International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 08-06-2026, Accepted: 08-07-2026, Published: 23-07-2026
Volume 11, Issue 3, 2026, Page No. 145-146

Study of Plains Cupid (*Luthrodes pandava*) diversity in the vegetative campus of Sreekrishna College, Guruvayur, Ariyannur, Thrissur, Kerala, India

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DOI: https://doi.org/10.66856/ijer.2026.11.3.11251

Abstract
Butterfly abundance and diversity are significantly influenced by spatial heterogeneity and seasonal variation in tropical landscapes. This study aimed to evaluate the abundance of Plains Cupid (*Luthrodes pandava*) across four distinct sites (LH, Ground, Helipad, and Main Block) from August to October 2025. The findings revealed site-specific peaks in butterfly populations: LH experienced a late-season surge with 20 individuals observed on October 7; Ground and Helipad peaked earlier in August-September, with 13 and 15 individuals respectively; while Main Block consistently recorded lower values (5-7 individuals). These results underscore the critical role of temporal monitoring and habitat heterogeneity in maintaining butterfly populations. Conservation strategies should therefore prioritize site-specific resource management to support both early and late-season abundance.

Keywords: Lepidoptera, relative abundance, conservation, indicator species

Introduction
The Plains Cupid, a small butterfly, stands out for its rare ecological and economic contributions. Its relationship with cycads and ants makes it one of the most interesting members of the Lycaenidae family. Plains cupid diversity is commonly found in India, Sri Lanka, Nepal, Southeast Asia, China, and Australia. It prefers gardens, parks, agricultural areas, open fields, and places with cycads. The plains cupid is adaptable to human environments. Understanding butterfly biology can help us appreciate butterfly diversity and manage plant health in gardens and nurseries. Many studies have been conducted in India on the abundance of butterflies (Gupta and Kumar, 2025) [4] Host plants of the butterflies were significant for the diversity and abundance of the species and from India there are many reports of host plants of the butterflies (Nitin *et al*., 2008) [7].

The diversity of plains cupid in the vegetative campus of Sreekrishna College, Guruvayur, during August to November, 2025 shows variations in the relative abundance of this species at different sites and seasons. This highlights the habitat and seasonal conservation importance of this species. The valuable insights of this investigation underline the ecological roles of this butterfly and the need for ongoing monitoring and conservation strategies to protect this species. Also, this butterfly can be used as indicator species of the ecosystem (Thomas, 2005) [7]

Materials and Methods
This study investigated the diversity of the Plains cupid butterfly on the campus of Sree Krishna College, Guruvayur, located in Ariyannur, Thrissur, and Kerala. Sree Krishna College in Guruvayur (Ariyannur, Kerala) is located at exact geographic coordinates. 10.6072° N latitude and 76.0885° E longitude. The research was conducted over three months, during which various microhabitats within the college campus were surveyed for the presence of this butterfly species. The study was conducted from August to October 2025. The observation site of the Sreekrishna College campus was categorized into Helipad, Ladies Hostel (LH), Ground, and Main block. The fixed-area transect method and visual encounter surveys (VES) are used for data collection. Each study location included transect lines spanning 500 m, along which observations were recorded. Visits were conducted between 6 a.m. and 8 a.m. to coincide with the periods of high butterfly activity. Data collection involved direct observation and photographic documentation, with particular attention paid to lepidopteran diversity in relation to time, season, and habitat preferences. Relative abundance (RA) = ni/N (Bisht *et al*., 2004) [1].

Results
The abundance of Plains Cupid butterflies was monitored across four sites—LH, Ground, Helipad, and Main Block—from August to October, 2025. Distinct temporal and spatial variations were observed in the study. LH exhibited stable counts (6–7 individuals) through August and September, followed by a sharp increase to 20 individuals on October 7, and then a decline to 13 on October 14. Ground showed moderate values in early August (7), peaking at 13 individuals on August 19 and September 16, and then stabilizing at 8–9 individuals in October. Helipad recorded its highest abundance in mid-August (15 individuals on August 12 and 19), followed by a decline to five on September 23, with partial recovery to ten on October 14. The Main Block consistently recorded low values (5–7 individuals) across all sampling dates, with no significant fluctuations.

Relative abundance (RA) = ni/N (Bisht *et al*., 2004) [1]

Relative abundance = (\frac{\text{count at site}}{\text{total count in month}} \times 100)

Months	LH	Ground	Helipad	Main B
August 2025	20%	25%	35%	25%
September 2025	25%	30%	30%	15%
October, 2025	40%	20%	25%	15%

The results revealed site-*Plains Cupid* abundance. LH demonstrated late-favorable microclimatic factors. Similar late ground and helipad-supported early peaks in August and September were observed, consistent with studies showing that butterfly diversity is strongly shaped by seasonal rainfall and vegetation cycles. The partial recovery at the Helipad in October suggests dynamic habitat conditions, potentially linked to vegetation turnover or disturbance regimes. The main Block consistently exhibited low abundance, implying limited suitability for the plains cupid habitat.

Discussion

Butterflies are widely recognized as bioindicators of ecosystem health because of their sensitivity to habitat quality, resource availability, and climatic variation (Das *et al*., 2023) [3]. Seasonal fluctuations in butterfly abundance are particularly pronounced in tropical and subtropical regions, where rainfall, vegetation cycles, and microclimatic conditions shape their population dynamics (Mahata, Naik, & Palita, 2024) [6]. The results highlighted clear site-specific and seasonal differences in Plains Cupid abundance. Bonebrake *et al*. (2008) [2] reported that habitat heterogeneity influences butterfly diversity. Kunte (1997) [5] recorded seasonal variations in butterfly diversity and abundance in four different tropical habitats in northern India. In our study, the LH site demonstrated a late-season surge, suggesting that this site provided optimal conditions in October, possibly due to increased floral resources, reduced competition, or favorable microclimatic factors. In contrast, ground and helipads supported early peaks in August and September, indicating that these habitats may offer resources earlier in the season but decline in suitability as conditions change. The partial recovery at the Helipad in October suggests dynamic habitat conditions, potentially linked to vegetation cycles or disturbance regimes. The main Block consistently exhibited low abundance, implying limited suitability for the Cupid in the plains. Factors such as reduced nectar availability, shading, and anthropogenic disturbance may explain the consistently poor performance at this site. Overall, these findings emphasize the importance of temporal monitoring in butterfly diversity studies. The asynchronous peaks across sites suggest that plains cupid populations exploit different habitats at different times, reflecting ecological plasticity. Conservation strategies should therefore prioritize maintaining habitat heterogeneity: LH for late-season resources, and Ground and Helipad for early-season support. Site-specific management can enhance the overall population stability and resilience.

Conclusion

This study demonstrated that Plains Cupid abundance is strongly influenced by both spatial and temporal factors. LH emerged as the most productive site in October, whereas the ground and helipad supported earlier peaks. The main Block contributed minimally to the overall diversity. These results underscore the need for habitat-specific conservation planning, ensuring that both early- and late-season resources are preserved to sustain butterfly populations throughout their active periods.

Acknowledgement

Authors acknowledge Department of Zoology, Sreekrishna College, Guruvayur for providing the laboratory and library facilities

Funds

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Competing Interest

The authors declare no relevant financial or non-financial interests.

Authors Contribution

All authors contributed to the study's conception and design. Data collections were done by ion [K.V.Safreena], [A.Aryananda] [T.V.Vismaya] and [P. Anusha] and analysis and the discussion of manuscript was prepared by [Brinesh R]. The first draft of the manuscript was written by [Brinesh R] and all authors commented on the pre- versions of manuscript. All authors have read and approved the final manuscript.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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