



E-ISSN: 2320-7078  
P-ISSN: 2349-6800  
JEZS 2017; 5(2): 13-15  
© 2017 JEZS  
Received: 03-01-2017  
Accepted: 04-02-2017

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## Study on food selection in two grasshopper species, *Calliptamus barbarus* (Costa, 1836) and *Chorthippus biguttulus* (Linnaeus, 1758) from Pakistan

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### Abstract

Study on food selection in two grasshopper species i-e: namely *Calliptamus barbarus* (Costa, 1836). and *Chorthippus biguttulus* (Linnaeus, 1758) was carried out during the year 2016 from Pakistan. Specimens were collected and kept in jars in order to note their feeding behavior. In addition to this, survival rate of species on different host plants was observed. The survival rate of *C. barbarus* was observed as  $4.11 \pm 4.67$  followed by *C. biguttulus* as  $17 \pm 4.38$  on *Cynodon dactylon*, *Paspalum notatum* and *Psidium guajava* respectively. Furthermore, it was found that insects did not preferred *Brassica oleracea var. capitata*. The present study findings will be very helpful to future researchers concerned with rearing of *C. barbarus* and *C. biguttulus*

**Keywords:** Grasshopper species, *Calliptamus barbarus*, *Chorthippus biguttulus*, *Paspalum notatum*, *Psidium guajava*

### 1. Introduction

The order Orthoptera includes among its members the short horned grasshoppers, locusts, crickets, katydids, long horned grasshoppers and wetas [2, 10]. The order is much more usually and diversely represented in low latitudes where, largely due to the notoriously devastating destruction caused by periodic locust and grasshopper plague outbreaks [1]. Basically grasshoppers to a certain extent are unusual among herbivorous insects, most are polyphagous, feeding selectively on plants from a number of dissimilar plant families. Because of their polyphagous nature, most grasshopper species are not projected to experience troublesome selection associated with host choice [6, 8].

Concerning the intake of vascular plants orthopterans are usually classified as graminivorous, forbivorous, or omnivorous and each class show special adaptations of their mouthparts [4]. Though, orthopterans may feed on different plant parts such as flowers, leaves, fruits, pollen [4, 7]; feeding habits are generally somewhat specific and the food selected by grasshoppers in natural conditions greatly dependent on the richness of plant species in that habitat [9].

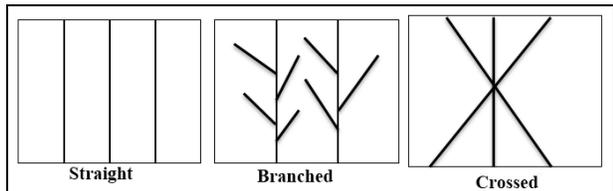
The insects are saltatorial, and phytophagous, having mandibulate, usually hypognathous mouthparts which bear a strong succession of grinding ridges [6]. Orthoptera also play vital roles in terrestrial food-webs as prey species for both insects and larger vertebrates. Many blister beetle larvae eat grasshopper eggs, and many flies depend upon adult grasshoppers as a food source. Many birds, reptiles, and small mammals need grasshoppers, katydids, and crickets as an essential source of rich protein [3]. No data on the food preference of *C. barbarus* and *C. biguttulus* was carried out from this region; it was therefore, present study was designed to investigate the food selection among *C. barbarus* and *C. biguttulus*.

### 2. Materials and methods

Adults of *C. barbarus* and *C. biguttulus* were collected between October and November in year 2016 from Mangloor, Mansehra, KPK, Pakistan ( $34^{\circ}15'6.62$  N":  $73^{\circ}6'38.39$  E"). The region is having an elevation of 4026 ft and represents a wide range of plant species. Insects were placed in plastic jars (1 feet 2inch length and 7.5 inches width) room tem ( $20 \pm 2$  °C) under a L:D 12:12 h. A total of 14 *C. barbarous* and 13 *C. biguttulus* were kept in 5 jars named J1, J2, J3, J4 and J5 respectively. Insects were fed daily with fresh plants which were common in that area. Plants included *Psidium guajava* (Common guava) leaves,

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*Brassica oleracea* var. *capitata* (cabbage), *Cynodon dactylon* (Bemuda grass), and *Paspalum notatum* (common bahia grass). Grasshoppers were given the choice to select between the plant species. Architecture of twigs in jars was set for grasshoppers that was straight, branchy and crossed (Table.1). Data was recorded and analyzed for results.



**2.1 Data analysis**

Data was analyzed by software (SPSS) version 16.0. Obtained data from experimental groups was subjected to one-way analysis of variance (ANOVA).

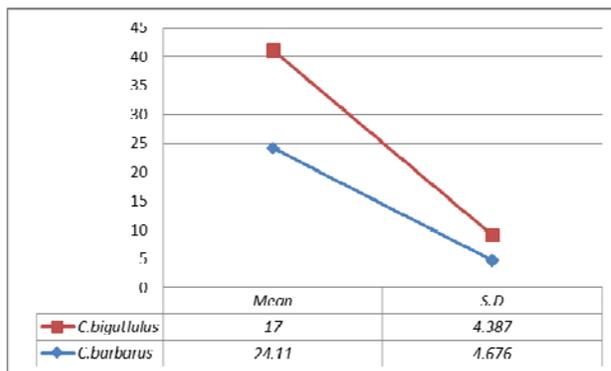
**3. Results and Discussion**

Grasshoppers are considered to be severe pests of agricultural crops. During the present study two species i-e: *C. barbarus* and *C. biguttulus* were collected and kept in jars in order to note their feeding behavior. In addition to this, survival rate of species on different host plants was note. The survival rate of *C. barbarus* was noted  $4.11 \pm 4.67$  followed by *Ch. biguttulus*  $17 \pm 4.38$  on *Cynodon dactylon*, *Paspalum notatum* and *Psidium guajava* respectively (Table.1 and 2, Fig.1). Furthermore, it was found that insects don't preferred *Brassica oleracea* var. *capitata*. The relationship between pollen and orthopteran feeding habits has an interesting origin. Since Darwin (1862) it was considered that Orthoptera are not capable of consistent pollination. Recently, a new species of raspy cricket (Gryllacrididae), *Glomeremus orchidophilus* which is endemic to Reunion island (Mascarenes, Indian Ocean) has been reported as the only pollinator of the orchid [5, 8]. Studies on the ecology and distribution of Katydidids (Tettigoniidae) was carried out in detail including their host plant preference by [5, 10, 12, 14]. Species belonging to genus *Euconocephalus* cause constant

threat to the valuable crops economic loss to mankind in Pakistan [13]. *Glyphonotus sinensis* Uvarov, 1939 reported as pest of agricultural land [11]. Some orthopterans eat plants which are injurious to the growth of livestock-preferred plants as well as poisonous plants to livestock. Also, the small size of orthoptera fecal pellets aids in microbial decomposition, and essential nutrients cycle back to soil more quickly than is the case with feces from sheep, cattle, horses, etc. Also, the nutrients from their decaying bodies also cycles more quickly than the larger decomposing bodies of livestock. Many different species of orthoptera can live in similar habitats or microhabitats in comparatively small geographic areas [1, 10]. It was perceived that the survival rate of *C. barbarus* is more than that of *C. biguttulus*. Finding of present study will be very helpful to future researchers concerned with rearing of *C. barbarus* and *C. biguttulus*.

**Table 1:** Showing descriptive statistics as Mean  $\pm$ SD of *C. barbarus* and *C. biguttulus*

Descriptive Statistics		
	N (18)	Mean $\pm$ SD
<i>C. barbarus</i>	9	24.11 $\pm$ 4.67
<i>C. biguttulus</i>	9	17 $\pm$ 4.38



**Fig 1:** Showing comparison between survival rate of *C. barbarus* and *C. biguttulus*.

**Table 2:** Showing the survival rate of *C. barbarus* and *C. biguttulus*.

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
<i>C. barbarus</i> - <i>C. biguttulus</i>	7.111	4.859	1.620	3.376	10.846	4.390	8	.002

**4. Conclusion**

From the present study it was concluded that food selection in two grasshopper species i-e: namely *Calliptamus barbarus* (Costa, 1836) and *Chorthippus biguttulus* (Linnaeus, 1758) showed their survival rate of on different plant tests. It is further recommended that if selection of their favorable food will be helpful in understanding their biology.

**5. Acknowledgement**

The authors are highly thankful to Mr. Shoaib Ali and Sidra Zukaib for helping out in species collection.

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