

Species Richness and Diversity of Grasshopper Fauna in Different Habitats of Bharathiar University Campus, Coimbatore, Tamil Nadu, India

Suganya M^{1*}, Gunasekaran C² and Manimegalai K³

^{1,3} Department of Zoology, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore – 641 043, Tamil Nadu, India.

² Department of Zoology, Bharathiar University, Coimbatore – 641 046, Tamil Nadu, India.

E-mail: suganyamuthu0294@gmail.com

ABSTRACT

The survey was conducted to study the species richness, rarity and commonness of grasshopper fauna in grasslands, shrubs and human altered areas of Bharathiar University Campus, Coimbatore, Tamil Nadu, India. A total of 25 species of grasshopper representing 22 genera belonging to 10 subfamilies and 18 tribes under three families. Maximum diversity was shown by the family Acrididae (55.8%) followed by Pyrgomorphidae (27.0%) and Tettigonidae (17.1%). Among the 10 subfamilies of grasshopper, Oedipodinae was the most dominant species in study area. The diversity indices such as, Shannon-weiner index, Simpson index, Margalef richness and Evenness were calculated using the statistical software PAST.

Key words: Grasslands, Tribe, Acrididae, Oedipodinae, PAST.

INTRODUCTION

Biological diversity implies the variety and variability among living organisms. It gives information on the present status of animal evolution, species abundance, richness, rarity and other ecological complexes. Orthoptera is one of the largest order incorporating more than 20,000 species worldwide and 10% of the total world species (1,750 species) have been recorded in India (Tandon & Hazra, 1998). Recently, Eades et al. (2016) had provided information on 27,260 species of Orthoptera fauna in the world. The Orthopterans are distributed throughout the physiographic zones of the world but their distribution largely relies on the vegetation like grasslands, agricultural fields and forests (Thakkar et al. 2015).

As pests, grasshopper cause a serious damage to crops and rangelands (Lockwood & Lockwood, 2008).

However, some of the grasshopper species are useful as a source of food (Illgner & Nel, 2000) and they are vital components of the food chain for many groups of birds and mammals (Capinera et al., 1997; Mayya et al. 2005). It is one of the important invertebrate groups for environmental monitoring and assessment (Henle et al. 1999). Some species act as a biological control for weeds (Oberholzer & Hill, 2001). The grasshopper distribution is rapidly changing due to the infringement of grasslands, forests and agriculture for industrial purposes (Kumar & Usmani, 2015). Hence, the goal of the present study was made to record the species richness and diversity of grasshopper fauna in Bharathiar University Campus, which is dominantly covered by grasslands, shrubs as well as human altered areas and this study will be essential for the conservation of the ecosystem.

MATERIALS AND METHODS

Study area

Grasshopper diversity was conducted at Bharathiar University campus. This place is located in the foot hills about 12 kms from the city of Coimbatore, Tamil Nadu, India. Sprawling campus of around 1000 acres covered along with dry deciduous forest and semi evergreen mixed scrub. Bharathiar University geographically situated at 11.0398° N Latitude and 76.8788° E Longitude. The study area was divided into three areas namely, grasslands, shrubs and human altered area.

Collection of grasshopper

How to Cite this Article:

Suganya M, Gunasekaran C and Manimegalai K (2020). Species Richness and Diversity Of Grasshopper Fauna In Different Habitats of Bharathiar University Campus, Coimbatore, Tamil Nadu, India. *Biolife*. 8(1), 10-17. DOI: 10.5281/zenodo.7404331

Received: 25 February 2020; Accepted: 27 March, 2020;
Published: 15 April, 2020

Data analysis



a. Acrida exaltata b. Acrida turrata c. Diabolocatantops pinguis d. Eyprepocnemis alacris e. Cyrtacanthacris tartarica f. Crucinotacris decisa g. Aulacobothrus luteipes h. Acrotylus insubricus i. Acrotylus humbertianus

Plate-A

Grasshoppers were collected from different areas through sweep net in the morning and evening time in the year November 2016 to October 2017. They were anaesthetized using chloroform, sorted out species-wise and counted.

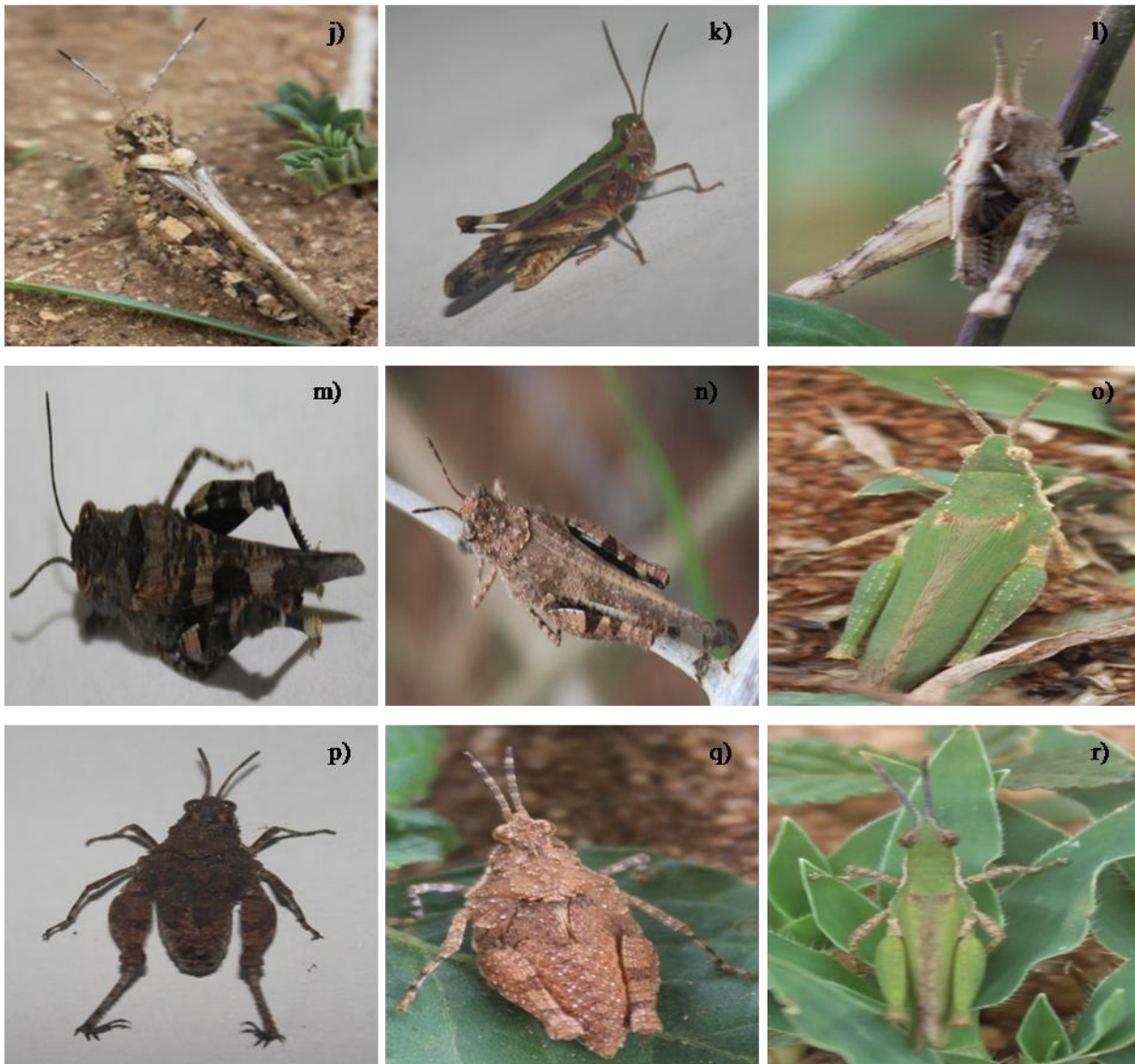
Identification of grasshopper

The collected grasshoppers were identified using the book Fauna of British India(Kirby, 1914)and also by referring to the web pages namely, <http://bugguide.net> and <http://www.orthoptera.org>.

Different diversity indices such as, Shannon-Weiner index, Simpson index, Margalef richness and Evenness were calculated using the statistical software PAST.

RESULTS AND DISCUSSION

A total of 25 species of grasshoppers were collected from three different habitats namely, grasslands, shrubs and human altered area (Plate 1, 2 and 3). All the collected grasshoppers were classified under three families viz., Acrididae, Pyrgomorphidae and Tettigonidae(Table-1).

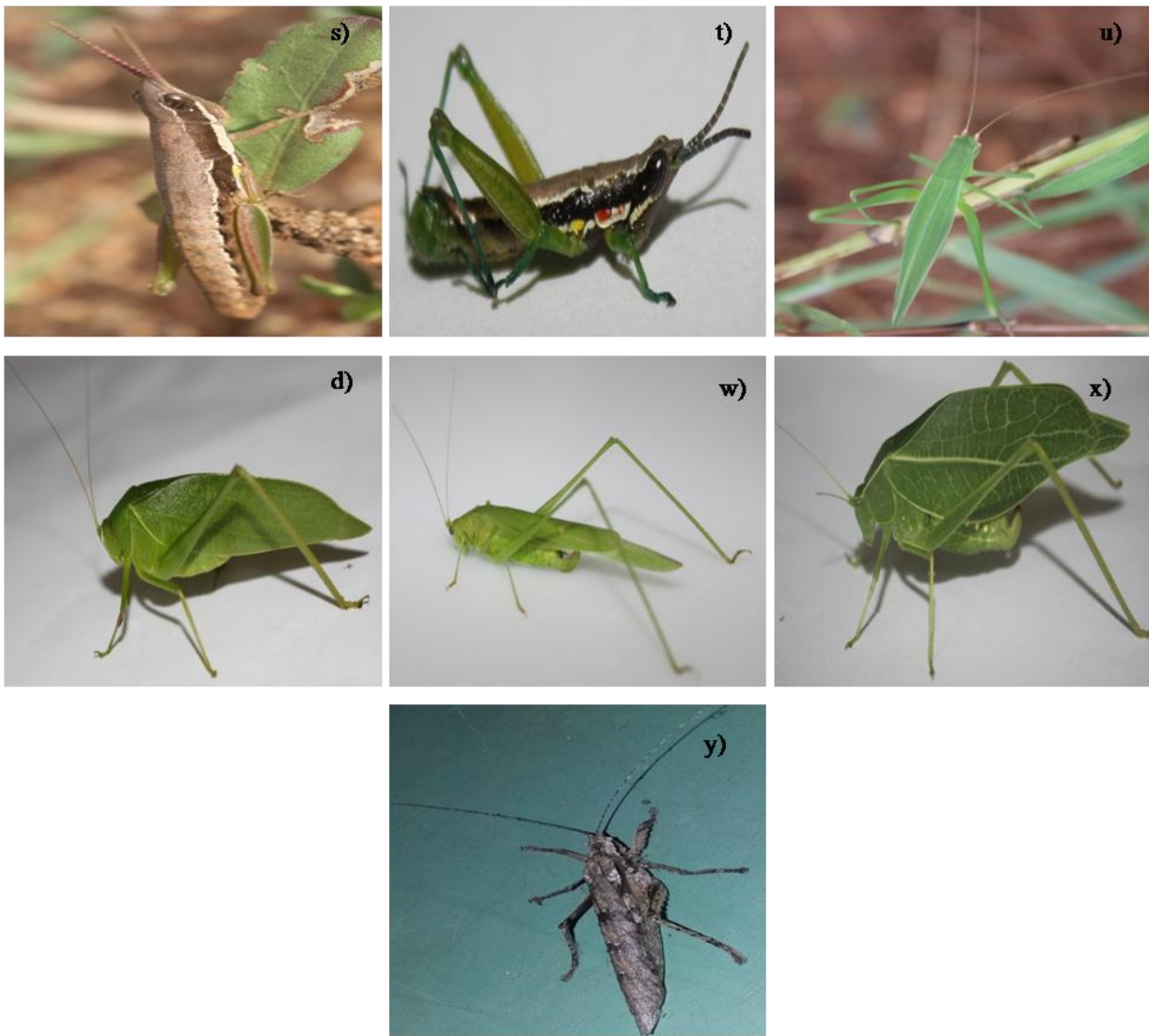


j. Dittopternis venusta k. Gastrimargus africanus l. Oedaleus abruptus m. Sphingonotus longipennis n. Trilophidia annulata o. Atractomorpha crenulata p. Chrotogonus oxypterus q. Chrotogonus turanicus r. Tagsta indica

Plate-B

Acrididae was the most dominant family with 14 species under 12 genera of six subfamilies and nine tribes, amounting to 55.8 % of the total collected species. The second largest family was Pyrgomorphidae with six species under five genera, two subfamilies and four tribes, which contributed 27.0% of the total collected species, while the Tettigoniidae ranked third with 17.1% of total species collected five species under five genera, two subfamily and five tribes (Fig-1 & Table-2). According to Kandibaneet al.(2004) 21 species of grasshoppers under three families, for example, Acrididae (71.4%), Tettigoniidae (23.8%) and Pyrgomorphidae (4.7%) were present in the irrigated rice ecosystem in Madurai, Tamil Nadu.

Akhtar et al. (2012) reported a maximum diversity being shown by the family Acrididae followed by Pyrgomorphidae. Different subfamilies of grasshopper, Oedipodinae was the most dominant group comprising about seven species of total collected species (Fig-2). Whereas Raghavender&Vastrad (2017) reported Oedipodinae was the rich species of subfamily followed by Catantopinae in agriculture and forest ecosystems. Among the 25 species, the maximum number of specimens collected were of *Acrotylushumbertianus* species and the least number of species collected were of *Oedaleusabruptus* (Fig-3). Different habitats of grasshopper, grassland was found to be the most common habitat for grasshoppers occupied (46.5%) out of total number of collected individuals. Next to grasslands, a greater number of grasshoppers were collected from shrubs (42.5%) and human altered area



s. Orthacris maindroni t. Neorthacris acuticeps u. Himertula vidhyavadhiaie v. Holochlora spectabilis w. Phaneroptera gracilis x. Trigonocorypha unicolor y. Sathrophyllia rugosa

Plate-C

(11.3%) (Fig-1). This perception was in parallel with the observations of Bhusnaret al.(2015) in Maharashtra and Paulraj et al.(2009) in Tamil Nadu stating that a moderate diversity and richness in all the grassland zones. In the present study, Family-wise diversity: Shannon-Weiner index, Simpson index, Margalef richness was highest in Acrididae followed by Pyrgomorphidae and Tettigonidae. Evenness was highest in Tettigonidae (Fig.-4). Thakar et al. (2015) observed Family-wise diversity, Shannon-Wiener diversity index and Evenness was elevated for Acrididae followed by Tettigonidae, Gryllidae and Pyrgomorphidae in South Gujarat Districts.

CONCLUSION

On the basis of this current study, grasshopper contribute much to the natural welfare as indicators, sensitivity to anthropogenic activities and vital role in conservation of

ecosystem. The changing scenario in grassland, agriculture and forest ecosystems have influenced the primary consumers like grasshoppers and thereby creating an effect on entire food web. So, their conservation has been perceived as crucial for sustainable world. We can conclude that the different areas of Bharathiar University Campus shows the variety of short and long horned grasshoppers. Hopefully, there will be a continuous study in this area to get comprehensive information and more number of species in the current list of the species.

Conflicts of Interest

Authors declare that there is no conflict of interests regarding the publication of this paper.

Table 1. List of grasshoppers from different habitats of BU Campus

SNo	Species	Family	Subfamily	Tribe
1.	<i>Acridaexaltata</i> (Walker, 1859)	Acrididae	Acridinae	Acridini
2.	<i>Acridaturrita</i> (Linnaeus, 1758)	Acrididae	Acridinae	Acridini
3.	<i>Diabolocatantopspinguis</i> (Stal, 1861)	Acrididae	Catantopinae	Catantopini
4.	<i>Eyprepocnemisalacris</i> (serville, 1838)	Acrididae	Eyprepocnemidinae	Eyprepocnemidini
5.	<i>Cyrtacanthacristartarica</i> (Linnaeus, 1758)	Acrididae	Cyrtacanthacridinae	Cyrtacanthacridini
6.	<i>Crucinotacrisdecisa</i> (Walker, 1871)	Acrididae	Gomphocerinae	Arcypterini
7.	<i>Aulacobothrusluteipes</i> (Walker, 1871)	Acrididae	Gomphocerinae	Arcypterini
8.	<i>Acrotylusinsubricus</i> (Scopoli, 1786)	Acrididae	Oedipodinae	Acrotylini
9.	<i>Acrotylushumbertianus</i> (Saussure, 1884)	Acrididae	Oedipodinae	Acrotylini
10.	<i>Ditopternisvenusta</i> (Walker, 1870)	Acrididae	Oedipodinae	-
11.	<i>Gastrimargusafricanus</i> (Saussure, 1888)	Acrididae	Oedipodinae	Locustini
12.	<i>Oedaleusabruptus</i> (Thunberg, 1815)	Acrididae	Oedipodinae	Locustini
13.	<i>Sphingonotuslongipennis</i> (Saussure, 1884)	Acrididae	Oedipodinae	Sphingonotini
14.	<i>Trilophidiaannulata</i> (Thunberg, 1815)	Acrididae	Oedipodinae	Trilophidiini
15.	<i>Atractomorphacrenulata</i> (Fabricius 1793)	Pyrgomorphidae	Pyrgomorphinae	Atractomorphini
16.	<i>Chrotogonusoxypterus</i> (Blanchard 1836)	Pyrgomorphidae	Pyrgomorphinae	Chrotogonini
17.	<i>Chrotogonusturanicus</i> (Kuthy, 1905)	Pyrgomorphidae	Pyrgomorphinae	Chrotogonini
18.	<i>Tagstaindica</i> (Bolivar, 1905)	Pyrgomorphidae	Pyrgomorphinae	Tagastini
19.	<i>Orthacrismaindroni</i> (Bolivar, 1905)	Pyrgomorphidae	Orthacridinae	Orthacridini
22.	<i>Neorthacrisacuticeps</i> (Bolivar, 1902)	Pyrgomorphidae	Orthacridinae	Orthacridini
21.	<i>Himertulavidhyavadhaiae</i> (Ingrisch and Muralirangan, 2004)	Tettigonidae	Phaneropterinae	Letanini
22.	<i>Holochloraspectabilis</i> (Walker, 1869)	Tettigonidae	Phaneropterinae	Holochlorini
23.	<i>Phaneropteragracilis</i> (Burmeister, 1838)	Tettigonidae	Phaneropterinae	Phaneropterini
24.	<i>Trigonocorypha unicolor</i> (Stoll,1787)	Tettigonidae	Phaneropterinae	Trigonocoryphini
25.	<i>Sathrophylliarugosa</i> (Linnaeus, 1758)	Tettigonidae	Pseudophyllinae	Cymatomerini

Table 2. Total number of species recorded from different habitats of BU Campus

SNo	Family	Total number of sub family	Total number of tribes	Total number of genera	Total number of species
1.	Acrididae	6	9	12	14
2.	Pyrgomorphidae	2	4	5	6
3.	Tettigonidae	2	5	5	5
	Total	10	18	22	25

Figure 1. Percentages occurrence of different families and habitats of grasshoppers

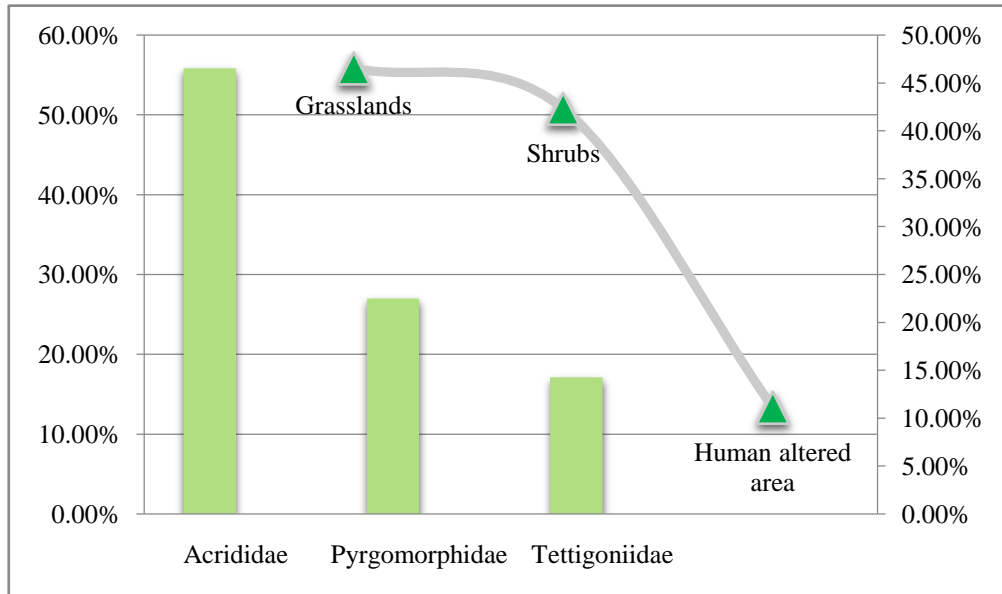


Figure 2. Species richness of subfamilies in study area

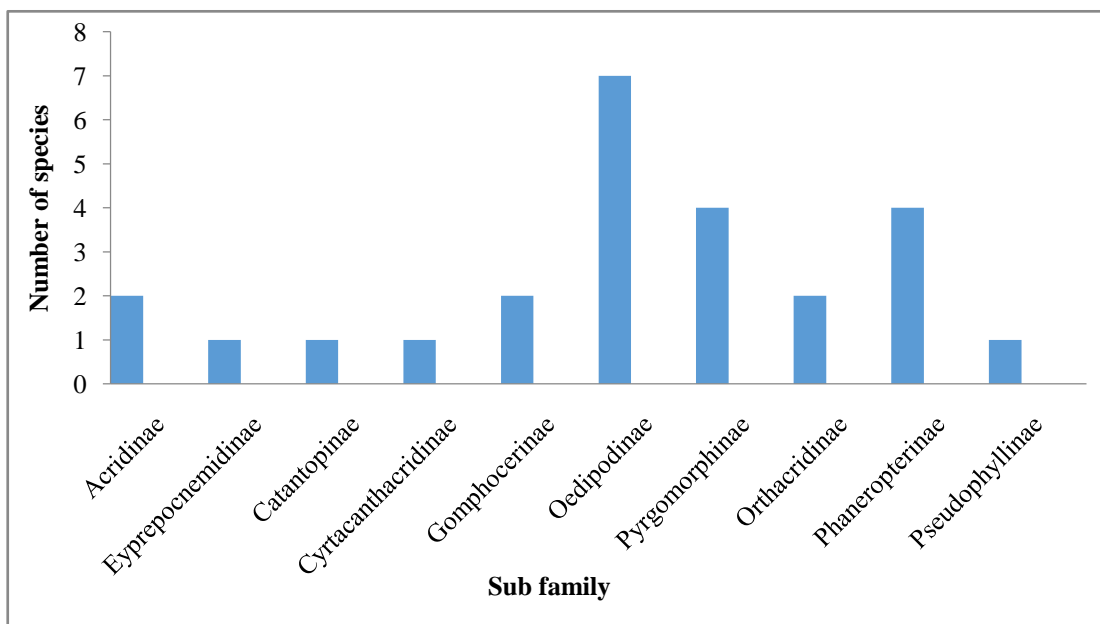


Figure 3. Showing number of individuals in different habitats of grasshopper

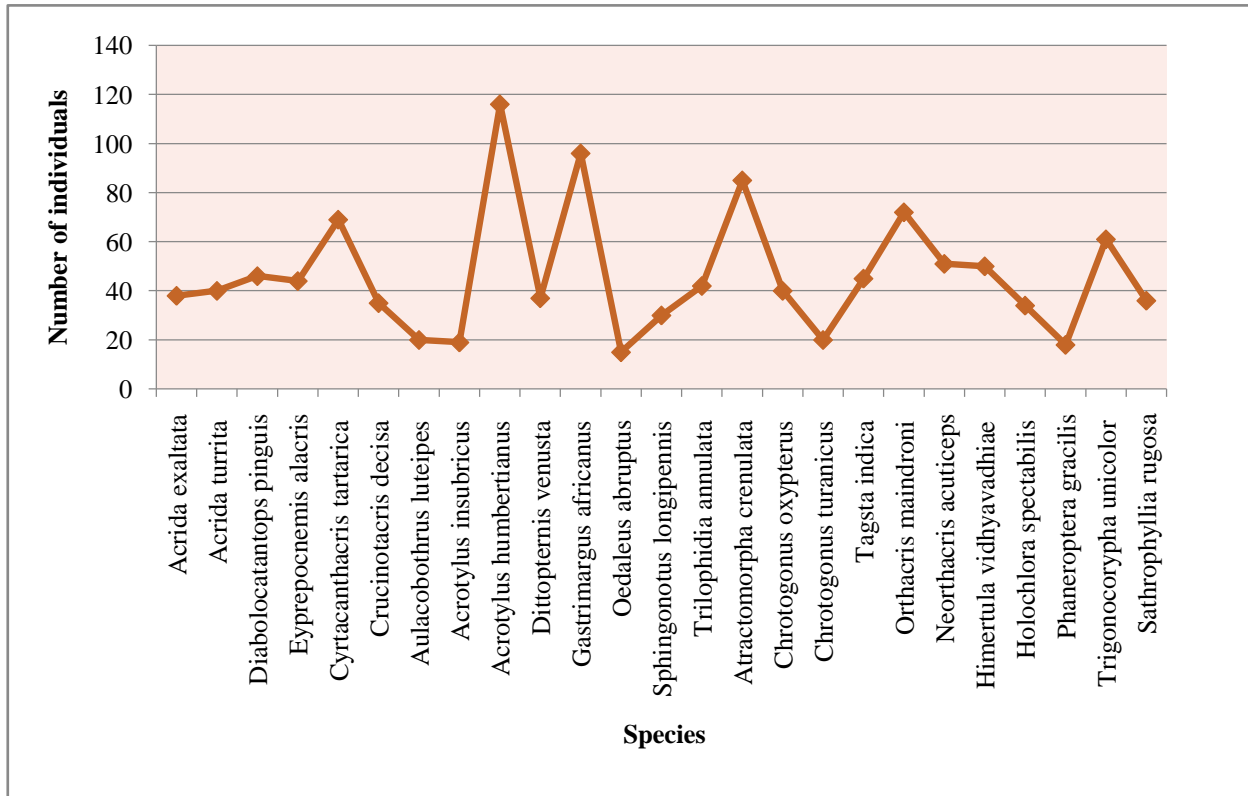
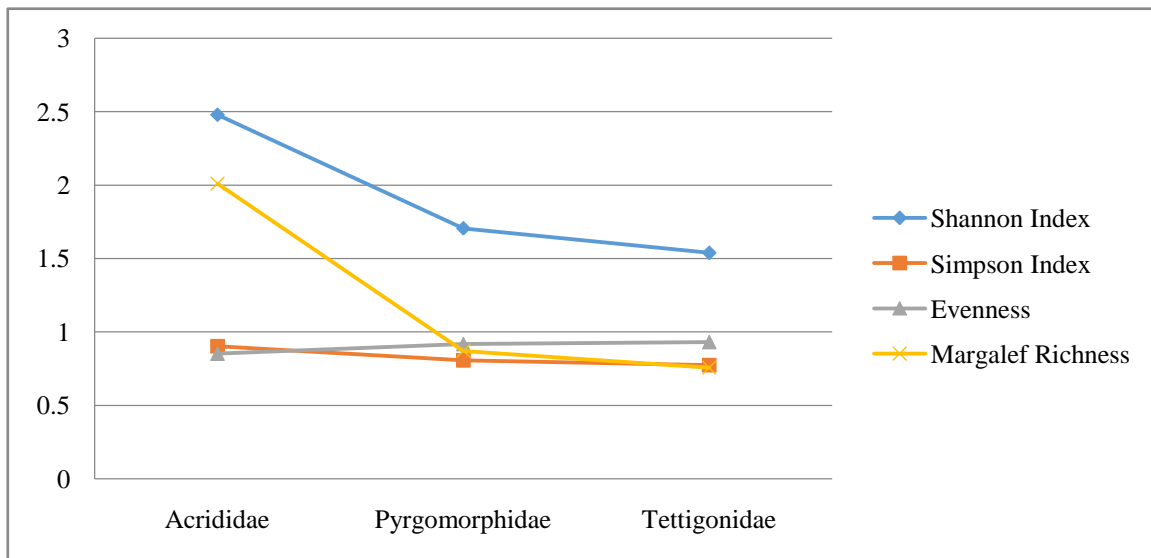


Figure 4. Comparison of diversity indices of three different families of grasshopper



References

- [1]. Akhtar, H., Usmani K., Nayeem, R. & Kumar, H. 2012. Species diversity and abundance of grasshopper fauna (Orthoptera) in rice ecosystem. - *Annals of Biological Research*. 3 (5): 2190-2193.
- [2]. Bhusnar, A. 2015. Acridid (Orthoptera) diversity of agriculture ecosystem from Solapur district of Maharashtra, India. *Biolife*.3(2): 46-468.
- [3]. Capinera, J.L., Scherer, C.W. & Simkins, J.B. 1997. Habitat associations of grasshoppers at the MacArthur agro-ecology research center, Lake placid, Florida. *Florida Entomologist*. 80(2): 253-261.
- [4]. Eades, D.C., Otte D., Cigliano, M.M. & Braun, H. 2016. *Orthoptera Species File*. Version 5.0./5.0. <http://Orthoptera.SpeciesFile.org> [Date accessed: 4 June 2016].
- [5]. Henle, K., Amler, K., Biedermann, R., Kaule, G. & Poschlod, P. 1999. Bedeutung und Funktion von Arten und Lebensgemeinschaften in der Planung. In: Amler, K., Bahl, A., Henle, K., Kaule, G., Poschlod, P., Settele, J. (eds). *Populationsbiologie in der Naturschutzpraxis*. Ulmer, Stuttgart. 17-23.
- [6]. Illgner, P. & Nel, E. 2000. The geography of edible insects in Sub-Saharan Africa: A study of the Mopane Caterpillar. *The Geographical Journal*. 166 (4): 336-351.
- [7]. Kandibane, M., Raguraman, S., Ganapathy, N. & Gunathilagaraj, K. 2004. Orthopteran diversity in irrigated rice ecosystem in Madurai, Tamil Nadu. *Zoos' Print Journal*. 19(10): 1663-1664.
- [8]. Kirby, W.F. 1914: *The fauna of British India Including Ceylon and Burma*. (Orthoptera) Volume I. Taylor and Francis, London. pages: 276.
- [9]. Swapna Gurrapu and Estari Mamidala. In vitro HIV-Reverse Transcriptase Inhibition of Andrographolide Isolated from Andrographis Paniculata. *European Journal of Biomedical and Pharmaceutical Sciences*. 2017. Volume 4, Issue 12. 516-522.
- [10]. Kumar, H. & Usmani, M.K. 2015. A checklist of acrididae (Orthoptera: Acridoidea) from Haryana, India. *Acta Zoológica Mexicana* (N. S.). 31(2): 234-238.
- [11]. Lockwood, D.R. & Lockwood, J.A. 2008. Grasshopper population ecology: catastrophe, criticality and critique. *Ecology Society*. 13(1): 34-51.
- [12]. Mayya, S., Sreepada, K.S. & Hegde, M.J. 2005. Survey of short-horned grasshoppers (Acrididae) from Dakshina Kannada District, Karnataka. *Zoos' Print Journal*. 20(9): 1977-1979.
- [13]. Oberholzer, I.G. & Hill, M.P. 2001. How safe is the grasshopper *Cornops aquaticum* for release on water hyacinth in South Africa. *Acia Proceedings*. 102: 82-88.
- [14]. Paulraj, M.G., Anbalagan, V. & Ignacimuthu, S. 2009. Distribution of grasshoppers (Insecta: Orthoptera) among different host plants and habitats in two Districts of Tamil Nadu, India. *Journal of Threatened Taxa*. 1(4): 230-233.
- [15]. Raghavender, B. & Vastrad, A.S. 2017. Changing scenario of short horned grasshopper diversity in agriculture and forest ecosystems in Dharwad. *Journal of Entomology and Zoology Studies*. 5(2): 268-272.
- [16]. Tandon, S.K. & Hazra, A.K. 1998. *Faunal diversity in India orthoptera*. Envis Center, Zoological Survey of India Kolkata. 183-188.
- [17]. Thakkar, B., Parmar, S. & Parikh, P. 2015. Study on diversity of Orthoptera fauna in South Gujarat, India. *International Journal of Pure and Applied Zoology*. 4: 368-374.