



Biodiversity of Oedipodinae (Orthoptera) from Hyderabad Division Sindh, Pakistan

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Abstract: In result of extensive survey a total of 1949 specimens of Oedipodinae were collected during the year 2017 amongst this, 1417 were immature whilst 532 were adults. Captured material was sorted out into 03 tribe's viz: Acrotilini, Epacromini and locustini offering 08 species. The species richness percentage was recorded 26.16%, 9.59%, 10.06%, 17.75, 7.75%, 21.75%, 1.48% and 5.43% for *A. longipes longipes*, *A. longipes subfasciatus*, *Aiolopus thalassinus thalassinus*, *A. thalassinus fabricus*, *Helithera aelopoidea*, *Locusta migratoria* and *Oedaleus sengalensis* respectively. Beside this, biodiversity index, $D = (n/N)^2$ and Simpsons' index ($S=1-D$) of all collected species was also presented here.

Keywords: Survey, Species richness Biodiversity Simpson's Index, Oedipodinae

1. **INTRODUCTION**

The group Oedipodinae stands out among the short-horned grasshoppers, because of their diversity and of their occurrence in agricultural crops, hilly areas and desert like plain. They commonly known as geophiles and phytophiles. Yet, no comprehensive data available on its diversity and distribution pattern from selected area. However, its food selection and feeding behavior have attracted the attention of orthopterists and acridologists throughout the world, at least partly because of insects' competition with mankind for – hence the current interest in their biology. This has triggered much research and has provided basic information on host selection and feeding behavior. Research so far conducted on family Acrididae has mainly concentrated on the taxonomic status which was given by Janjua (1957), Moeed (1966, 1971), Perwin (1983), Wagan, and Solangi, (1989). Beside this, Roonwal, (1976, 1978), Uvarov (1966, 1977), Chapman *et al.*, (1988), Behmer (1993, 1994) Muralirangan *et al.*, (1997) has studied feeding behavior of this different grasshopper. More recent Riffat and Wagon (2010) studied the effects of various plants on nymphal development and eggs production of *Hieroglyphs perpolita*. Pitafi and Riffat (2016) studied the effects of various plants on nymphal development and life span of instars and adults of *Acrotylus humbertianus* under laboratory conditions. But none of these carried work on its pest's status. On the other hand Bernays and Chapman (1973) reported that survivability of insects also depends upon the type of food. Various studies in areas such as biology, ecology, behavior and biomass (Roonwal 1945 and Katiyar,

1960) have been done on different species of *Hieroglyphus*.

However, there is no detailed study on the diversity of Oedipodinae species has been done from selected area that's why this study made on distribution of Oedipodinae. We hope that assemblage of biodiversity information from available data will strengthen the national capacity of countries with regard to decision making and management in nature conservation and sustainable development.

2. **MATERIAL AND METHODS**

Sampling: For this study insects were collected from various areas of Hyderabad division. Sampling was done during May to November 2017 from different habitats. All collected insects brought to laboratory for further observation.

Killing and Preservation:

The standard entomological method described by Vickery and Kevan (1983) and Riffat and Wagan (2015) was adopted with slight modification. Collected material was brought into the laboratory killed by means of potassium cyanide in standard entomological killing bottles. The specimens were not left too long (15 mins) in cyanide, because the color changed particularly that of green specimens. Pinning of the specimens was made within few hours. Specimens were flexible there was a little danger of losing any part through the necessary manipulation, further the parts could be stretched as desired. Mounting was done according to the following standard procedure of Riffat and Wagan (2015).

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Statistical analysis: Data was analyzed with the help of statistical software (SPSS) version 16.0. Obtained data from experimental groups was subjected to one-way analysis of variance (ANOVA) and species richness was calculated by: Biodiversity Index, $D=(n/N)^2$ and through Simpson Index of Biodiversity, $S=1-D$.

3. RESULTS AND DISCUSSION

In extensive survey a total of 1949 specimen were collected amongst this sampling, 1417 were immature and 532 were adults. Sampling was done in different season of the year 2017. The collected material was sorted out into 03 Tribes viz: Acrotilini, Epacromini and locustini and 08 species i.e *Acrotylus humbertianus*, *A.longipes longipes*, *A.longipes subfasciatus*, *Aiolopus thalassinus thalassinus*, *A.thalassinus tamulus*, *Heliothera aeolopoides*, *Locusta migratoria* and *Oedaleus sengalensis*. The species richness percentage was reported significantly highest i.e 26.16% and 21.75% *Acrotylus humbertianus* and *Hilethera aeolopoides* respectively, while lowest percentage i.e 1.48% was reported in *Locusta migratoria* followed by 5.43% in *Oedaleus sengalensis* (Table.1).

Highest collected instars were from the Matiari i.e 217 followed by Hyderabad and Tando-Muhammad Khan i.e 180 and 178 respectively, while lowest number of instars were collected from Sujawal i.e 129. Highest number of adults were collected from Tando Muhammad Khan i.e 81 followed by Jamshoro and Hyderabad i.e 71 and 65 respectively, while lowest collection was from Dadu i.e 33 (Table.2) and it seem from (Table 3) that district wise collection of male and females was highest in Hyderabad i.e 103 followed by Tando Muhammad Khan i.e 76, while highest females collection was observed from Matiari i.e 62, while highest female collection was observed from Matiari i.e 188 followed by Hyderabad and Jamshoro i.e 178 and 137 respectively. Beside this, species biodiversity index (D) showed that highest richness was noted for *A. humbertianus* i.e 0.068 followed by *Hilethera aeolopoides*, *Aiolopus thalassinus thalassinus* i.e 0.047 and 0.031 respectively (Table .4) and Simpsons index of biodiversity was calculated 0.999 for *L.migratoria* followed by *O.sengalensis* i.e 0.997, while least was *A.humbertianus* i.e 0.931 (Table.4). During field investigation it was observed that Oedipodinae affected the many useful plants.

Table 1 Species collection during the year 2017

S/No.	Species	Instars	Adults	Total	%
1	<i>Acrotylus humbertianus</i>	362	148	510	26.16
2	<i>A.longipe longipes</i>	152	35	187	9.59
3	<i>A.longipes subfasciatus</i>	158	38	196	10.06
4	<i>Aiolopus thalassinus thalassinus</i>	239	107	346	17.75
5	<i>A.thalassinus tamulus</i>	104	47	151	7.75
6	<i>Hilethera aeolopoides</i>	301	123	424	21.75
7	<i>Locusta migratoria</i>	18	11	29	1.48
8	<i>Oedaleus sengalensis</i>	83	23	106	5.43
	Total	1417	532	1949	99.97%

Table 2 Sex differentiation of Oedipodinae from different districts of Hyderabad division.

S/no.	Districts	Male	Females	Total	%
1	Hyderabad	103	178	281	14.41
2	Thatta	56	101	157	8.05
3	Badin	62	115	177	9.08
4	Matiari	105	188	293	15.03
5	Jamshoro	74	137	211	10.82
6	Sujawal	76	140	216	11.08
7	T.M. Khan	79	142	221	11.33
8	Tando Allah yar	70	129	199	10.21
9	Dadu	67	127	194	9.95
	Total	692	1257	1949	99.96%

Table 3 Incidence of various species (Mature and Immature) during the year 2017

Tribe	Species	Districts																	
		Hyd.		Thatta		Badin		Matiari		Jamshoro		Sujawal		T.M.K		T.A.Y		Dadu	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Acrotylini	<i>Acrotylus humbertianus</i>	32	43	15	21	19	34	31	56	21	36	23	32	21	38	17	19	17	35
	<i>A.longipes longipes</i>	21	19	9	15	11	13	10	14	8	10	7	8	5	13	4	13	5	12
	<i>A.longipes subfasciatus</i>	9	17	7	14	6	10	10	21	11	18	8	23	5	14	3	9	4	7
Epacromini	<i>Aiolopus thalassinus thalassinus</i>	15	32	7	13	9	21	19	33	9	22	14	29	17	24	18	31	13	20
	<i>A.thalassinus tamulus</i>	6	15	5	9	6	10	8	16	3	9	5	8	7	11	4	10	8	11
	<i>Hilethera aelopoides</i>	23	38	11	23	9	18	19	33	17	34	16	29	19	25	21	38	14	37
Locustini	<i>Locusta migratoria</i>	3	4	0	0	1	2	2	3	0	1	0	2	1	4	0	3	1	2
	<i>Oedaleus sengalensis</i>	4	10	2	6	1	7	6	12	5	7	3	9	4	13	3	6	5	3
	Total	103	178	56	101	62	115	105	188	74	137	76	140	79	142	70	129	67	127

Table 4 Quantitative measure of various Species of Oedipodinae through Biodiversity and Simpson's Index

S/No.	Species	Total	$D = \frac{1}{\sum (n/N)^2}$	$S = 1 - D$
1	<i>Acrotylus humbertianus</i>	510	0.068	0.931
2	<i>A.longipes longipes</i>	187	0.009	0.990
3	<i>A.longipes subfasciatus</i>	196	0.010	0.989
4	<i>Aiolopus thalassinus thalassinus</i>	346	0.031	0.968
5	<i>A.thalassinus tamulus</i>	151	0.006	0.993
6	<i>Hilethera aelopoides</i>	424	0.047	0.952
7	<i>Locusta migratoria</i>	29	0.00022	0.999
8	<i>Oedaleus sengalensis</i>	106	0.0029	0.997
	All-together	1949	0.17412	7.819

4. CONCLUSION

During the present survey it was noticed that immature stages are more destructive in a way that are available in field, but we remained unnoticed as they increases their density and emerge as adults, but it was too late to control them at once. The collected material was sorted out into 03 Tribes viz: Acrotilini, Epacromini and locustini and 08 species i.e *Acrotylus humbertianus*, *A.longipes longipes*, *A.longipes subfasciatus*, *Aiolopus thalassinus thalassinus*, *A.thalassinus tamulus*, *Helithera aelopoides*, *Locusta migratoria* and *Oedaleus sengalensis*. During field survey it was noticed that when Oedipodinae feel safe, they dull themselves and when they feel threatened (when the predator tries to attack them) they leap out to reveal bravely and continue this practice until predator left the field.

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