

Study on genus *Heteracris*, Walker, 1870 (Eyprepocnemidinae: Acrididae) from middle Sindh Pakistan

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Received: 29 April 2024 / Revised: 04 July 2024 / Accepted: 05 August 2024 / Published online: 06 August 2024.

How to cite: Nazeer Memon, A., Baloch, N., Sultana, R. (2024). Study on genus *Heteracris*, Walker, 1870 (Eyprepocnemidinae: Acrididae) from middle Sindh Pakistan, Journal of Wildlife and Biodiversity, 8(4), 31-48. DOI: <https://doi.org/10.5281/zenodo.13822802>

Abstract

This study presents a unique contribution to the field of zoology, entomology, and biodiversity. Species belonging to the genus *Heteracris*, Walker, 1870, commonly known as short-horned grasshoppers in the family Acrididae, were captured from various Middle Sindh, Pakistan localities. The material was identified into two species: *Heteracris littoralis* (Rambur, 1838) and *Heteracris adspersa* (Redtenbacher, 1889). A detailed morphological description of the species, digital images, and key information for their identification in middle Sindh are provided in this paper.

Keywords: Acrididae, Species, *Heteracris*, Identification, Middle Sindh, Genus

Introduction

Grasshoppers can be found all over the globe, even in under-polar regions. However, the majority of grasshopper genera and species are found in tropical and subtropical climates. One of the biggest orders of insects, Orthoptera, has two suborders: Cealifera (the superfamily of short-horned grasshoppers) and Ensifera (the superfamily of long-horned grasshoppers). These insects, in their hemimetabolous nymphal stage, look quite similar to adult forms, with the exception that they lack fully formed wings and reproductive apparatus. Ali and Panhwar (2017) found that these herbivores wreak havoc on pastures, woodlands, and economic crops all across the world. Contrarily, they continue to have a major influence on grassland ecology via nutrient cycling, community structure shaping, and providing sustenance for numerous invertebrates and vertebrates. Furthermore, after crickets, they are the most eaten insects by humans. Among the

most varied and ecologically vital grassland insect groups are the locusts, including grasshoppers, which belong to the suborder Caelifera of the order Orthoptera (Latchininsky et al., 2011). Grasshoppers vary in their preferences for host plants based on their evolutionary history. Fields and meadows are common terrestrial habitats for Orthoptera, while other species prefer shady spots like caverns, deserts, bogs, or even beaches. While most species in the Ensifera and Caelifera suborders eat plants, there are a few of omnivores among them. The Acrididae family contains over a hundred species of grasshoppers, which are harmful to both grasslands and agricultural crops (Dadd, 1963). Grasshoppers are among the most devastating crop pests. Some of the named species are extremely rare, while others are ubiquitous; yet others exhibit extreme population swings, sometimes becoming transient keystone species. finally, whole insect communities may be crucial to the long-term health of ecosystems. Monocots and dicots are both consumed by grasshopper species (Elshazly et al., 2019). In 2016, 250 specimens were from Gorakh Hill Station. Acrididae, Tetrigidae, Dericorythidae, and Pyrgomorphidae are the four families and six subfamilies of Caelifera (Orthoptera) found at this location (Panhwar, 2018). Grasshoppers and other orthopterans abound in Southeast Asia. An urgent need to investigate the ecology of orthoptera in Southeast Asia exists, in addition to our current lack of knowledge regarding the diversity of orthoptera in the region (Tan et al., 2017). At present, 140 genera make up the subfamily Acridinae worldwide. *Heteroacris littorals suspended their molting in the nymphal stage and their ovarian development in the adult stage until favorable food plants became available.* Several studies have been carried out on various aspects of Acrididae including genus *Heteroacris* (Whitman, 2008; Gupta & Shishodia, 2009; Song, 2018; Hebard, 1932; Ghazawi et al., 2007; Wandji et al., 2021; Cano & Santos, 1989; Sharaby et al., 2017; Alrubeai, 1986; Ibrahim, 1980; Abdel Rahman, 2023; Alrubeai, 1986; Saini & Thakur, 2013; Johnsen, 1981; Sharma, 2012; Panhwar et al., 2023; Panhwar & Mustafa, 2022; Panhwar et al., 2016) but no detail study has been carried out from middle Sindh. It was therefore present study was carried out from the middle Sindh Pakistan to investigate the *Heteroacris* fauna.

Material and methods

For the extensive accumulation of specimens from different agricultural fields, including vegetables, cereals, grasses, etc. at different times on a weekly and monthly basis. They were regularly possessed by

insect net, and hand-picking; specimens shifted to Advanced Entomology Lab at ; specimens were shifted to the Advanced Entomology Lab at the Department of Zoology the University of Sindh Jamshoro for their morphometrical and taxonomic study. Recognition of the material was done using the Magnifier glass and Binocular Microscope. Various body parts are measured with a digital Vernier caliper.

Preservation and killing method

Through the application of the methods developed by Vickery and Kevan (1983), all of the Acrididae material that was gathered was killed and eventually stored. In order to preserve the correct coloration of the insect, the samples that were collected were brought into the laboratory and treated with potassium cyanide (KCN) for a period of fifteen to thirty minutes. Furthermore, the pinning of specimens was accomplished in a matter of hours due to the fact that the specimens were flexible, there was minimal risk of losing any portion through the necessary manipulation, and the pieces were able to expand in any way that was wanted. A small distance to the left of the median dorsal carina and placed on the pronotum posterior to the transverse sulcus, the insect pins were introduced into the body of the insect. After that, the samples were stretched out on the stretching board, and particular focus was given to the legs, wings, and antennae in order to display crucial taxonomic characteristics. With the assistance of a dry camel hairbrush, dust particles and other undesirable stuff were successfully eliminated. When the specimens had completely dried out (after twenty-four hours), they were eliminated from the stretching board and placed in the Insect boxes that had standardized labels. These Boxes were used to protect naphthalene balls from being carried away by ants and other insects so that samples may be preserved for a longer period of time.

Samples Identification

A stereoscopic dissecting binocular microscope was used to conduct a comprehensive examination of all the preserved samples. The specimens were identified through the utilization of keys and photographs, as well as descriptions found in various books and papers, including illustrations and synonymy, which were accessible through the Orthoptera online Species file (<http://www.orthoptera.org>) ((Kirby, 1910; Cigliano et al.,2024). Every single one of the body parameters was measured in millimeters

The Advanced Entomological Laboratory, located in the Department of Zoology at the University of Sindh in Jamshoro Sindh, Pakistan, was the location where all of the samples were collected and stored.

Results

Genus *Heteracris*, Walker, 1870

Description

Size medium to large. Integument rugose. Antenna filiform, usually thick, sometimes slightly widened in the middle. Head sub-conical, broad eyes prominent, the vertex's fastigium is either parabolic or angular and has an obtuse tip; the median carina is present in most cases; the front is oblique and somewhat convex; and the frontal ridge is wide, flat, and relatively low. Metazona shorter than prozona, with a slightly ex-curved posterior edge; three sulci cross the dorsum; pronotum flattened or weakly tectiform with sharp median and lateral carinae, which eventually extend rearward, straight or weakly incurved. The prosternal process is either cylindrical or slender, compressed somewhat anterior to posteriorly, slightly angled backward, and has an acutely rounded tip. The mesosternal interspace is lengthier and narrower than its maximal length, although it can be slightly wider at times. Metasternal interspace with a large or adjacent space. Wings and tegmina are fully formed, the tegmina membrane is partially see-through, the costal area is enlarged at the base with moderately sparse reticulation, and the apex is obtusely rounded. The hind femur is very slim, the hind tibia is very short, and the hind foot is very slender. Big arolium. A male's last abdominal tergite with two projections. Plate above the anus of a male with an angular tip. The cervix is broad, incurved, tightly compressed, and downcurved, and its apex is either rounded or subacute. Having a wide, occasionally bilobed, apex, the subgenital plate is subconical. The valve of the ovipositor is short and strong, curved, and has an acute tip.

Remarks

Although it shares a common ancestor with *Cyathosternum* I. Bolivar in the form of an anterior process of the male parapoct, this genus is easily distinguished from it due to the absence of a notch at the top of the subgenital plate.

Key middle Sindh species of *Heteracris* Genus

1. The length of the hind femur is more than five times its greatest width, and the male Subgenital plate has two tubercles of.....*H.adspersa* (Redtenbacher).

- The length of the hind femur is five times or less than its greatest width, and the male subgenital plate points *H. littoralis* (Rambur).

***Heteracris adspersa* (Redtenbacher, 1889)**

Description

Small size. The antenna is Longer than the combined length of the head and pronotum, with 23–25 segments (Fig. 1). The skull is shorter than the pronotum, the eyes are in the middle of the skull, the vertex's fastigium is parabolic, and obtusely tounded, the frontal ridge is flat, and there are no ventral carinulae. The pronotum is somewhat narrowed at the front, with a well-developed median and lateral carinae; three sulci cross the dorsum, and the back is broadly rounded. The sternal process is circular at the top and slightly angled backward; it is cylindrical in shape. Laterally expanding mesosternally, the interspace is nearly twice as wide as its maximum length. Wings and tegmina fully matured. It has a little lesser wing span than a Tegmina. The shinbone is narrow. Legs fourteen to sixteen with black tips on the spikes. Metaloid of medium size. Long, curving, cylindrical cervixes that are sub-acutely expanded at the apex. Triangle-shaped subgenital plate with a point at its tip. A shade of dark gray. The tegmina membrane is semitransparent and covered with small, dispersed patches of dark brown color. Clear and devoid of color wings. A whiter hind femur with darker markings and a reddish-colored hind tibia. The color of the abdomen is slightly lighter and browner. It resembles the male but is somewhat bigger. Ovipositor has short, curved valves and short, subacute cervixes. All measurments have been given in the appendix, tables 1-7.



Figure 1. Showing Morphology of *Heteracris adspersa*

Remarks

Although it shares many similarities with *H.rantae* Uvarov, such as a generally oval body and spotless tegmina, this species is easily distinguished from its near relative by its bituberculate male

sub-genital plate. Other traits are detailed in the keys and description (Fig. 2). Both cultivated areas and fields with a mixture of grasses and bushes are home to this species. All around the Punjab, you can find this bug. Districts of Faisalabad, Chakwal, Bhakkar, and leyyah were included in Yousuf's (1996) report on this species.

Diversity of species *Heteracris adspersa*

$$D = (n/N)^2 = (141/5760)^2 = (0.0244)^2 = 0.0005$$

N=total no of species

$$D = 1 - 0.0005 = 0.9994$$

n = particular species

D = Diversity

Heteracris littoralis* (Rambur,1838)*Description**

Size medium. The antenna 23–26 segments, longer than the head and genitalia combined. The head is set below the pronotum and has a subconical shape (Fig. 2). The vertex fastigium is flat and trapezoidal in shape, protruding spherically over the frons. There are no fastigial foveolae and the frontal ridge is wide and level. Metazona shorter than prozona, posterior edge broadly rounded, pronotum weakly tectiform with high median and lateral carinae; three sulci cross the dorsum. Having a somewhat compressed, cylindrical, and rounded apex, the prosternal process slants backward. The narrow and extended mesosternal interspace is longer than its widest point but narrower than its lobes. Aorta erecta. Acutely rounded apices and fully developed tegmina and wings. Thick, broader at the base hind femur with rounded dorsal genicular lobes and a complete dorsal carina. Slender hind tibia with thirteen inner and fifteen exterior spines with black tips. Moderate arsenate. Obtusely rounded at its tip, the supramalar plate is small. The incisors are long and tapered, with sharply rounded tips. The undergenital plate is almost triangular in shape, with a sharply pointed tip and a curving upward profile. Brownish-yellow, often with thin black lines under the eyes. The head and pronotum are striped with yellow stripes that reach the middle of the tegmina and a dark brown median. The tegmina are somewhat see-through and more pale, dotted with brown. Clear and devoid of color wings. The hind femur is lighter in color and has two slightly darkened bands. The reddened tip of the hind tibia. Looks like a man but is much bigger. Anterior plate that is brief and has a blunt, rounded tip. Short, conical, base-widened cerci with sub-acute apices. The ovipositor is sturdy and compact, and its valves are curved. The ventral valves have an outwardly projecting tooth-like structure. elongated, conical, and subgenital with a broadly rounded border. Tables 8 to 14 give more information about the species morphology.



Figure 2. Showing Morphology of *Heteracris littoarlis*

Remarks

Though they share a similar basic body form, this species can be clearly distinguished from *H. adpersa* (Uvarov) thanks to its longer, thinner femur and the other traits mentioned in the identification and descriptions.

More taxa live in areas where *H. littorals* are found than in places where *H. dispersal* is. This species was collected in fields with a mixture of grasses, plants, and bushes, as well as fields farmed for maize and vegetables. In contrast to Yousf (1996), Ahmed (1957–1980) documented this species in Punjab.

Diversity of species *Heteracris littoarlis*

$$D = (n/N)^2 = (150/5760)^2 = (0.0260)^2 = 0.0006$$

N=total no of species

$$D = 1 - 0.0006 = 0.9993$$

n = particular species

D = Diversity

Discussion

The order Orthoptera includes the following insects: grasshoppers, locusts, katydids, and crickets. The Acridoidea superfamily includes grasshoppers and locusts. This superfamily contains some of the most profitable pests, particularly the locust species, which may seriously harm crops by forming swarms and consuming enormous amounts of vegetation (Panhwar, 2018). The strong hind legs of the members of the superfamily Acridoidea, designed for jumping, are their defining characteristics. They are also herbivorous because their food is mainly composed of grasses, supplemented with different types of flora. Typical features include large compound eyes, fully formed wings, and elongated bodies (Saeed et al., 2000; Sarwar et al., 2021). Baloch et al., (2023) presented checklist of 74 grasshopper species comprising 11 subfamilies i-e: Gomphocerinae, Oedipodinae, Tropicopolinae, Eyprepocnemidinae, Catantopinae, Hemiacridinae, Oxyinae, Calliptaminae, Cyrtacanthacridinae, Acridinae and Dericorythinae (Dericorythidae). During the present study, species of genus *Heteracris*, Walker, 1870, were collected from different locations of middle Sindh. *Heteracris littoralis* (Rambur, 1838) and *Heteracris adspersa* (Redtenbacher, 1889) were the two species identified from the material. Morphological description of the species, digital photographs of the species, and a key for the identification of the *Heteracris* species found in middle Sindh. Abdel Rahman (2023) researched *Heteracris littoralis* embryonic brain and compound eyes as affected by abamectin and fipronil insecticides. Elshazly et al. (2019) studied the tolerance of *Heteracris littoralis* to the toxic plant.

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Appendices

Table 1. Showing measurement of various body parts of *Heteracris adspersa*

Body Parameters	Male n =12		Female n=12	
	Mean \pm SD	Range	Mean \pm SD	Range
Length of Antennae	8.25 \pm 0.423	7.5 – 9	9.37 \pm 0.469	8.5 – 10
Length of Pronotum	3.16 \pm 0.222	3 – 3.5	4.67 \pm 0.461	4.2 -5.6
Length of Tegmina	16.7 \pm 0.625	15.5 – 17.8	22.84 \pm 1.037	21.6 25.8
Length of Femur	13.72 \pm 1.005	12 – 15.8	20.95 \pm 1.923	17.3 – 24.7
Length of Tibia	10.4 \pm 0.376	10 – 11	15.72 \pm 0.618	15 – 17
Length of Body	16.53 \pm 0.754	15.7 – 18.3	27.72 \pm 1.395	24.7 30

Table 2. Showing Distribution of *Heteracris adspersa* from District Dadu during the year 2022

Month and year	Phaka	Qazi arif	M.Ibrahem	Hussain Gadhi	Bachal Bouk	Total Specimens
JAN 2023	00	00	00	00	00	00
FEB 2023	00	00	00	00	00	00
MAR 2023	00	01	00	00	00	01
APRIL 2023	01	01	00	00	01	03
MAY 2023	00	02	00	00	00	02
JUNE 2023	00	00	02	02	01	05
JULY 2023	00	00	03	02	02	07
AUG 2023	01	03	01	01	01	07
SEP 2023	00	00	01	01	00	02
OCT 2023	00	00	00	00	00	00
NOV 2023	00	00	00	00	00	00
DEC 2023	00	00	00	00	00	00
Total	02	07	07	06	05	27

Table 3. Showing Distribution of *Heteracris adspersa* from District Dadu during the year 2023

Month and year	Phaka	Qazi Arif	M.Ibrahem	Hussain Gadhi	Bachal Bouk	Total Specimens
JAN 2022	00	00	00	00	00	00
FEB 2022	00	00	00	00	00	00
MAR 2022	00	00	01	00	00	01
APRIL 2022	00	02	01	01	01	05
MAY 2022	01	01	02	01	00	05
JUNE 2022	02	01	01	01	00	05
JULY 2022	00	02	00	01	00	03
AUG 2022	00	00	00	00	00	00
SEPT 2022	00	00	00	00	00	00
OCT 2022	00	00	00	00	00	00
NOV 2022	00	00	00	00	00	00
DEC 2022	00	00	00	00	00	00
Total	03	06	05	04	01	19

Table 4. Showing Distribution of *Heteracris adspersa* from District SBA during the year 2022

Month and year	Walidad Zardari	Bux Dahri	Bandhi	Baharo Mari	Khan Rind	Total Specimens
JAN 2022	00	00	00	00	00	00
FEB 2022	00	00	00	00	00	00
MAR 2022	00	00	00	00	00	00
APRIL 2022	00	00	01	00	00	01
MAY 2022	00	00	01	00	00	01
JUNE 2022	00	01	02	00	00	03
JULY 2022	00	02	01	00	01	04
AUG 2022	00	02	00	00	02	04
SEPT 2022	00	00	00	00	01	01
OCT 2022	00	00	00	00	00	00
NOV 2022	00	00	00	00	00	00
DEC 2022	00	00	00	00	00	00
Total	00	05	05	00	04	14

Table 5. Showing Distribution of *Heteracris adspersa* from District SBA during the year 2023

Month and year	Walidad Zardari	Bux Dahri	Bandhi	Baharo Mari	Khan Rind	Total Specimens
JAN 2023	00	00	00	00	00	00
FEB 2023	00	00	00	00	00	00
MAR 2023	00	00	00	00	00	00
APRIL 2023	00	02	00	00	00	02
MAY 2023	00	02	00	01	01	04
JUNE 2023	00	03	02	01	01	07
JULY 2023	01	02	02	01	01	07
AUG 2023	00	01	01	01	01	04
SEP 2023	01	01	00	01	02	05
OCT 2023	00	01	00	00	01	02
NOV 2023	00	00	00	00	00	00
DEC 2023	00	00	00	00	00	00
Total	02	12	05	05	07	31

Table 6. Showing Distribution of *Heteracris adspersa* from District Naushero Feroze during the year 2022

Month and year	PURAN	HYDER JESAR	AYAL TUNIO	THARU SHAH	HALANI	Total Specimens
JAN 2022	00	00	00	00	00	00
FEB 2022	00	00	00	00	00	00
MAR 2022	00	00	00	00	00	00
APRIL 2022	00	01	00	00	00	01
MAY 2022	01	01	00	01	00	03
JUNE 2022	02	01	00	02	01	06
JULY 2022	00	03	00	00	01	04
AUG 2022	00	02	00	01	01	04
SEPT 2022	00	00	00	00	00	00
OCT 2022	00	00	00	00	00	00
NOV 2022	00	00	00	00	00	00

DEC 2022	00	00	00	00	00	00
Total	03	08	00	04	03	18

Table 7. Showing Distribution of *Heteracris adspersa* from District Naushero Feroze during the year 2023

Month and year	PURAN	HYDER JESAR	AYAL TUNIO	THARU SHAH	HALANI	Total Specimens
JAN 2023	00	00	00	00	00	00
FEB 2023	00	00	00	00	00	00
MAR 2023	00	00	00	00	01	01
APRIL 2023	00	00	01	02	00	03
MAY 2023	01	02	00	00	02	05
JUNE 2023	02	05	00	00	02	09
JULY 2023	02	02	00	00	01	05
AUG 2023	00	01	01	00	02	04
SEP 2023	01	01	00	00	02	04
OCT 2023	00	01	00	00	00	01
NOV 2023	00	00	00	00	00	00
DEC 2023	00	00	00	00	00	00
Total	06	12	02	00	12	32

Table 8. Showing measurement of various body parts of *Heteracris littoralis*

Body Parameters	Male n =12		Female n=12	
	Mean ± SD	Range	Mean ± SD	Range
Length of Antennae	7.26±0.725	6.3 -8.6	11.38±0.959	10.1 -12.8
Length of Pronotum	6.8±0.626	5.8 – 7.8	7.25±0.514	6.5 – 8
Length of Tegmina	21.66±1.023	20 – 24.5	32.52±1.221	30.5 -34.2
Length of Femur	15.09±1.017	14.7 -17.8	24.10±1.181	21.5 -26
Length of Tibia	12.01±1.022	11 -14.6	22.92±1.157	21 – 24.5
Length of Body	31.69±1.472	29.5 -34.6	37.23±2.182	34 - 40

Table 9: Showing Distribution of *Heteracris littoralis* from District Dadu during the year 2022

Month and year	Phaka	Qazi arif	M.Ibrahem	Hussain Gadhi	Bachal Bouk	Total Specimens
JAN 2022	00	00	00	00	00	00

FEB 2022	00	00	00	00	00	00
MAR 2022	00	00	00	00	00	00
APRIL 2022	00	00	00	00	00	00
MAY 2022	00	00	00	00	00	00
JUNE 2022	01	00	01	00	00	02
JULY 2022	00	00	02	01	01	04
AUG 2022	00	00	02	02	02	06
SEPT 2022	02	02	00	00	01	05
OCT 2022	01	00	00	00	00	01
NOV 2022	00	00	00	00	00	00
DEC 2022	00	00	00	00	00	00
Total	04	02	05	03	04	18

Table 10. Showing Distribution of *Heteracris littoralis* from District Dadu during the year 2023

Month and year	Phaka	Qazi arif	M.Ibrahem	Hussain Gadhi	Bachal Bouk	Total Specimens
JAN 2023	00	00	00	00	00	00
FEB 2023	00	00	00	00	00	00
MAR 2023	01	00	00	00	00	01
APRIL 2023	01	00	01	02	00	04
MAY 2023	02	00	00	02	00	04
JUNE 2023	01	01	00	02	01	05
JULY 2023	00	00	00	01	00	01
AUG 2023	02	01	01	02	00	06
SEP 2023	01	02	00	00	02	05
OCT 2023	01	00	00	00	00	01
NOV 2023	00	00	00	00	00	00
DEC 2023	00	00	00	00	00	00
Total	09	04	02	09	03	27

Table 11. Showing Distribution of *Heteracris littoralis* from District SBA during the year 2022

Month and year	Walidad Zardari	Bux Dahri	Bandhi	Baharo Mari	Khan Rind	Total Specimens
JAN 2022	00	00	00	00	00	00
FEB 2022	00	00	00	00	00	00
MAR 2022	00	00	00	00	00	00

APRIL 2022	00	00	01	00	00	01
MAY 2022	00	00	01	01	00	02
JUNE 2022	00	01	00	00	00	01
JULY 2022	00	02	01	02	00	05
AUG 2022	01	00	02	02	00	05
SEPT 2022	00	01	01	01	00	03
OCT 02022	00	00	01	01	00	02
NOV 2022	00	00	00	00	00	00
DEC 2022	00	00	00	00	00	00
Total	01	04	07	07	00	19

Table 12. Showing Distribution of *Heteracris littoralis* from District SBA during the year 2023

Month and year	Walidad Zardari	Bux Dahri	Bandhi	Baharo Mari	Khan Rind	Total Specimens
JAN 2023	00	00	00	00	00	00
FEB 2023	00	00	00	00	00	00
MAR 2023	00	00	00	01	00	01
APRIL 2023	00	00	01	01	00	02
MAY 2023	00	00	02	00	00	02
JUNE 2023	00	03	03	02	01	09
JULY 2023	02	01	01	02	01	07
AUG 2023	02	02	02	01	00	07
SEP 2023	00	00	00	00	00	00
OCT 2023	00	00	00	00	00	00
NOV 2023	00	00	00	00	00	00
DEC 2023	00	00	00	00	00	00
Total	04	06	09	07	02	28

Table 13. Showing Distribution of *Heteracris littoralis* from District Naushero Feroze during the year 2022

Month and year	PURAN	HYDER JESAR	AYAL TUNIO	THARU SHAH	HALANI	Total Specimens
JAN 2022	00	00	00	00	00	00
FEB 2022	00	00	00	00	00	00
MAR 2022	00	01	00	00	01	02
APRIL 2022	00	00	00	00	01	01
MAY 2022	01	02	01	00	01	05

JUNE 2022	00	04	01	00	01	06
JULY 2022	00	01	02	00	00	03
AUG 2022	01	02	00	00	03	06
SEPT 2022	00	00	00	00	00	00
OCT 2022	00	00	00	00	00	00
NOV 2022	00	00	00	00	00	00
DEC 2022	00	00	00	00	00	00
Total	02	10	04	00	07	23

Table 14. Showing Distribution of *Heteracris littoralis* from District Naushero Feroze during the year 2023

Month and year	PURAN	HYDER JESAR	AYAL TUNIO	THARU SHAH	HALANI	Total Specimens
JAN 2023	00	00	00	00	00	00
FEB 2023	00	00	00	00	00	00
MAR 2023	00	00	00	00	02	02
APRIL 2023	01	02	01	00	01	05
MAY 2023	02	02	00	00	03	07
JUNE 2023	01	01	01	00	02	05
JULY 2023	00	03	00	00	03	06
AUG 2023	00	02	00	00	04	06
SEP 2023	00	02	00	00	02	04
OCT 2023	00	00	00	00	00	00
NOV 2023	00	00	00	00	00	00
DEC 2023	00	00	00	00	00	00
Total	04	12	02	00	17	35