Environmental Sciences; FLW–Faculty of Law; FMS-Faculty of Management Sciences; FPS–Faculty of Physical Sciences; FLS–Faculty of Life Sciences

DISCUSSION

This study identified a total of eight epiphyte species associated with eight phorophytes, indicating a diverse assemblage of vascular epiphytes distributed in six families. This relatively limited number of families amidst a variety of species underscores the remarkable ecological adaptability of epiphytes. This is consistent with earlier reports that vascular epiphytes are distributed across 73–84 families (Zotz, 2013). Notably, families such as Polypodiaceae, Moraceae and Polytrichaceae were predominant in the study areas, indicating their high species richness and abundance. The observed high diversity within these families may be attributed to their exceptional stress-tolerance and adaptability.

Epiphytes are highly sensitive to microclimatic variations since they derive water and nutrients from atmospheric sources, rendering them vulnerable to changes in humidity and light. However, they exhibit resilience in humid environments, which favour their survival (De Paula Marchiori *et al*., 2023). Among the species identified, *Ficus* (Moraceae) is well-known for its epiphytic tendencies (Burrows and Burrows, 2003), exemplifying the intricate relationships between host trees and epiphytic flora. The distribution of epiphytes varied significantly across the study sites, with the total abundance of 26 individuals (46.4% relative abundance) observed from five species: *Ficus aurea*, *Gongronema latifolium*, *Monechma incanum*, *Polytrichum commune and*

Platycerium bifurcatum. The pronounced epiphytic diversity in the Faculty of Law could be attributed to higher species richness, abundance and diversity of phorophytes in this area. Specific tree species, such as *Ficus benjamina* in the Faculty of Law, *Mangifera indica* in the Faculty of Engineering and *Terminalia catappa* in both the faculties of Agriculture and Engineering, were noted for their suitability as hosts for epiphytic growth.

The bark characteristics of phorophytes play a crucial role in epiphyte colonisation. For instance, *Mangifera indica* was particularly conducive for epiphyte attachment due to its rough, fissured bark, which enhances microhabitat availability for epiphytes (Hietz, 1998). This is in line with findings by Chioma *et al.* (2022), which show that rough-textured bark retains moisture and provides a conducive environment for diverse epiphytic communities. Consequently, the bark's physical properties significantly influence epiphyte diversity, with rough bark surfaces promoting higher colonisation rates compared to smoother counterparts.

Factors influencing epiphyte diversity in tropical ecosystems are multifaceted, encompassing the abundance and characteristics of phorophytes, as well as broader stand dynamics such as age and species composition (Zhao *et al*., 2015). The identity of host trees significantly shapes epiphyte community structures, as trees with varying sizes, ages and bark textures present different ecological niches for epiphytes (Woods, 2013). Specifically, epiphytes exhibit a marked preference for trees with rough bark over smooth bark (Callaway *et al*., 2002; Tupac-Otero *et al*., 2007), indicating a selective advantage linked to bark traits that promote stability and moisture retention (Wyse and Bruce, 2011; Mondragón and Mora-Floresa, 2024).

In this study, the Faculty of Life Sciences (FLS) and the Faculty of Physical Sciences (FPS) demonstrated the lowest epiphyte abundance, likely due to reduced tree density and increased anthropogenic disturbances, such as tree felling and branch pruning. These disturbances considerably alter the natural environment, adversely impacting the distribution and diversity of vascular epiphytes (Flores-Palacios and García-Franco, 2004; Hietz *et al*., 2006; Krömer *et al*., 2007). In contrast, the Faculties of Engineering and Agriculture showed a higher similarity in epiphyte composition, which may stem from comparable tree species assemblages.

The findings indicate that epiphytes exhibit a pronounced preference for specific host trees, as seen with *Ficus aurea* being the most frequently observed species in some faculties, while *Platycerium bifurcatum* and *Polytrichum commune* emerged as the most prevalent across the study area. The previous report indicates that *Platycerium bifurcatum* is the dominant epiphyte in the region (Adubasim *et al*., 2018; Alex *et al*., 2021). Their high abundance may be attributed to their establishment in shady, humid microenvironments with limited soil availability.

The vertical stratification of epiphytes revealed that half of the observed species thrived at sub-canopy heights (below 21 metres), while the other half occupied higher canopies (21 to 40 metres). This pattern aligns with previous studies, indicating that epiphyte diversity correlates positively with crown height due to increased exposure to sunlight and available surface area for colonisation (Addo-Fordjour *et al*., 2008; Chomba *et al*., 2011; Paudel *et al*., 2015).

This study has demonstrated the intricate relationships between epiphytes and their phorophytes, highlighting how host tree characteristics, environmental conditions, and anthropogenic activities affect epiphyte diversity and distribution.

Understanding these dynamics is crucial for developing effective conservation strategies aimed at preserving these unique communities, particularly in urban and disturbed ecosystems. The resilience and ecological roles of epiphytes make them vital indicators of forest health, underscoring the importance of integrating their conservation into broader biodiversity management efforts (Alex *et al*., 2021).

CONCLUSION

This study highlights significant variations in the species composition and diversity of vascular epiphytes across the seven study sites. These differences could be attributed to fluctuations in key environmental parameters, including humidity, light availability and moisture levels. Given the sensitivity of epiphytic flora to anthropogenic disturbances, it is imperative for the University Administration to initiate strategies aimed at minimising human impact on these vital ecosystems. Protecting the health of epiphytic communities not only contributes to the overall biodiversity of the study site but also supports ecological balance within the University's natural habitats. Future research should focus on monitoring these epiphyte populations to assess the effectiveness of conservation measures and to further understand the ecological roles they play in the environment.

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