

Butterfly Species Diversity, Occurrence and Abundance In Gandhi Park of Shivamogga, Karnataka, India

Sayeswara, H.A.

Department of Zoology, Sahyadri Science College (Autonomous), Kuvempu University, Shivamogga-577203,
Karnataka, India

Corresponding Author: Sayeswara, H.A.

Abstract: The survey was conducted to prepare a preliminary checklist of butterflies of Gandhi Park at Shivamogga, Karnataka. Shivamogga City Corporation is a heart land of Karnataka state. Climate of Shivamogga is tropically wet and dry. Majority of the rainfall occurs between June and early October. Butterflies were sampled from July to November 2016. This short term study recorded 36 species of butterflies in 27 genera from five families. Nymphalidae dominated the list with 16 species. Papilionoidea and Pieridae with 8 species each. Lycaenidae with three species and Hesperidae with only one species. It was found that two species of butterflies were very common, nine species are common, thirteen species are not rare and twelve species of butterflies were rare in occurrence in Gandhi park of Shivamogga. This study will enlighten the information regarding the diversity of butterflies and forms a baseline data for future butterfly studies.

Key words: Butterflies, Nymphalidae, Gandhi Park, Shivamogga

Date of Submission: 31-08-2018

Date of acceptance: 15-09-2018

I. Introduction

Arthropods are good indicators of habitats biodiversity because they respond quickly to environmental changes, and are highly diverse taxon. Lepidoptera (Butterflies and moths) are the second largest order of arthropods and are most easily identified, making them particularly useful for biodiversity survey (Erhardt, 1985; Kremen, 1994; Inouye, 2001; Tiple and Arun, 2009). Butterflies are sensitive biota, which get severely affected by environmental variations and changes in forest structure (Pollard, 1991). Butterflies are the most beautiful and colorful creatures on the earth and have a great aesthetic value. They form an important part of the food chain of birds, reptiles, amphibians, spiders and predatory insects (Aneesh *et al.*, 2013). Butterflies are also sociologically significant as they are morphologically and colorfully meaningful which has various effects to the culture to some groups of people (Alma *et al.*, 2015). Butterflies serve the ecosystem especially by recycling nutrients (N,P & K) essential for crops (Schmidt and Roland, 2006). Their larvae release faeces while feeding on the agrestals and provide required nutrients to the crops (Marchiori and Romanowski, 2006). Butterflies and their caterpillars are dependent on specific host plants for food, thus the diversity of butterflies indirectly reflects overall plant diversity especially that of shrubs and herbs in the given area (Padhye *et al.*, 2006). Most of them are strictly seasonal and prefer only particular set of habitats (Kunte, 1997). The adult butterflies act as pollinators and help in pollination of many native plants. To a large extent, butterflies contribute to the growth, maintenance and expansion of flora in the tropical regions where these insects show high abundance and species diversity. For many predators like birds, lizards these butterflies both in larva and adult stages act as their prey species. Diurnal butterflies are preferred indicators of habitat disturbance because of their sensitivity to environmental changes, diversity, advanced taxonomy, and lower economic and temporal costs of collection (Bonebrake *et al.*, 2010; Daily & Erlich, 1995; Leon-Cortes *et al.*, 2003; Bonebrake & Sorto, 2009). They also have been used as models to monitor temporal changes in plant-insect interactions, because climate change induces phenological mismatches between butterflies and their exploited plant species that can produce changes in trophic webs (Parmesan, 2006; Altermatt, 2010; Kocsis & Hufnagel, 2011). India is home to about 1504 species of butterflies (Triple, 2011) which is about 8.74% of total butterfly species of world and constitutes of 65% of total Indian fauna. Different species of butterfly are supported by different ecosystems of our country (Sprih *et al.*, 2015). Appropriate abiotic and biotic factors such as climate condition, temperature and wind exposure, availability of host and larval plants (Barlow *et al.*, 2007), food and vegetation (Ravindra *et al.*, 1996; Khan *et al.*, 2004; Jain & Jain, 2012; Kharat *et al.*, 2012; Kumaraswamy & Kunte, 2013), topographic features (Amala *et al.*, 2011), habitat quality (Barlow *et al.*, 2007) are some of the most important parameters to determine butterfly composition in a community. Increased urbanization is one of the main cause of decrease in butterfly species richness, diversity and abundance (Blair and Launer, 1997; Clark *et al.*, 2007; Poczewicz *et al.*, 2009) In the present day scenario, due to fragmentation of habit and depletion of natural cover many species of

butterfly facing threat to their existence. The present study was conducted to estimate diversity and occurrence of butterfly community.

II. Materials And Methods

Study area

Gandhi Park is one of the biggest parks in Shivamogga with an area of 5 hectares. The park has a variety of flowering plants. Shivamogga City Corporation (13° 55' 183 NL, 75°, 342 123 EL) is heart land of Karnataka state. According to the Shivamogga City Municipal Corporation, the city has a total area of about 50 km² (19.31 square miles). Climate of Shivamogga is tropically wet and dry. This means that the winter and the early part of the summer are typically dry periods. Majority of the rainfall occurs between June and early October.

Butterfly collection

Butterflies were sampled for a period of seven months from July to November 2016. Field observations were made once in a week. The survey was done every Sunday between 10.00 to 16.00 hours on Gandhi Park of Shivamogga. Observations were made through Pollard walk method by counting all the butterflies found in 10 meter, beside the observer and visual count method was also adopted (Kunte, 1997; Gupta et al., 2012; Kunte et al., 2012), during good weather conditions. Butterflies were observed, captured, identified and released immediately at the spot of capture. The butterflies which were difficult to identify in the field were collected as voucher specimens using a hand net. The dead specimens were kept in butterfly collection box.

Determination of Abundance

The species were further divided in to 4 categories: Very Common (VC), Common(C), Not Rare (NR) and Rare (R) on the basis of their count from the study area. Any species with count less than 10 times were placed in rare category, count between 10 and 15 were placed in not rare category, count between 15 and 20 were categorized as common while species with count more than 20 times were placed in very common category.

Identifications of butterflies

The key characters used for identification were color pattern, wing span and mode of flight. Identifications were carried out with help of Evans(1932), Yalbot (1947), Photographic guides of Smith (2006), Van dr Poel & Wangchuk (2007) and internet references (www.flutters.org; www.ifoundbutterflies.org)

III. Results And Discussion

Many studies have been documented on the butterflies on India. Larson (1988) made a detailed survey of Butterflies of Niligiri Mountains and recorded nearly 300 species including endemics. Saurav Dwari and Amal Kumar Mondal (2015) recorded 29 species of butterflies from Agricultural fields of Howrah district of West Bengal. Alma *et al.* (2015) recorded 104 species of butterflies from open and close canopy forests of Cadaclan, San Fernando La union botanical garden of North Luzon, the Philippines. Abideen *et al.* (2015) recorded 57 species of butterfly in University of Ibandan Botanical Garden, Nigeria. Santhosh and Basavarajappa (2014) recorded 95 species of butterflies from Agro-horticultural ecosystems of Mysore, India. Sayeswara (2014) recorded 33 species of butterflies from Sahyadri College Campus, Shivamogga City, Karnataka. Irunbam and Meenakshi (2014) recorded 125 species of butterflies from Mendralgang of Bhutan. Prasanna Kumar *et al.* (2013) recorded 84 species of butterfly from tropical habitats of Eastern Ghats of Andhra Pradesh. Monsoon Jyoti Gogoi (2013) recorded 292 species of butterflies from Jeypore-Dehing forest, Eastern Assam. Joseph (2013) reported 101 species of butterflies from Alagarhills, Tamil Nadu. Manendra Kaneria *et al.* (2013) reported 50 species of butterflies from Bilaspur District, Chhattisgarh. Sharmila and Chhattisgarh. Jeevan *et al.* (2013) recorded 41 species of butterflies from Mandagadde Bird Sanctuary of Shivamogga, Karnataka. Bubesh Gupta et al. (2012) recorded 50 species of butterflies from Seshachalam Biosphere Reserve, Andhra Pradesh. Raghavendra Gowda *et al.* (2011) reported 54 species of butterflies from Lakkavalli range of Bhadra Wild Life Sanctuary, Karnataka. Venkataraman (2010) reported 70 species of butterflies in the Eastern Ghats. Arun Singh (2009) recorded 147 species of butterflies from Kedarnath Musk Deer Reserve, Himalaya. Pramod Kumar *et al.* (2007) recorded 57 species of butterflies from Tiger- Lion Safari, Thyavarekoppa, Shivamogga, Karnataka. Soloman Raju (2004) recorded 68 species of butterflies from Visakhapatnam. Kunte (1997) recorded 103 species of butterflies from for tropical habitats in Northern Western Ghats.

A total of 36 species of butterflies belonging to five families were identified from the Gandhi Park of Shivamogga (Figures 1 & 2). Monthly variations of butterflies are given in Figures 3-8. Butterfly compositions of different families are given in Figure 9. Relative abundance of butterflies is given in Figure 10.

Nymphalidae recorded 12 genera and 16 species of butterflies constituting 44.4% of total butterfly population. In diversity, the genus *Junonia* is represented by 4 species, *Danaus* is represented by 2 species and *Hypolimnas*, *Tirumala*, *Elymnias*, *Euploea*, *Neptis*, *Ariadne*, *Orsotriaena*, *Mycalesis*, *Melanitis* and *Ideopsis* each represented by a single species. *Junonia iphita*, *Junonia lemonias*, *Danaus chrysippus*, *Danaus genutia*, *Ariadne merione*, *Orsotriaena medus*, *Mycalesis subdita* and *Melanitis leda* appeared in all the five months from July to November.

Papilionoidea supported 4 genera and 8 species of butterflies constituting 22.2% of total butterfly population. With regard to their diversity the genus *Papilio* was represented by 4 species, *Pachliopta* was represented by 2 species and *Graphium* and *Acraea* represented only by a single species. *Papilio polytes*, *Papilio polymnester*, *Papilio demoleus*, *Papilio crino*, *Pachliopta hector* *Graphium agamemnon* and *Acraea violae* appeared in the five months.

Pieridae recorded 7 genera and 8 species of butterflies constituting 22.2% of total butterfly population. The genus *Catopsila* was represented by 2 species and *Hebomoia*, *Eurema*, *Cepora*, *Ixias*, *Belenois* and *Delias* each represented by a single species. *Catopsila pomona*, *Eurema hecabe*, *Cepora nerissa*, *Ixias pyrene*, *Belenois aurota* and *Delias eucharis* appeared in all the five months.

Lycaenidae recorded 3 genera and 3 species of butterflies constituting 8.33% of total butterfly population. With regards to their diversity, the genera *Jamides*, *Pseudozizzeeria* and *Chilades* was represented by a single species, *Jamides celeno* and *Chilades parrhasius* appeared in all the five months. Hesperidae supported only one butterfly *Notocrypta curvifascia* which appeared in all the five months from July to November.

It was found that two species of butterflies were very common, nine species are common, thirteen species are not rare and twelve species of butterflies were rare in occurrence in Gandhi park of Shivamogga.

IV. Conclusion

A total of 36 species of butterflies belonging to five families were recorded from Gandhi park of Shivamogga. Butterfly diversity of Gandhi park of this district is very high but cannot compare with past due to lack of previous data. The botanical garden and growth of natural trees are main causes of species richness and diversity of butterflies. Botanical parks are unique ecosystem that provides several services to butterflies. From our observations, we conclude that the butterfly community varied significantly among different habitats. Vegetation type played an important role in diversity patterns of butterfly community. Butterfly habitat protection should be given the first priority in any conservation programme. Attempts should be made to initiate conservation of butterflies in the National parks and Sanctuaries. Research efforts should be stepped up to gather information on the biology and ecology of all butterflies.

Acknowledgement

The authors would want to convey their gratitude to the honorable Chairmen Dr. K.L.Naik, Assistant Professor of Zoology, Sahyadri Science College (Autonomous), Shivamogga, Karnataka, India for infrastructural facility in this study.

Literature cited

- [1]. Abideen, A.A., James, K.O. and Georgina, S.M. (2015). Butterfly Species Diversity and Abundance in University of Ibadan Botanical Garden, Nigeria, *Open Journal of Ecology*, 5: 352-360.
- [2]. Alma, E.N., Alma, B.M., Grecebio Jonathan, D.A. (2015). Diversity and distribution of Butterflies in the open and close canopy forests of Cadaclan, San Fernando La union botanical garden of North Luzon, the Philippines, *Journal of Biodiversity and Environmental Sciences*, 6(1): 169-177.
- [3]. Altermatt, F. (2010). Tell me what you eat and I will tell you when you fly: diet can predict phenological changes in response climate change. *Ecology Letters*, 13: 1475-1484.
- [4]. Amala, S., Rajkumar, M. and Anuradha, V. (2011). Species richness of butterflies in the selected areas of Siumalai Hills, *International Journal of Pure Applied Science Technology*, 6(2): 89-92.
- [5]. Aneesh, K.S., Adarsh, C.K. and Nameer, P.O. (2013). Butterflies of Kerala Agricultural University (KAU) Campus, Thrissur, Kerala, India, *Journal of Threatened tax*, 5(9): 4422-4440.
- [6]. Arun, P.S. (2009). Butterflies of Kedarnath Musk Deer Reserve, Garhwal, Himalaya, India, *Journal of Threatened Taxa*, 1(1): 37-48.
- [7]. Barlow, J., Overal, W.L., Araujo, I.S., Gardner, T.A. and Carlos, A.P. (2007). The value of primary, secondary and plantation forests for fruit-feeding butterflies in the Brazilian Amazon, *Journal of Applied Ecology*, 44: 1001-1012.
- [8]. Blair, R.B. and Launer, A.E. (1997). Butterfly diversity and human land use: Species assemblages along an urban gradient, *Biological conservation*, 80: 113-125.
- [9]. Bonebrake, T.C. and Sorto, R. (2009). Butterfly (Papilionoidea and Hesperioidea) rapid assessment of a coastal countryside in EI Salvador, *Tropical Conservation Science*, 2(1): 34-51.
- [10]. Bonebrake, T.C., Ponisio, L.C., Boggs, C.L. and Erlich, P.R. (2010). More than just indicators: A review of tropical butterfly ecology and conservation, *Biological Conservation*, 143: 1831-1841.
- [11]. Bubesh, G.M., Chalapathi Rao, P.V., Srinivasa Reddy, D., Shekhar Maddala, S.R. and Madhu Babu, P. (2012). A Preliminary observation of butterflies of Seshachalam Biosphere Reserve, Eastern Ghats, Andhra Pradesh, India, *World Journal of Zoology*, 7(1): 83-89.

- [12]. Clark, P.J., Michael, J.R. and Chew, F.S.(2007). Effect of urbanization of butterfly species richness, guild structure and rarity, *Urban Ecosystem*, 10: 321-337.
- [13]. Daily, G.C. and Erlich, P.R. (1991). Preservative of biodiversity in small rainforest patches: rapid evaluations of using butterfly trapping, *Biodiversity and Conservation*, 4: 35-55.
- [14]. Erhardt, A. (1985). Diurnal Lepidoptera: Sensitive indicators of cultivated and Abandoned Grassland, *Journal of Applied Ecology*, 22: 849-861.
- [15]. Evans, W.H. (1932). The identifications of Indian Butterflies, 2nd Edition, Natural History Society, Bombay, India.
- [16]. Gupta, M.B., Rao, P.V.S., Reddy, D.S., Maddala, S.R.S.C.S. and Babu, P.M. (2012). A Preliminary observations on Butterflies of Seshachalam Biosphere reservoir, Eastern Ghats, Andra Pradesh, India, *World Journal of Zoology*, 7(1): 83-89.
- [17]. Irungbam Jatishwor Singh & Meenakshi Chib. (2014). A Preliminary checklist of butterflies (Lepidoptera: Rhopalocera) of Mendralgang, Tsirang district, Bhutan, *Journal of Threatened Taxa*, 6(5): 5755-5768.
- [18]. Inouye, D.W.(2001). Role of Pollinator in *Encyclopedia Biodiversity*, 4: pp.730-732, Academy Press, London.
- [19]. Jain, N. and Jain, A. (2012). Butterfly diversity of Hadoti Region, Rajasthan, India, *Flora and Fauna*, 1892): 274-276.
- [20]. Jeevan, E.N., Naik, K.L., Ashashree, H.M. and Sayeswara, H.A. (2013). Butterfly diversity and Status in Mandagadde of Shivamogga, Karnataka, *International Journal of Applied Biology and Pharmaceutical Technology*, 4(4): 325-332.
- [21]. Kehimkar, I. (2008). *The Book of Indian Butterflies*. Bombay Natural History Society, Oxford University Press, Bombay.
- [22]. Khan, M.R., Khurshid, A., Ikram, B., Malik, A.I. and Mir, A. (2004). Biodiversity of Butterflies fro district Pooch and Sudhnoti, Azad Kashmir, *Asian Journal of Plant Sciences*, 3(5): 556-560.
- [23]. Kharat, A., Nikam, S. and Gurule, S. (2012). Pattern of butterfly diversity from Nasik and Dhule Districts, Maharashtra, *Flora and Fauna*, 18(2): 243-252.
- [24]. Kocsis, M. and Hufnagel, L. (2011). Impact of climate change on Lepidoptera species and communities. *Applied Ecology and Environmental Research*, 9(1): 43-72.
- [25]. Kremen, C. (1994). Biological Inventory Using Target Taxa: A Case Study of Butterflies in Rainforest Madcasgar. *Journal of Ecological Applications*, 4: 407-422.
- [26]. Kumaraswamy, S. and Kunte, K. (2013). Integrating biodiversity and conservation with modern agricultural landscapes, *Biodiversity and Conservation*, 22: 2735-2750.
- [27]. Kunte, K. (1997). Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in Northern Western Ghats, *Journal of Biosciences*, 22: 593-603.
- [28]. Kunte, K., Sondhi, S., Sangam, B.M., Lovalekar, R., Tokekar, K. and Agarvekar, G. (2012). Butterflies of Gora Hills of Meghalaya, Northeastern India: their diversity and conservation, *Journal of Threatened Taxa*, 4(10): 2933-2992.
- [29]. Larsen, T.B. (1988). The Butterflies of Niligiri Mountains of South India, *Bombay Natural History Society*, 85(1): 26-43.
- [30]. Leon-Cortes, J.L., Jones, R. and Gomez-Nucamendi, O.L.(2003). A Preliminary Assessment of the Butterfly Fauna of El Eden Ecological Reserve: Species Richness and Habitat Preferences. In: *The lowland Maya Area: Three Millennia at the Human-Wild land interface*. Goemz-Pompa, A., Allen, M.F., Fedick, S.L. and Jimenez-Osornio, J. (Eds.), pp. 261-276, Haworth Press, Binghamton, New York.
- [31]. Manendra Kaneria, Manish Kaneria and Vivek Kushwah. (2013). Diversity of Butterflies (Lepidoptera) in Bilaspur District, Chhattisgarh, India, *Asian Journal of Experimental Biological Sciences*, 4(2): 282-287.
- [32]. Marchiori, M.O. and Romanowski, H.P. (2006). Species composition and diel variation of a butterfly taxocene (Lepidoptera, Papilionoidea Hesperioidea) in a forest at Itapúa state Part, Rio Grande do Sul, Brazil, *Eevista Brasileira de Zoologia*, 23(2): 443-454.
- [33]. Monsoon Jyoti Gogai. (2013). A Preliminary checklist of butterflies recorded from Jeypore-Dehing forest, Eastern Assam, India, *Journal of Threatened Taxa*, 5(2): 3684-3696.
- [34]. Parmesan, C. (2006). Ecological and evolutionary responses to recent climate change, *Annual Review of Ecology, Evolution and Systematic*, 37: 637-669.
- [35]. Pollar, E. (1991). Monitoring butterfly numbers, pp.87-111. In: Goldsmith, F.B.(Ed.). *Monitoring for Conservation and Ecology*, Chapman and Hall, London.
- [36]. Pocewicz, A., Morgan, P. and Eignbrode, S.D. (2009). Local and landscape effects on butterfly density in northern Idaho grass lands and forests, *Journal of Insect Conservation*, 13: 593-601.
- [37]. Pramod Kumar, M.P.H., Hosetti, B.B., Poomesh, H.C. and Raghavendra Gowda, H.T. (2007). Butterflies of Tiger- Lion Safari, Thyavarekoppa, Shivamogga, Karnataka, *Zoo's Print Journal*, 2(8): 2805.
- [38]. Prasanna Kumar, V., Harinath, P., Meerabai, B. and Ramanna, S.P. (2013). Patterns of Butterfly diversity in three tropical habitats of Eastern Ghats in Southern Andra Pradesh, *Discovery Life*, 4(11): 10-15.
- [39]. Raghavendra Gowda, H.T., Vijaya Kumar, Pramod Kumar, A.F. and Hosetti, B.B.(2011). Butterfly diversity, Seasonality and Status in Lakkavalli range of Bhadra Wild Life Sanctuary, Karnataka, *World Journal of Science and Technology*, 1(11): 67-72.
- [40]. Ravindra, M., Viswanathan, S. and Ram, G.M. (1996). Checklist of butterfly species of Osmonia University Campus, Hyderabad, *Zoo's Print Journal*, 11(10): 5.
- [41]. Santhosh, S. and Basavarajappa, S. (2014). Butterfly diversity at Agro-Horticultural ecosystems under tropical conditions of Karnataka, India, *The Ecoscan*, 8(1&2), 67-75.
- [42]. Saurav Dwari and Amal Kumar Mondal. (2015). Butterflies diversity of Agricultural fields of Howrah district, West Bengal, India with special reference to their host plants in agroecosystem, *International Journal of Science and Nature*, 6(3): 389-396.
- [43]. Sayeswara, H.A. (2014). A Preliminary observation on Butterflies of Sahyadri College Campus, Shivamogga, Karnataka, India, *International Journal of Pharma Medicine and Biological Sciences*, 3(4): 34-39.
- [44]. Sharmila, J.E. and Joseph, T. (2013). Diversity of butterflies in Alagarhills, Tamil Nadu, South India, *Current Biotica*, 6(4): 473-479.
- [45]. Schmidt, B.C. and Polard, J. (2006). Moth diversity in a fragmented habitat: Importance of functional groups and landscape scale in the boreal forest, *Annals of the Entomological Society of America*, 99(6): 1110-1120.
- [46]. Soloman Raju, A.J. (2004). Nectar host plants of some butterfly species at Visakhapatnam, *Science and Culture*, 70: 187-190.
- [47]. Smith, C. (2006). *Illustrated Checklist of Nepal's Butterflies*. Craftsman Press, Bangkok.
- [48]. Talbot, G.(1947). *The Fauna of British India including Ceylon and Burma butterflies*, 2nd Edition, Volume-II, Taylor and Francis Ltd., London, UK.
- [49]. Tiple, A.D. and Arun, M.K.(2009). Butterfly Species Diversity, Habitats and Seasonal Distribution in Nagpur City, Central India, *Journal of Natural History*, 43: 855-884.
- [50]. Tiple, A.D. (2011). Butterflies of Vidarbha region, Maharashtra State, Central India, *Journal of Threatened Taxa*, 3(1): 1469-1477.

- [51]. Vander Poel, P. and Wangchuk, T. (2007). Butterflies of Bhutan Mountains, hills and valleys between 800 and 3000m. Royal Society for Protection of Nature (RSPN), Thimphu, Bhutan.
 [52]. Venkataraman, S.P. (2010). Biodiversity and Conservation of Butterflies in the Eastern Ghats, The Ecoscan, 4(1): 59-

Table 1. Butterflies of Gandhi Park of Shivamogga

Sl. No.	Scientific names	Common names	Occurrence				Abundance				
			VC	C	NR	R	J ul	A ug	Se p	Oc t	N ov
NYMPHALIDAE											
01	<i>Junonia almana</i> Linnaeus, 1758	Peacock pansy-	-	-	-	√	-	2	1	3	2
02	<i>Junonia iphita</i> Cramer, 1779	Chocolate pansy	-	√	-	-	3	5	4	4	1
03	<i>Junonia lemonias</i> Linnaeus, 1758	Lemon pansy	-	√	-	-	5	2	4	2	2
04	<i>Junonia hierta</i> Fabricius,	Yellow pansy-	-	-	√	-	-	3	3	4	1
05	<i>Hypolimnas bolina</i> Linnaeus, 1758	Great egg fly -	-	-	-	√	2	1	2	1	-
06	<i>Tirumala septentrionis</i> Butler, 1874	Dark blue tiger-	-	-	√	-	3	3	2	4	-
07	<i>Danaus chrysippus</i> Linnaeus, 1758	Plain tiger-	-	√	-	-	2	6	4	5	1
08	<i>Danaus genutia</i> Crammer, 1779	Stripped tiger	-	-	√	-	1	3	2	3	1
09	<i>Elymnias hypermnestra</i> Linnaeus, 1763	Common palm fly -	-	-	√	-	2	4	3	3	-
10	<i>Euploea core</i> Cramer, 1780	Common crow-	√	-	-	-	4	5	4	6	2
11	<i>Neptis hylas</i> Linnaeus, 1758	Common sailer	-	-	-	√	2	1	3	2	-
12	<i>Ariadne merione</i> Cramer, 1777	Common caster	-	√	-	-	4	3	5	2	2
13	<i>Orsotriaena medus</i> Wallengren, 1858	Dark grass brown	-	-	-	√	1	2	2	1	2
14	<i>Mycalasis subdita</i>	Tamil bushbrown	-	-	√	-	3	2	2	1	3
15	<i>Melanitis leda</i> Linnaeus, 1758	Common evening brown	-	-	√	-	2	1	4	2	2
16	<i>Ideopsis vulgaris</i> Butler, 1874	Blue glossy tiger	-	-	-	√	-	1	3	2	2
PIERIDAE											
17	<i>Catopsila pyranthe</i> Linnaeus, 1758	Mottled emigrant-	-	-	-	√	1	2	2	1	-
18	<i>Catopsila pomona</i> Fabricius, 1775	Lemon emigrant-	-	-	-	√	2	2	1	1	1
19	<i>Hebomoia glaucippe</i> Linnaeus, 1758	Great orange tip-	-	-	-	√	1	-	2	2	1
20	<i>Eurema hecabe</i> Linnaeus, 1758	Common grass yellow-	-	-	√	-	3	1	4	2	2
21	<i>Cepora nerissa</i> Fabricius, 1775	Common gull-	-	√	-	-	4	3	5	5	1
22	<i>Ixias pyrene</i> Linnaeus, 1775	Yellow orange-	-	-	√	-	2	3	2	5	2
23	<i>Belenois aurota</i> Fabricius, 1793	Pioneer yellow-	-	√	-	-	3	5	5	2	2
24	<i>Delias eucharis</i> Drury, 1773	Common jezebel-	-	-	√	-	3	1	4	1	1
PAPILIONODAE											
25	<i>Papilio polytes</i> Linnaeus, 1758	Common mormon-	-	√	-	-	2	3	5	3	3
26	<i>Papilio polymnester</i> Cramer, 1775	Blue mormon-	-	√	-	-	1	3	6	5	2
27	<i>Papilio demoleus</i> Linnaeus, 1758	Lime butterfly-	-	-	√	-	2	4	3	1	1
28	<i>Papilio crino</i> Fabricius 1792	Common banded peacock	-	-	√	-	1	3	2	4	2
29	<i>Pachliopta aristolochiae</i> Fabricius, 1775	Common rose-	-	-	-	√	-	3	2	1	-
30	<i>Pachliopta hector</i> Linnaeus, 1758	Crimson rose-	√	-	-	-	5	6	4	7	3
31	<i>Graphium agamemnon</i> Linnaeus, 1758	Tailed jay-	-	√	-	-	2	5	4	4	3
32	<i>Acraea violae</i> Fabricius, 1775	Tawny coster-	-	-	√	-	3	1	2	4	3
LYCAENIDAE											
33	<i>Jamides celeno</i> Cramer, 1775	Common cerulean	-	-	√	-	2	3	1	3	2
34	<i>Pseudozizeeria maha</i> Kollar, 1848	Pale grass blue	-	-	-	√	2	2	-	3	1
35	<i>Chilades parrhasius</i> Fabricius, 1793	Indian cupid	-	-	-	√	1	3	1	2	2
HESPERIDAE											
36	<i>Notocrypta curvifascia</i> Felder & Felder, 1862	Restricted demon	-	-	-	√	1	2	3	1	1

VC – Very common, C – Common, NR – Not rare, R – Rare

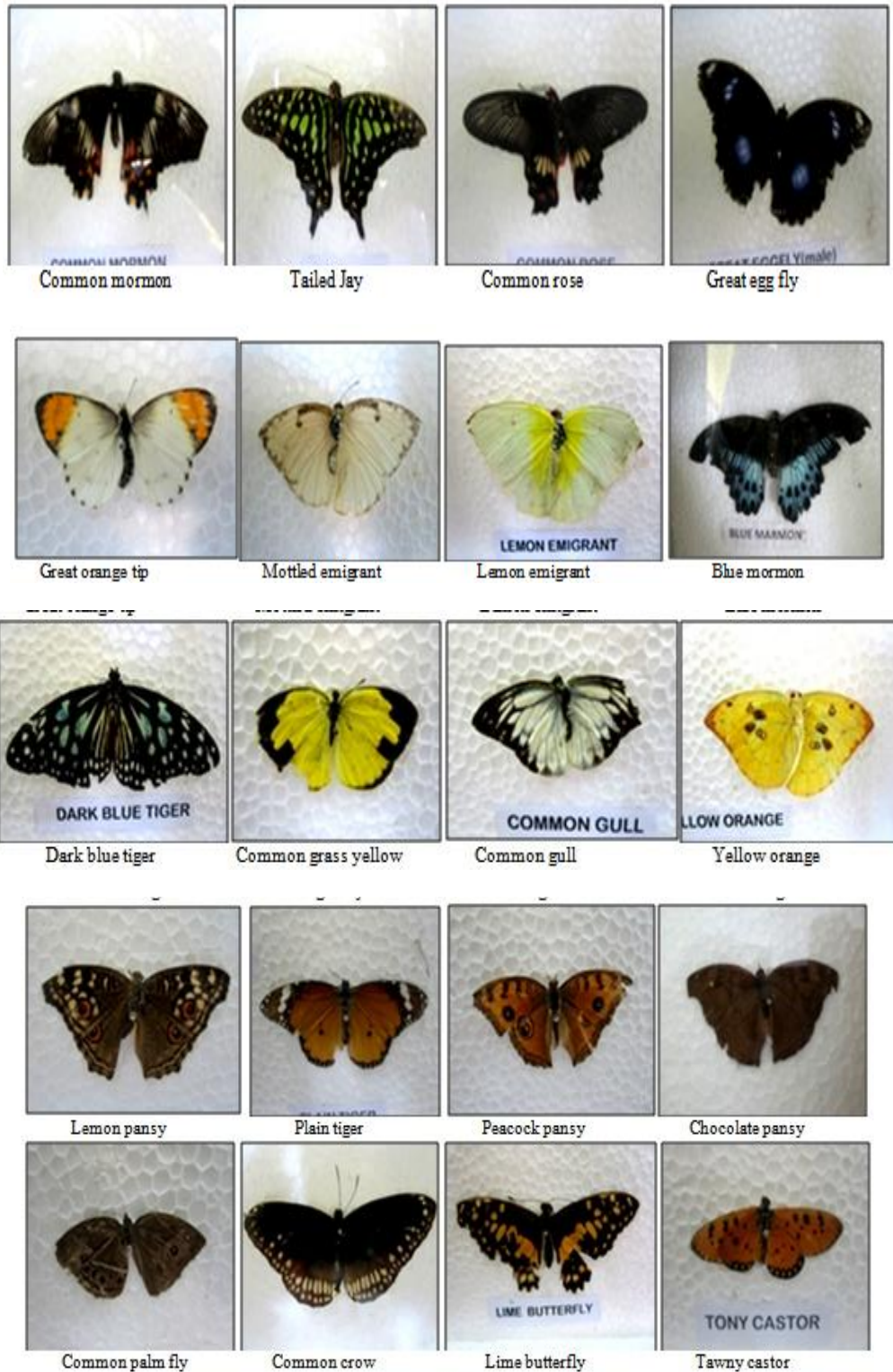


FIGURE 1. Butterflies of Gandhi Park of Shivamogga



FIGURE 2. Butterflies of Gandhi Park of Shivamogga

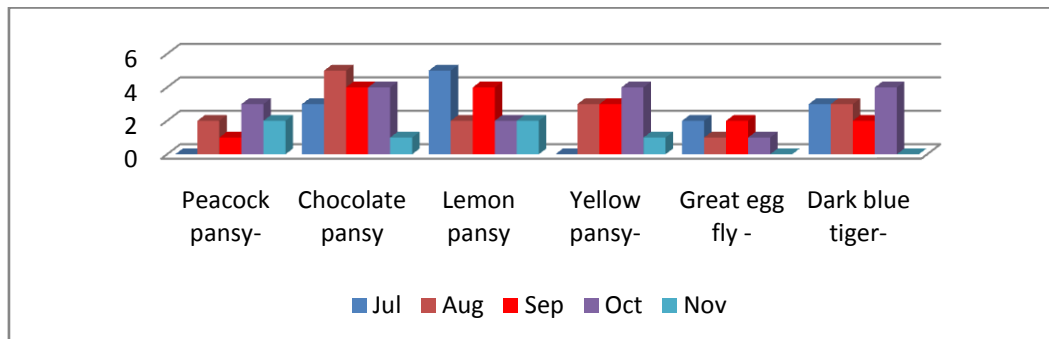


Figure 3: Monthly variations of butterflies

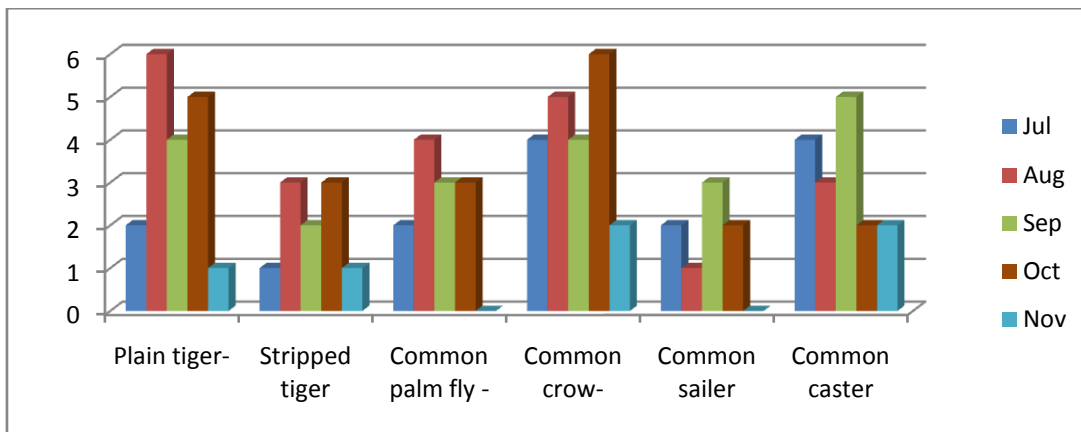


Figure 4: Monthly variations of butterflies

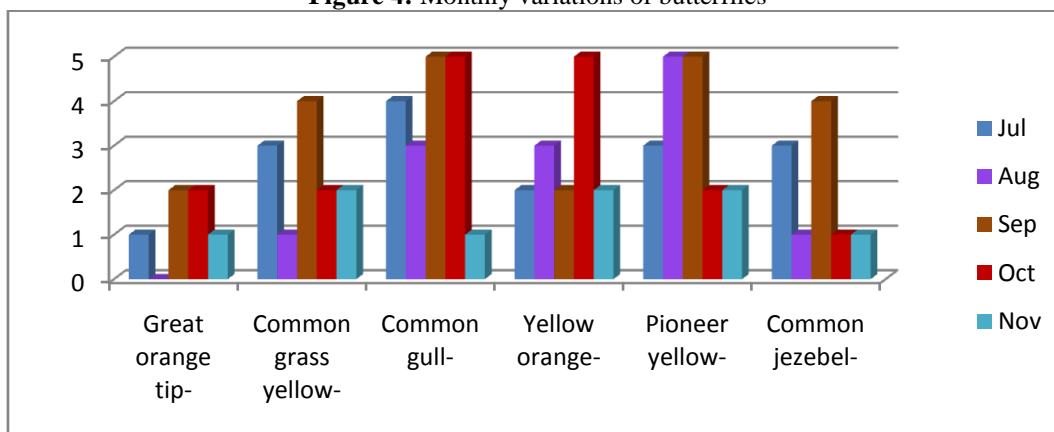


Figure 5: Monthly variations of butterflies

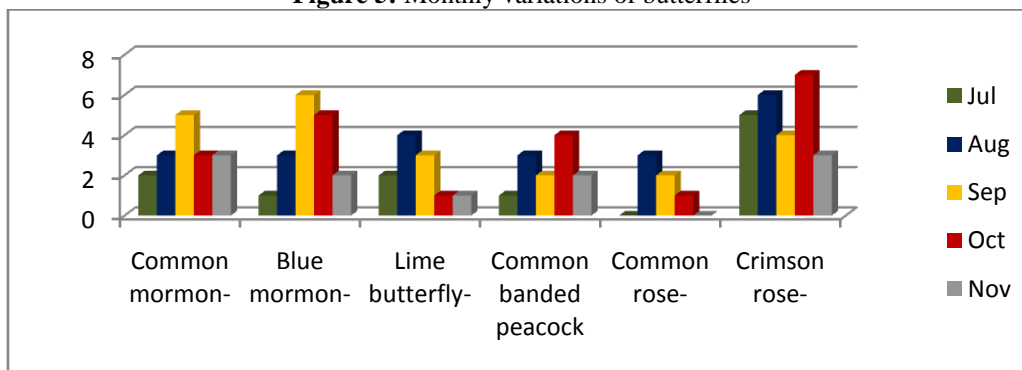


Figure 6: Monthly variations of butterflies

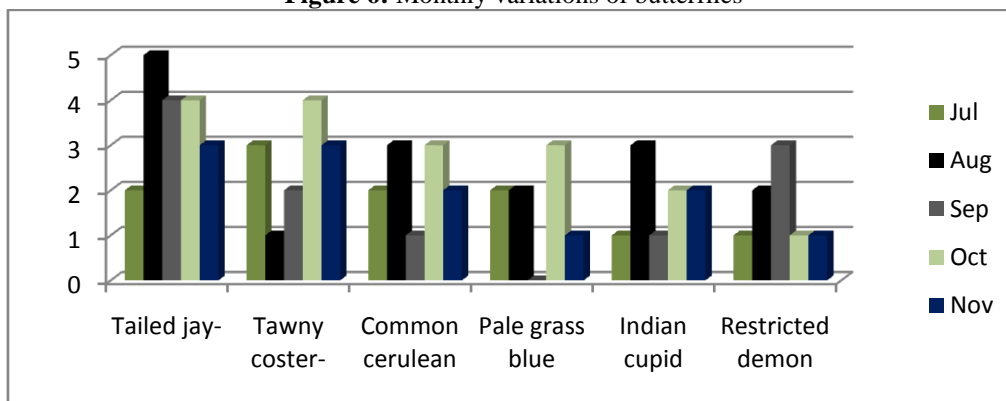


Figure 7: Monthly variations of butterflies

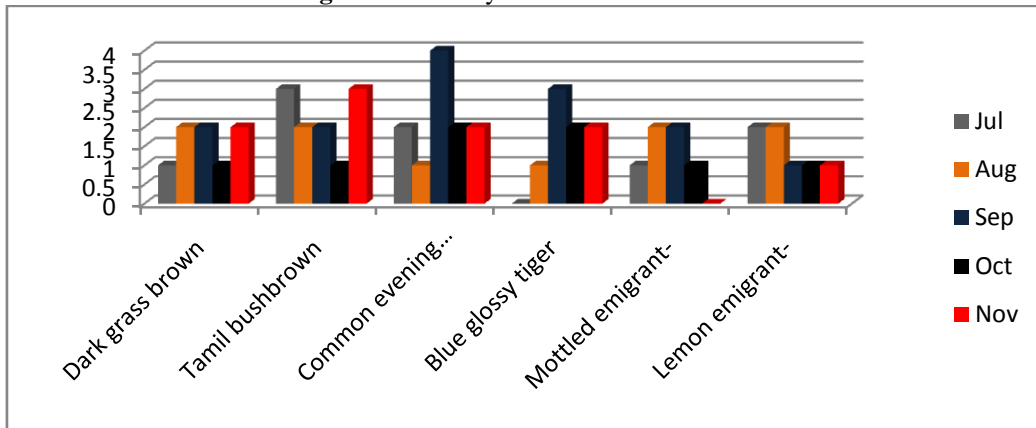


Figure 8: Monthly variations of butterflies

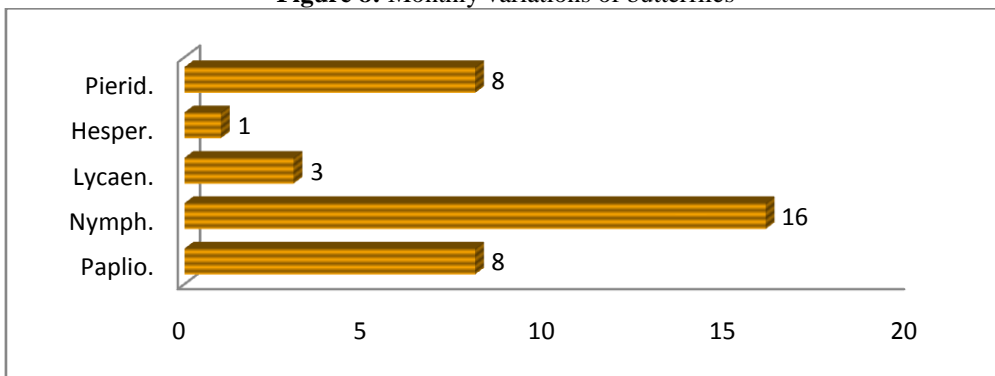


Figure 9: Distribution of butterflies in different families

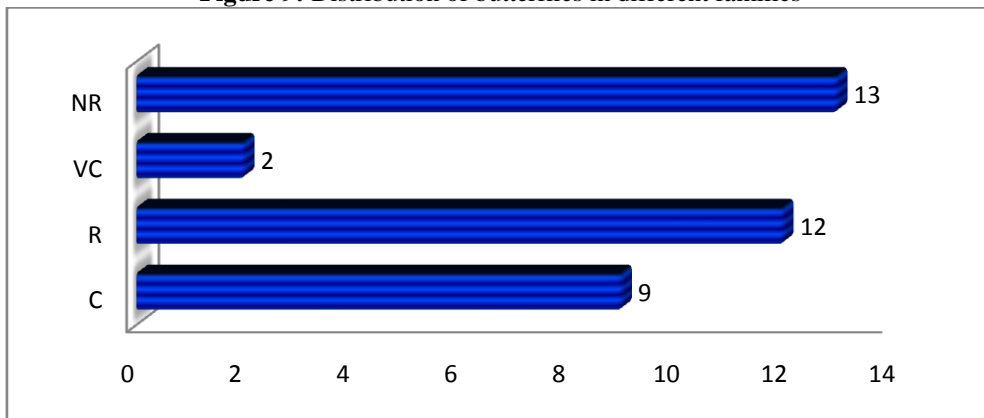


Figure 10: Occurrence of butterflies

Sayeswara, H.A. "Butterfly Species Diversity, Occurrence And Abundance In Gandhi Park of Shivamogga, Karnataka, India." 'International Journal of Engineering Science Invention(IJESI), vol. 7, no. 9, 2018, pp. 67-75