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Mpem and Djim National Park's katydids (Orthoptera Tettigoniidae) in Cameroon: ecology, distribution and threats

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ABSTRACT Katydids (Orthoptera Tettigoniidae) play essential roles in ecosystem health as herbivores and prey in food webs. However, habitat loss and human activities threaten their survival. This study examines the ecology, distribution, and threats to katydid populations in Mpem and Djim National Park (MDNP), Cameroon. They were collected using sweep nets from July 2023 to June 2024 across shrub savanna and forest habitats, covering four seasons. Human activities were recorded to assess threats. A total of 149 katydid specimens representing 10 species were identified. Species richness and diversity were higher in forest habitats than in shrub savanna, where species distribution was more even. Seasonal variations influenced abundance, with forest species thriving during rainy seasons due to higher moisture levels. Anthropogenic activities, including transhumance, agriculture, and bushfires, were identified as major threats. These findings highlight the need for targeted conservation strategies to protect katydid populations in MDNP. Understanding their ecological roles and the specific threats they face is essential for developing effective management practices to preserve biodiversity in this vulnerable region.

KEY WORDS Ensifera; anthropogenic pressure; species richness; ecotone; protected area.

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INTRODUCTION

The conservation of biodiversity is an urgent global concern, particularly in regions rich in unique ecosystems, such as ecotones (Lemessa et al., 2023). Mpem and Djim National Park (MDNP) in Cameroon, known as forest-shrub savanna ecotone, is characterized by a rich diversity of species that are adapted to the specific conditions found in that transitional area (Mbi & Ndi, 2013; Hiol Hiol et al., 2015; Mbi & Lebga, 2020; Sagang et al., 2022; Makak et al., 2024). This zone serves as a habitat for numerous animal species, many of which are endemic or have specialized ecological requirements (Atagana et al., 2018; Difouo et al., 2020; Simo et al., 2021).

Among the myriad of species that contribute to biodiversity, insects, including bush crickets or katydids represent a significant portion of the biodiversity found in that ecotone that plays an essential role in maintaining ecological balance (Simeu-Noutchom et al., 2022). Katydids are integral components of terrestrial ecosystems, contributing to various ecological functions. They serve as herbivores, feeding on a wide range of plants and therefore influencing plant community dynamics. Their feeding habits can affect plant growth and reproduction, ultimately shaping the structure of the ecosystem (Andersen et al., 2004; Ward & Lariviere, 2004). Furthermore, katydids are known for their role in nutrient cycling; as they feed on plant material and subsequently decompose them, they contribute to soil fertility and promote healthy plant growth (Belovsky & Slade, 2000). In addition to their role as herbivores, katydids are important prey for various predators, including birds, mammals, and reptiles. This positions them as a crucial link in food webs, supporting higher trophic levels and contributing to overall ecosystem stability (Safi & Siemers, 2010; Palmer et al., 2022). Their presence is often indicative of a healthy ecosystem; thus, monitoring katydid populations can provide valuable insights into environmental health. The loss of katydid species could lead to significant disruptions in these ecological processes, highlighting the need for targeted conservation efforts. Despite their ecological significance, katydids face numerous threats primarily driven by human activities. Habitat destruction due to deforestation for agriculture and urban development poses a significant risk to their populations (Gossner et al., 2023; Pernat et al., 2024).

In Cameroon, where agricultural expansion is rampant, natural habitats are being fragmented or entirely destroyed (Njom et al., 2022; Simeu-Noutchom et al., 2022). This not only reduces the available habitat for katydids but also isolates populations, making it difficult for them to find mates and maintain genetic diversity. Additionally, the use of pesticides in agricultural practices further exacerbates the decline of katydid populations (Uhl & Brühl, 2019). Pesticides can have lethal effects on non-targeted insect species, including beneficial insects like katydids (Sánchez-Bayo, 2021; Leroy et al., 2022). The cumulative impact of habitat loss and pesticide exposure can lead to rapid declines in katydid populations, particularly for species that inhabit specialized microhabitats. The vulnerability of katydids is heightened by their life history traits. Many species exhibit specific habitat preferences and have limited dispersal capabilities, making them particularly susceptible to environmental changes (Ter Hofstede et al., 2017; Thompson et al., 2017; Simeu-Noutchom et al., 2022). In MDNP, where biodiversity is exceptionally high but increasingly threatened by human activities, understanding these vulnerabilities is crucial for effective conservation strategies. Currently, there exist a significant knowledge gap regarding the distribution and conservation status of katydid species in Cameroon. While some katydid species have been recently identified within the MDNP, comprehensive studies on their diversity, ecology and threats remain scarce (Simeu-Noutchom et al., 2022; Njom et al., 2022). This lack of information hampers conservation efforts and highlights the urgent need for targeted research initiatives.

To develop successful conservation strategies for katydids in MDNP and similar habitats, it is essential to gather accurate data on their species richness, ecological needs, and the specific threats they face. To address the urgent need for biodiversity conservation in MDNP, this study seeks to explore the ecological roles and conservation needs of katydids. Among the key questions driving this research are: What specific vegetation types or microhabitats within MDNP support the highest diversity of katydids? How do seasonal variations affect the population dynamics and habitat preferences of katydid species in the park? What are the primary anthropogenic threats to katydid populations in MDNP? By focusing on these questions, this study aims to enhance our understanding of katydid ecology, inform targeted conservation strategies, and contribute to the broader goal of preserving the park's biodiversity.

MATERIAL AND METHODS

Study area

The Mpem and Djim National Park (MDNP) is located in the north of the Department of Mbam and Kim, south of the Yoko district, east of the Engamé-Tikar district and west of the central axis serving (Ntui-Yoko), extended between latitude 08°21' and 09°00' N, and longitude 14°25' and 14°55' E and covers an area of 97,480 ha (Fig. 1). However, the easiest access route to the Mpem and Djim National Park remains the transitional axis starting from the

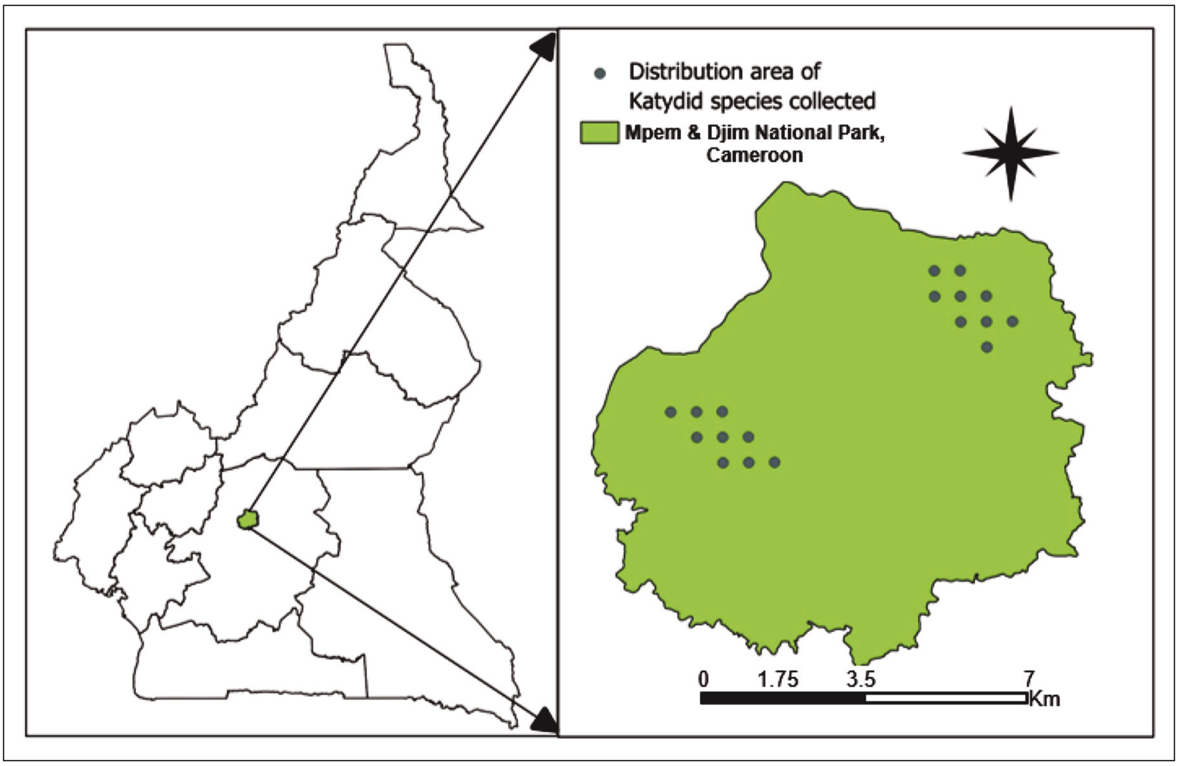

Figure 1. Study area in the Mpem and Djim National Park, Cameroon.

capital of the Mbam and Kim Department (Ntui) passing through the Ngoro district (Makak et al., 2024). It is partially delimited on its eastern side by the large Djim River which has its source downstream of the mountain range which borders the Yoko district and, to the south by the large Mpem River which has its source in the vicinity of the Namibe-Bikar district (Njom et al., 2022). These two large rivers flow independently and form a mouth at the place called Massambe, a transitional village to reach the large Voundou crossroads then Ntui, the capital of the Mbam and Kim Department. This half-loop formed by these two large rivers is at the origin of the name "Mpem and Djim National Park". Water is abundant in the Park and the majority of these rivers flow seasonally from April to December (streams); only the Mpem or the Djim flow throughout the year. Indeed, Mpem and Djim National Park is under four climatic regimes: a long dry season (from mid-November to mid-March), a short rainy season (from mid-March to mid-June), a short dry season (from mid-June to mid-September), and a long rainy season (from mid-September to mid-November).

Data sampling

The present study is based on an extensive review of existing literature and newly collected data from the Mpem and Djim National Park (MDNP) between July 2023 and June 2024. Sampling was conducted in various sectors of the park, including both shrub Savanna and forest vegetation, following transect walks of approximately 8 kilometers over the course of two days per season and per habitat type. Sampling occurred between 10 a.m. and 4 p.m. during four distinct seasonal periods: the long dry season (December), the short rainy season (May), the short dry season (July), and the long rainy season (October). Sampling was conducted across all four seasons, utilizing tools such as GPS for recording coordinates, digital cameras, and sweep nets for species collection. To assess potential threats during the park survey, the presence of anthropogenic activities was noted along the transects. These activities included bushfires, pasture use, logging, hunting, shifting cultivation, and others. Ecological traits of the katydid species were evaluated based on their abundance, occurrence, and habitat characteristics. Additionally, the geographic distribution of each collected species across Africa, as well as their identification was established through a literature review and keys provided by some authors (Naskrecki, 2007; Naskrecki, 2008; Massa, 2013; Hemp, 2013; Heller et al., 2014; Massa, 2021; Hemp & París, 2021; Simeu-Noutchom & Heller, 2022; Cigliano et al., 2025).

Data analysis

Data analysis was performed using PAST software (version 4.03) to calculate diversity indices, and R software (version 4.4) was employed for graphical representations. Abundance was defined as the total number of mature individuals collected in the park, enabling accurate predictions of the population size of katydid species within their respective habitats. Rarefaction curves were used to plot the number of katydid species observed relative to the number of individuals sampled. These curves compare species richness across different environments by standardizing the number of individuals sampled. Separate curves were generated for the two main habitats within the park: Forest and shrub savanna.

RESULTS

Species richness of katydids

Following a year of observation, 149 specimens have been recorded in two habitats, respectively 11 individuals in shrub savanna and 138 specimens in forest (Table 1). The forest habitat exhibits higher species richness and the total number of specimens, while the shrub savanna habitat is less rich and populous. The shrub savanna shows slightly lower dominance, suggesting less skewed species distribution than the forest. The shrub savanna marginally surpasses the forest, suggesting slightly better evenness in species distribution. Forest has slightly higher diversity than the shrub savanna, attributed to its greater species richness. Shrub savanna shows a more equitable species representation. The shrub savanna's lower value suggests less dominance by a single species, while the forest habitat's higher value suggests more dominance by a single species. This comparison reveals how differing environmental conditions influence biodiversity patterns, emphasizing habitat type.

Rarefaction curves

The shape and slope of rarefaction curves provide insights into species richness and evenness. The forest rarefaction curve shows a steeper initial slope (Fig. 2), indicating that many species are found with fewer specimens. As more specimens are added, the curve begins to flatten, suggesting that additional sampling yields diminishing returns in new species discovery. The shrub savanna curve starts with a more gradual slope, reflecting lower initial species diversity compared to forest. It may take a larger number of specimens to reach a similar plateau, indicating that shrub savanna has fewer species overall or that they are less evenly distributed (Fig. 2). The differences in the shapes of the curves can indicate ecological factors affecting species distribution: forest ecosystems often support higher biodiversity due to complex structures, varied microhabitats, and more resources; shrub savanna, while still biodiverse, might be limited by

Index	Taxa_S	Specimens	Dominance_D	Simpson_1-D	Shannon_H	Equitability_J	Berger-Parker
Forest	10	138	0.249	0.750	1.694	0.735	0.420
Shrub savanna	6	11	0.223	0.776	1.642	0.916	0.363
MDNP	10	149	0.221	0.778	1.821	0.790	0.389

Table 1. Diversity indices of katydids between forest and shrub savanna habitats of MDNP, Cameroon.

factors such as soil quality, moisture availability, and competition among species.

Katydids' species relative abundance in habitats and seasons

In the forest habitat, several species exhibit notable abundance patterns that correlate strongly with seasonal changes. For instance, *Apteroscirtus denudatus*, *Leproscirtus granulosus*, *Macroscirtus kekeunoui* and *Zeuneria melanopeza* show significantly higher abundance during the short rainy season and long rainy season, suggesting that these species thrive in conditions characterized by abundant moisture (Fig. 3). This trend is indicative of their reproductive strategies and life cycles, which are likely synchronized with the availability of water resources. The presence of these species during the rainy season may be attributed to favorable conditions for growth and reproduction, allowing them to maximize their population sizes when resources are plentiful. Conversely, during the long dry season and short dry season, there is a marked decline in species abundance across the forest habitat. This decline underscores the impact of drought conditions on species survival, as limited water availability can severely restrict growth and reproductive success. In contrast, the shrub savanna habitat presents a different ecological dynamic. Whether dry or rainy season, katydids' species demonstrate decreased abundance, indicating their less adaptability to the specific conditions of this habitat. Some species found in forest were absent in shrub savanna such as: *Macroscirtus kekeunoui, Apteroscirtus denudatus, Plastocorypha* sp. and *Leproscirtus granulosus* (Fig. 3). The shrub savanna is characterized by less variable canopy cover levels compared to forests, leading to different survival strategies among its resident species. However, similar to the forest habitat, there is also a noticeable decrease in abundance during the dry season in shrub savanna, reflecting a common challenge faced by many species in arid environments where prolonged drought can limit resources.

Threats to katydids and other wildlife

Over the year, many threats have been found during sampling around and in the park. Katydid

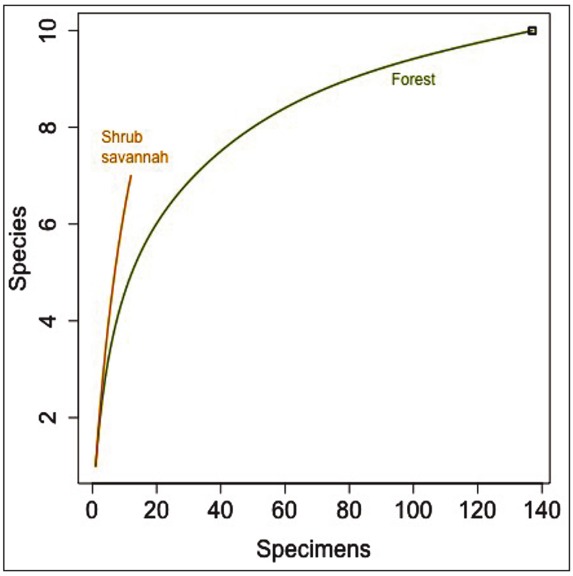

Figure 2. Rarefaction curves comparing forest and shrub savanna habitats.

species existence in the Mpem and Djim National Park, along with that of numerous other invertebrates, is threatened by multiple activities such as transhumance, overgrazing, agriculture, logging and bush fires (Fig. 4).

Transhumance and overgrazing

Livestock farming is a significant activity for transhumant herders, particularly the "Bororos", who raise thousands of cattle in the Linté sector of the Mpem and Djim National Park. However, the coexistence of livestock farming and natural resource conservation often leads to conflicts between forest administration and local communities. The grazing and trampling of domestic animals in protected areas contribute to soil degradation, posing a challenge to conservation efforts. The northern sector of the Mpem and Djim National Park is more shrub savanna with a few pockets of forest; thus, it possesses substantial fodder resources that attract domestic animals. To sustain their large herds, these herders traverse nearly the entire protected area. Overgrazing by cattle driven by transhumant "Mbororo" herders from Adamaoua and other regions exacerbates the degradation of the park, leading to trampling around watering holes, destruction of plant cover, and soil leaching. Moreover, these

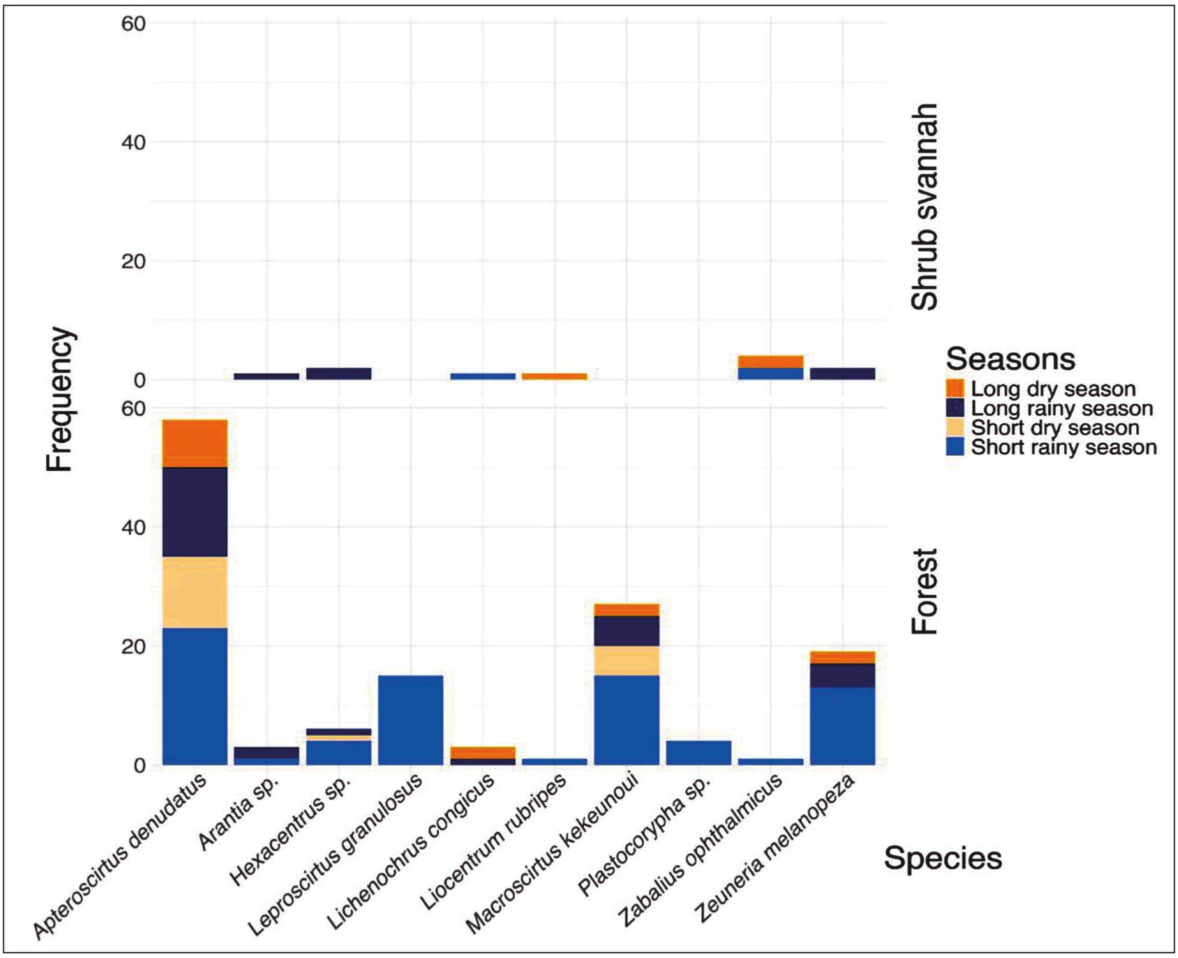

Figure 3. Relative abundance of katydids' species in different type of habitats in the MDNP, Cameroon.

watering holes facilitate disease transmission between wild and domestic animals, as both converge there to drink.

Agriculture and Logging

There has been an increasing recruitment of natural areas for agriculture. The populations living near the park practise slash-and-burn agriculture (Fig. 4). It emerges from our observations in the field that, cocoa cultivation is practised but also itinerant agriculture on slash-and-burn (cassava, peanuts, corn, etc.). The Mpem and Djim National Park is experiencing strong anthropogenic pressures which are linked to agricultural activities (Figs. 4–7). The natives have occupied certain essential points for a long time to carry out their activities and said sites, even with the existence of the park, remain places of covetousness for the populations on one hand and on the other hand, the non-materialization of the artificial limits to be used to circumscribe the park is a permanent threat to the park because the populations from the various regions of Cameroon acquire land for cocoa cultivation which is practised mostly in the forest area. Logging is manifested by the cutting of tree species for commercial purposes but also by the collection of firewood by populations living near the protected areas of Cameroon (Fig. 5). This logging could significantly reduce the range of animals that depend on it.

Bush fires

The issue of fires around the park and sometimes in the park are primarily caused by shepherds and farmers (Fig. 4). Shepherds often ignite fires in search of fresh grass for their livestock during the dry season, using fire as a method to clear land for grazing. Similarly, farmers set fires to clean and prepare their fields for agricultural activities. While this practice can be beneficial for rejuvenating the soil and encouraging new growth, it poses significant risks to the surrounding ecosystem. The uncontrolled spread of wildfires can threaten local wildlife and their habitats, leading to ecological imbalance. Additionally, the smoke produced by these fires can negatively impact air quality in nearby areas. Therefore, it is crucial to find a balance between agricultural practices and environmental protection. Exploring sustainable alternatives to burning can help mitigate these risks, and raising awareness about the consequences of fire-setting is essential for promoting responsible land management. Ultimately, fostering a harmonious relationship between agriculture and nature is vital for preserving both livelihoods and the environment.

Katydid species check list and their habitat in Mpem and Djim National Park

Specimens collected in the Mpem and Djim National Park consisted of 10 species of katydids (Figs. 8–17): *Apteroscirtus denudatus*, *Macroscirtus kekeunoui*, *Zeuneria melanopeza*, *Hexacentrus* sp., *Lichenochrus congicus*, *Arantia* sp., *Plastocorypha* sp., *Leproscirtus granulosus*, *Zabalius ophthalmicus*, *Liocentrum rubripes.*

Systematics

Ordo ORTHOPTERA Olivier, 1789
Familia TETTIGONIIDAE Krauss, 1902
Subfamilia PHANEROPTERINAE Burmeister, 1838

Genus *Zeuneria* Karsch, 1889
Zeuneria melanopeza Karsch, 1889 (Fig. 17)

This species is found in dense vegetation, which provides essential resources for feeding and shelter. It typically inhabits forest edges, grasslands, and shrublands and also associated with habitat mosaics that include montane habitats. As a herbivorous bush-cricket, *Z. melanopeza* feeds on various plant

Figures 4–7. Some anthropogenic activities in MDNP, Cameroon. Fig. 4: bush fires. Fig. 5: deforestation. Fig. 6: maize farms. Fig. 7: cocoa farms plantation.

materials, which are crucial for its growth and reproduction. Males produce distinctive calls to attract females, a common behaviour among katydids that plays a significant role in their mating rituals. Moreover, in addition to Cameroon, *Zeuneria melanopeza* has been documented in several specific locations, particularly in West and central Africa. Key areas include: Guinea, Ghana, Central african republic (Massa, 2013; Heller, 2024; Cigliano et al., 2025).

Genus *Arantia* Stål, 1874
Arantia sp. (Fig. 9)

Species inhabiting a variety of environments, including forests, grasslands, and shrublands. As herbivorous insects, members of *Arantia* consume leaves and other plant materials. This diet is crucial for their growth and reproductive success. Many species within this genus exhibit color patterns that help them blend into their surroundings, providing protection from predators. The geographic distribution of *Arantia* is primarily concentrated in tropical regions, particularly in Africa. Specific locations where species from this genus have been recorded include: West Africa countries such as Sierra Leone, Liberia, and Ivory Coast; Central Africa: in addition to Cameroon, *Arantia* has been documented in Democratic Republic of Congo (Hemp & Massa, 2017; Cigliano et al., 2025).

Subfamilia HEXACENTRINAE Karny, 1925

Genus *Hexacentrus* Serville, 1831
Hexacentrus sp. (Fig. 10)

Hexacentrus sp. was found in environments that feature dense vegetation, such as dense forests, grasslands, and shrublands. These habitats provide essential resources for feeding and shelter.

The genus *Hexacentrus*, includes predatory katydids and plays a significant ecological role in various environments across Asia, Africa, Australia, and the Pacific (Ghosh et al., 2023). *Hexacentrus* species preying on various insects and their predation helps control insect populations, contributing to the ecological balance within their habitats. Furthermore, they utilize their specialized forewings for sound production during mating rituals, which also plays a role in territory establishment, predator avoidance by confusing potential threats and mate attraction. Their roles as predators and communicators underscore their importance in ecological dynamics and biodiversity conservation efforts.

Subfamilia MECOPODINAE Walker, 1871

Genus *Apteroscirtus* Karsch, 1892
Apteroscirtus denudatus Karsch, 1892 (Fig. 8)

The ecological characteristics of *Apteroscirtus denudatus* show that it inhabits environments typical for many bush-crickets, which include grasslands and forest edges. These habitats provide essential resources such as vegetation for feeding and shelter from predators. The species is likely adapted to local climatic conditions, which can vary significantly across its range. Outside of Cameroon, *Apteroscirtus denudatus* has been documented in several African countries, particularly in regions that support its ecological requirements. This species is known only from Cameroon and Central African Republic (see Cigliano et al., 2025). These locations are characterized by diverse ecosystems, including shrub savanna and forest areas, which are conducive to the survival of this bush-cricket species. The distribution patterns indicate a preference for areas with adequate moisture and vegetation cover, essential for its life cycle and ecological interactions.

Genus *Leproscirtus* Karsch, 1892
Leproscirtus granulosus Karsch, 1886 (Fig. 11)

Leproscirtus granulosus has been collected in areas with dense vegetation where it finds shelter and helps decompose leaf litter; it inhabits tropical regions of Africa. The species' presence in these areas highlights its restricted adaptability to different ecological niches within tropical ecosystems. Specific studies have identified populations in Equatorial Guinea, Cameroon, Democratic Republic of Congo where it was collected during ecological surveys (Heller et al., 2014).

Genus *Macroscirtus* Pictet, 1888
Macroscirtus kekeunoui Simeu-Noutchom et Heller, 2022 (Fig. 14)

Macroscirtus kekeunoui was found in humid forest environments, which provide the necessary

Figures 8–17. Katydids' species check list in Mpem & Djim National Park, Cameroon: Fig. 8: male of *Apteroscirtus denudatus*. Fig. 9: female of *Arantia* sp.. Fig. 10: female of *Hexacentrus* sp. Fig. 11: male of *Leproscirtus granulosus*. Fig. 12: female of *Lichenochrus congicus*. Fig. 13: *Liocentrum rubripes*. Fig. 14: *Macroscirtus kekeunoui*. Fig. 15: *Plastocorypha* sp. Fig. 16: female of *Zabalius ophthalmicus*. Fig. 17: male of *Zeuneria melanopeza.*

conditions for its survival and reproduction. These habitats are characterized by dense vegetation, which offers shelter and food sources. As a herbivorous forest-dwelling katydid, *M. kekeunoui* feeds on a variety of plant materials, including leaves and stems. Its feeding habits contribute to the ecological balance by influencing plant community dynamics. Moreover, contrarily to other katydids, *M. kekeunoui* males do not bear stridulatory organs and therefore do not exhibit stridulation. Its distribution in Cameroon highlights the need for further research and conservation strategies to protect this species and its habitat from ongoing environmental threats. Understanding its ecology and distribution can provide insights into the health of the ecosystems it inhabits and inform broader conservation efforts in tropical regions.

Subfamilia PSEUDOPHYLLINAE Burmeister, 1838

Genus *Lichenochrus* Karsch, 1890
Lichenochrus congicus Rehn, 1914 (Fig. 12)

Lichenochrus congicus is a notable species for mimicking forest litter, which provides it with camouflage in its natural habitat. The distribution of this species is primarily centered in the rich biodiversity areas of Congo Basin and specific forest reserves in Ghana (Naskrecki, 2007; Cigliano et al., 2025).

Genus *Liocentrum* Karsch, 1890
Liocentrum rubripes Bolívar, 1906 (Fig. 13)

Only one female was collected during our survey, *Liocentrum rubripes*, inhabiting environments typical for many orthopterans. This species has been caugth in forest, grassland and shrubland ecosystems, where they can find ample vegetation for feeding and shelter from predators. Outside of Cameroon, *Liocentrum rubripes* has been reported in several African countries, including Gabon, Democratic Republic of Congo, Guinea, Sierra Leone and Liberia (Naskrecki, 2008; Cigliano et al., 2025).

Genus *Zabalius* Bolívar, 1886
Zabalius ophthalmicus (Walker, 1869) (Fig. 16)

Zabalius ophthalmicus has been found in habitats that feature dense vegetation, such as forests and shrublands. These environments provide essential resources for feeding and shelter. As a herbivorous katydid, it primarily feeds on leaves and other plant materials. This diet is crucial for its growth and reproduction. The distribution of *Zabalius ophthalmicus* is essentially Afrotropical, and primarily concentrated in East Africa, with notable occurrences in South Africa, Tanzania, Mozambique (Hemp, 2013; Cigliano et al., 2025).

Subfamilia CONOCEPHALINAE Kirby et Spence, 1826

Genus *Plastocorypha* Karsch, 1896
Plastocorypha sp. (Fig. 15)

Plastocorypha sp. has been collected in forests, characterized by trees and some undergrowth rich in Marantacea. These forests provide essential resources such as food and shelter. The species thrives in areas with dense vegetation, especially Marantacea which supports its herbivorous diet. This species is likely nocturnal, using camouflage to avoid predators during the day. This behaviour helps it evade detection while feeding on plant materials. It may play a significant role in its ecosystem by contributing to herbivory dynamics and serving as prey for various predators. Its presence may also indicate the health of the ecosystem, as these insects are sensitive to environmental changes. *Plastocorypha* is distributed in Guinea, Ghana, Cameroon, Gabon, Congo, RDC, Rwanda and South Sudan (Heller et al., 2014; Cigliano et al., 2025).

Plastocorypha includes five species flawed with errors because of incomplete original description. According to our observation and research, these species fall into two groups based on their coloration, the 'dark orange-red faces' which consist of *Plastocorypha brevipes* Rehn, 1914, *Plastocorypha cabrai* Griffini, 1909, *Plastocorypha ituriana* Bolívar, 1922 and the 'black faces' which consist of *Plastocorypha nigrifrons* Redtenbacher, 1891 and *Plastocorypha vandikana* Karsch, 1896. These species can be easily confused due to the lack of distinctive characters. Only females and nymph were collected during our survey. However, the accurate identification needs male specimen and for this purpose, needs further investigation.

DISCUSSION

The study of Ensifera in Cameroon is making increasingly significant progress, particularly in documenting diversity and distribution in crickets, mole crickets and Tettigoniidae (Simeu-Noutchom et al., 2020, 2021, 2022, 2023). However, specific research on ecology and their conservation remains limited, particularly in protected areas. The MDNP is full of several groups of Ensifera such as Tettigoniidea, commonly known as katydids or bush-crickets. They are known to play significant roles in their ecosystems (Naskrecki, 2013; Samways, 1989). To better understand their ecological significance, we documented the Tettigoniidea species found in the MDNP, highlighting their habitat preferences, some ecological roles, and implications for biodiversity conservation. The results from the year-long observation of katydids in the MDNP reveal notable differences in species richness and distribution across two habitats: forest vegetation and shrub savanna. The forest habitat exhibited significantly higher species richness compared to the shrub savanna. This disparity underscores the role of habitat complexity, as forests generally provide diverse microhabitats, and ecological niches, fostering higher biodiversity (Cavard et al., 2011; García-Tejero & Taboada, 2016). Furthermore, research shows that bushfires frequently affect shrub savanna habitat, which can negatively impact insect diversity and abundance. Fire kills insects instantly through extreme heat and combustion, especially those with low mobility, such as larvae, pupae, and ground-dwelling species, impacting the diversity and abundance of insect species (Warren et al., 1987; Carbone et al., 2019). Rarefaction curves reinforce these findings, with the forest curve showing a steep initial slope and an early plateau, indicative of high species diversity that stabilizes with additional sampling. The shrub savanna, with a shallower initial slope, requires more sampling effort to reach a plateau, reflecting its lower richness and possibly greater environmental constraints.

The overall analysis reveals significant insights into how habitat type and seasonal changes influence species distribution and abundance. While forest species tend to rely heavily on consistent moisture availability for their survival and reproductive success, shrub savanna species exhibit a more flexible response to changing moisture conditions. Additionally, this result highlights the importance of understanding these dynamics for conservation efforts; recognizing which species are vulnerable during specific seasons can inform strategies aimed at preserving biodiversity within these ecosystems. The ecology of katydid species is intricately linked to their habitat preferences (Grzędzicka & Vahed, 2020). For instance, *Macroscirtus kekeunoui, Apteroscirtus denudatus, Plastocorypha* sp. and *Leproscirtus granulosus* are essentially found in dense forests characterized by rich undergrowth, particularly favouring Marantaceous plants that support its herbivorous diet. These habitats provide essential resources such as food and shelter, enabling the species to thrive. Moreover, the sensitivity of these species to environmental degradation, positions them as potential bioindicators for assessing forest ecosystem health. Indeed, some katydids, like their close relatives the grasshoppers, can function as effective biological indicators (Thompson et al., 2017). However, the Mpem and Djim National Park, as a vital ecological zone, faces multiple anthropogenic threats that jeopardize its biodiversity and ecological balance. Livestock farming, particularly by transhumant herders like the Bororos, is a major concern. Overgrazing and trampling by large cattle herds degrade soil quality, destroy vegetation, and disrupt wildlife habitats, particularly around watering holes, where disease transmission between domestic and wild animals is a critical issue (Wick et al., 2016; Steier & Patel, 2018). Moreover, bushfires, often intentionally set by shepherds to rejuvenate grazing lands or by farmers to prepare fields, frequently spread uncontrollably in the MDNP, destroying habitats, polluting the air, and threatening insects and other animals (Bhattacharjee et al., 2023). Similarly, slash-and-burn agriculture and expanding cocoa cultivation encroach on forested areas, accelerating habitat destruction. Logging, whether for commercial timber or local firewood needs, further exacerbates deforestation, shrinking the habitat ranges of many species including some katydids (Abudulai et al., 2022). These overlapping pressures not only endanger specific species, such as katydids, but also threaten the overall health of the park's ecosystem. Mitigating these challenges requires urgent action through sustainable practices, enhanced law enforcement, and community engagement to ensure the park's long-term preservation.

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