



## STUDIES ON THE IMMATURE STAGES OF ACRIDINAE (ORTHOPTERA: ACRIDIDAE) FROM SINDH

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### ARTICLE INFORMATION

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SAL collected the samples wrote the paper, RS designed the study, SK analysis the data and format the manicurist.

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### ABSTRACT

Grasshoppers belong to Acridinae are polyphagous insects and cause severe Damage to agricultural crops of these *Acrida exaltata*, were reported as severe pest of cash crops in Sindh. During present study it was noted that immature stages of these species were more injurious to the crops than adults. It was therefore felt necessary, and attempt has been made to study the biology of these pests. Moreover, identification of instars. And measurement of different body parts was also taken for easily identification of instars. The present study might be helpful for taking possible control measure at early stage against the species of economic concern.

## 1. INTRODUCTION

Grasshoppers' insect fauna belong to sub-family *Acridinae* are of great economic importance in Sindh. The representative of this sub-family is considered as pest many crops including cereals, vegetables, orchards, pastures, and rain field areas. They are widely distributed throughout the world (Riffat *et al.* 2012). Majority of them are active during sunshine can cause heavy damage in cultivated crops when their population may be increased at dynasties. The hoppers are seen to be more epidemic than the adults, because they have no functional wings, so are unable to fly and all the time they are going to eat, hence causes more damage than the adults. Although many species are not out break potential it is important to be able to identify nymphs at any early stage so that proper diagnosis of economic problems could be made.

This study makes distribution and identification of nymphs possible hence control measures against the economic species may be initiated at early stage. Although there is a lot of work has been done on taxonomic status of *Acridinae* by Kirby. But there are several aspects regarding the biology of *Acrida exaltata* species are less known. It is therefore felt necessary to examine the immature stages of this pest. The basic knowledge about the biology of pest species provides authentic information for its control. The result of such study will be instrumental in understanding and devising the population management strategies to adopt control measure at the appropriate.

## 2. MATERIALS AND METHODS

The nymphs of *Acrida exaltata* were collected from agricultural fields fodder crops and their surroundings vegetation of grasses with the help of

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traditional insect net (8.89 cm in diameter and 50.8 cm in length) as well as by hand picking. The collection was made during 2017 in the months of May to October from various localities of Sindh. (MAP OF SINDH) The collected material was transferred into plastic jars and carried to laboratory for further study.

### 3. RESULTS

#### Description of Immature stages of *Acrida exaltata* Walker, 1899

##### *1<sup>st</sup> Instar*

Body light green in colour. Antennae ensiform with 10 -11 segments. Fastigium of vertex parallel, pronotum shorter than head, posterior margin flat, Wing-pads not appeared.

##### *2<sup>nd</sup> Instar*

Body elongated stick like. Antennae ensiform with 12 -13 segments, Wing-pads directed downwards rounded margin, thicker. Fastigium of vertex parallel, pronotum elongated posterior margin produced, Femur cylindrical.

##### *3<sup>rd</sup> Instar*

Body light green in colour. Antennae ensiform with 13-14 segments. Head longer than pronotum, pronotum elongated, prozona longer than metazona, Wing-pads reaches up to half of the 1<sup>st</sup> abdominal segment, femur cylindrical, Tibia having 20 outer and 23 inner black tipped spines.

##### *4<sup>th</sup> Instar*

Antennae with 15-16 segments. Fastigium of vertex parallel sides, median carina indicated towards apical half, Pronotum slightly divergent towards metazona, outer margin acute angular. Wing-pads directed upwards and reaches up to middle 2<sup>nd</sup> abdominal segment. Tibia shorter than the femur possess 22 outer and 24 inner spines.

##### *5<sup>th</sup> Instar*

Antennae with 17-18 segments. Pronotum parallel sided, median carina distinct toward apical half, Wing-pads extending up to margin or cross 2<sup>nd</sup> abdominal segment having dark brown scattered spots. Femur green in colour, Tibia with 25-outer and 29 inner black tipped spines.

### 4. DISCUSSION

*Acrida exaltata* considered as one of the most common species of this region and are found throughout the year showing the biannual life span (Uvarov, 1977). *Acrida exaltata* completes its life cycle within three months. *Acrida exaltata* was found from Maize (*Zea mays*), rice (*Oryza sativa*) jowar (*Sorghum vulgare*) Gram (*Cicer arietinum*) Sugarcane (*Saccharumof ficinarum*) Paddy (*Oryza sativa*) Wheat (*Triticuma estivum*). The instars *Acrida exaltata* appears in moth of late April to July and September to November. So adults are found throughout the year due to their biannual life cycle. At the present huge number of hoppers were collected.

### 5. CONCLUSION

The instars *Acrida exaltata* appears in moth of late April to July and September to November. It is best time to adopt control measured against this pest in field. Further, adults are found throughout the year due to their biannual life cycle.

### 6. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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**Table -1. Showing the Morphometric of various developmental Stages *Acrida exaltata***

Body parameters (mm)	Developmental stages (n=10)				
	1 <sup>st</sup> instars Mean± SD	2 <sup>nd</sup> Instars Mean± SD	3 <sup>rd</sup> instar Mean± SD	4 <sup>th</sup> instar Mean± SD	5 <sup>th</sup> instar (Mean± SD)
Antennal segments	9.0±0.12	14.21±2.0	16.32±0.72	19.3±0.21	21.5±0.5
Antennal length	2.23±0.12	3.21±0.10	4.25±0.42	7.23±0.63	10.03±0.72
Length of Pronotum	9.2±0.10	1.23±0.12	2.01±0.12	3.24±0.13	3.0±0.12
Length of Femur	7.2±0.82	8.3±0.25	9.23±0.3	10.12±0.62	11.1±0.5
Length of Tibia	6.42±0.86	7.23±1.6	7.0±0.2	9.3±0.2	10.04±0.23
Length of supra-anal plate	0.9±0.20	1.25±0.12	1.50±0.12	1.82±0.12	2.12±0.1
Total body length	12.0±0.32	14.6±0.21	16.5±0.23	18.2±0.3	20.5±1.15

**Table -2. Identification key to various instars of *Acrida exaltata***

1.	Antennae ensiform with 10 -11 segments. Wing-pads not appeared.....	<b>1<sup>st</sup> Instar</b>
–.	Antennae ensiform with 12 -13 segments, Wing-pads a thick line appeared.....	<b>2<sup>nd</sup> Instar</b>
2.	Antennae ensiform with 13-14 segments. prozona longer than metazona, Wing-pads directed downwards with sharp lines Tibia having 20 outer and 23 inner black tipped spines.....	<b>3<sup>rd</sup>Instar</b>
–.	Not as above.....	<b>3</b>
3.	Antennae with 15-16 segments. Wing-pads directed upwards and reaches up to middle 2 <sup>nd</sup> abdominal segment. Tibia shorter than the femur possess 22 outer and 24 black tipped inner spines.....	<b>4<sup>th</sup> Instar</b>
–.	Antennae with 17-18 segments. Wing-pads extending up to margin or cross 2 <sup>nd</sup> abdominal segment having dark brown scattered spots. Tibia with 25-outer and 29 inner black tipped spines.....	<b>5<sup>th</sup> Instar</b>



Fig.1 Immature stages of *Acrida exaltata* (1<sup>st</sup> Instar -5<sup>th</sup> Instar)