SindhUniv. Res. Jour. (Sci. Ser.) Vol. 51 (04) 601-606 (2019)
http://doi.org/10.26692/sujo/2019.12.96
SINDH UNIVERSITY RESEARCH JOURNAL (SCIENCE SERIES)

The first two Records of Darkling Beetles (Tenebrionidae: Coleoptera)) from Lower Sindh, Pakistan

F. D. SOOMRO, R. SULTANA, F. SOOMRO*, Z. MEMON*

Department of Zoology, University of Sindh, Jamshoro, Pakistan

Received 12th March 2019 and Revised 24th October 2019

Abstract: Family Tenebrionidae has great economic importance as it contains insect pest that are cosmopolitan in nature and most imperatively are associated with stored products. Darkling beetles are a large group of insects that belong to the family Tenebrionidae and affect the stored products. At the present 03 sub-families namely: Stinochinae, Tenebrioninae and Pimeliinae were reported. During this survey a total number of 300 specimens were collected and sorted out into 10 species i.e. *Promethissemiculcata* (Fairmaire, 1882), *Promethiscoracina* (Knoch, 1801), *Promethispunctulator* (Fairmaire, 1883), *Strongyliumforcipicullis* (Fairmaire, 1900), *Uloma excise* (Gebien, 1913), *Triboliummolitor* (Linnaeus 1758), *Alphitobiuslaevigatus* (Fabricius 1781), *Gonocephalumhispidocustatum* (Fairmaire, 1883), *Trachydermahispida* (Forskal, 1775), *Pimeliacapito* (Krynicky 1832). However, *Trachydermahispida* (Forskal.1775) *Pimeliacapito* (Krynicky 1832) were captured for the first time they are new records for this region in this paper their detail account was presented along with photographs.

Keywords: Tenebrionidae, Cosmopolitan, Stored Products, New Records.

1. INTRODUCTION

Beetle is a very diverse group of class insect and Darkling beetle is one of the largest beetle as compared to their other families. The word Tenebrio is derived from Latin language that means who loves to live in darkness. People use larvae of darkling beetle as food for raptile, birds and other animals. (Beutel and Leschen 2005). It is of a great economic importance as it contains insect pests that are cosmopolitan in nature and most imperatively are associated with stored products. Tenebrionidae is the fifth largest and most diverse family within order Coleoptera that contains more than 18,000 insect species and 15000 has described in worldwide (Tahir, *et al.* 2004 and Anwar, *et al.*1995). The Considerable taxonomic work has been carried out on Tenebrionidae in cultivated areas. These beetles mostly live in desert areas under the temperature of 50ºC. Through their long legs they have quality to save their body from burning sand and capable to move speedily. Most of the darkling beetles have interested defense mechanism, whenever they feel disturb they usually change the position of head and tail, head move down and tail lies upward. They secrete a fluid if foul smelling with dark colour for defense purpose. Tenebrionidae significantly affect the stored product. Earlier, many researcher (Aalbu, *et al.* 2002), (Lacordaire 1859), (LeConte and Horn 1883 (Arnett 1963) has carried work on this family from abroad. But, from Pakistan no single reference is available that's why this study is carried out.

2. MATERIAL AND METHOD

Beetles are not frequently found in field, they are mostly available in unlikely places and captured by using different methods, such as black light, pitfall, mercury vapor and sticky board. While light Trap and pit fall trap method, is typically more successful than another. Most of samples were collected through this. However, many species were also observed on single dead tress especially Oak plant. This habitat is right for collecting Tenebrionidae. Many samples were occupied on trees with growth of fungus in mesic jungles areas. For sampling of day-time different substrate i.e, tress, decaying plant, material and debris were also visited. During the present study we have adopted the pitfall method which found very useful.

2.1 Sampling

Due to large size, specimen easily collected by hand picking. The main sources of collection for this family are soil surface of different farm and Jungle area, under the rocked of mountain area and store grain storage areas. However, some insect also collected by using aspirator (stored grains), light traps and pitfall traps. The light traps having 250 W mercury vapors light and paced next to a white sheet of cloth (3x2 sqm). whereas, pitfall traps, involved plastic containers (8 cm top width, 10cm bottom width) fill with animal dung (1/3 portion) and sunk in the ground. Recently the impact of trap colors has been examined. (Buchholz *et al.*, 2009). Further these traps monitored monthly for insect collection and all insect species brought to Entomology Bio-Control Research Laboratory (EBCRL) Department of Zoology, University of Sindh for further analysis.

++Corresponding Authors: Email: farheensoomro23@gmail.com, riffat.sultana@usindh.edu.com
*Department of Zoology,Shah Abdul Latif University, Khairpur

Fig.1: Method of collection of Tenebrionidae through different Traps

2.2 Maceration process

For anatomical study, the insects were put in the beaker that was filled with 1/3 of water. After filling the water, it was put on a heat source until boiling, then insects was left for 4-5 minutes to moisturize the insect body in order to avoid the any breaking during separation process of their body parts while dissecting. After separation, the insect's head and the abdomen were put in a Pyrex beaker of 25 ml containing 10 % Potassium hydroxide (KOH) and put on a heat source for 4-5 minutes. This process helped to dissolve the fatty tissue in the insect's body. Later, these parts were washed with water and the process was repeated until the cleaning of selected body parts of insects from KOH .However, antennae, mouth parts and genitalia were separated by using the dissecting tools. These parts were put in the Ethyl Alcohol with different concentrations (25%, 50%, 75%, and 100 %) then put in Xylol at 2 minutes for clearing purpose and then on filter paper to dry these insect body parts. Canada balsam was used to prepare insect slides and these slides were placed under source of 100 w of light in order to dry for maximum three to four days to examine and to draw images.

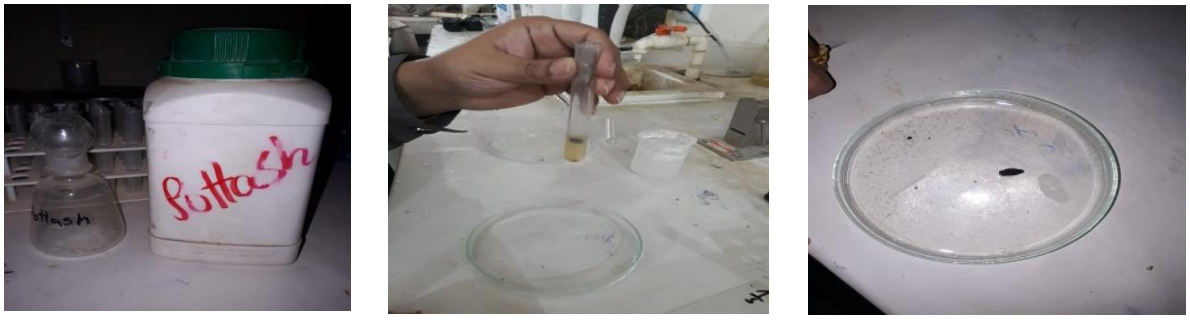

Fig.2: Maceration process for gentile of different species of Darkling beetles

2.3 Preservation and Depository

The covered glass tube were used to collect specimen then kept inside the refrigerator with plastic cover. These specimens killed and pinned and saved them for many days. The process of Pinning by using insect pins on the black enamel of different sizes (2, 3 and 4). A label adhered containing the information regarding areas of the insect collections: Dates of collection, Name of the collector and number of specimen and depository museum.

2.4 Imaging

For identification of whole body images and characters, these beetles observed under Nikon 18 Mega Pixels and 42 HD Coolpix (P-520) Camera.

3. RESULTS

During present survey a number of 300 specimens were accumulated during May 2018 to July 2019. Sub-family Stinochinae and Tenebrioninae are representing 4 genera with 4 species i.e *Promethissemiculcata*, *P. coracina*, *P. punctulator*, *Strongyliumforcipicullis* of Stinochinae and *Uloma excise*, *Triboliummolitor*, *Alphitobiuslaevigatus*, *Gonocephalumhispidocustatum* of Tenebrioninae while in subfamily Pimeliinaehas 2 genera with 2 species i.e. *Trachydermahispida*, *Pimeliacapito*. All these were reported from different localities of lower Sindh. It observed that most dominant species was *Trachydermahispida* followed by *Pimeliacapito* and lowest ratio of *Promethiscoracina*. However, Trachyderma*hispida* (Forskal.1775) *Pimeliacapito* (Krynicky 1832) we recaptured for the first time they are new records for this region.

3.1. *Trachydermahispida* (Forskal.1775)

Head slightly rectangular with blackish hair and separated tubercles. Antennae long, surpassing and throughout cover with hair. Pronotum was convex. Anterior and posterior margins straight with rounded angles. Elytra elongated wider than base of pronotum. Legs thick, tuberculated, and hairy. Abdomen was fine with tubercles and short hair.

Fig.3: *Tracydermahispida* in wild

Table 1. The measurement of various body parts (mm) of *Trachydermahispida*

Parameter	Mean ± D.D	
	Male (n=30)	Female (n=30)
Antennal segment	7.33 ± 1.25	9.16 ± 4.49
Antennal length	6.6 ± 5.5	7.3 ± 4.03
Length of Head	2.3 ± 1.25	3.0 ± 0.61
Distancebetween Eyes	3.29 ± 0.58	3.75 ± 1.5
Length of Pronotum	6 ± 1.58	6.16 ± 1.75
Length of Abdomen	16.5 ± 2.8	17.3 ± 2.16
Length of Wing	32.5 ± 2.5	36.7 ± 2.8
Length of Femur	8.8 ± 3.43	8.9 ± 3.75
Length of Tibia	7.28 ± 1.85	8.50 ± 2.00
Total body Length	24.15 3.96	262± 4.5

Remarks

This species has dimorphism between the segments 5, 6 and 7 of the pupae and adults, something difficult to observe. In adults there is a greater opening between the segments of the males as opposed to a smaller opening in the females. In female pupae, the seventh segment is clearly divided vertically in two, while in males only a small opening is shown in the middle. In female there is jell like lobe appear at the end of the abdomen which shows ovipositor.**(Fig. 4).**

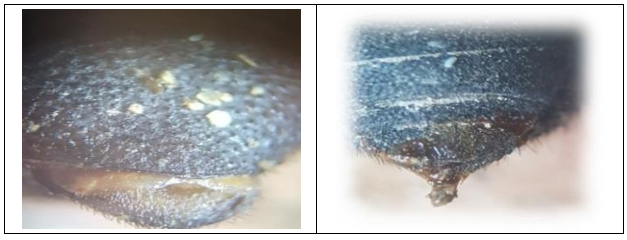

Fig.4: Ovipositorof *Trachyderma hispida*

***Pimeliacapito* (Krynicky 1832)**

Head blackish with thin hair and tubercles. Antennae not long, Pronotum Elytra shortened wider than base of pronotum. Legs thick with tuberculate, and hairy. Abdomen was plan with numerous tubercles. Body general color is shine-blackish **(Fig. 5).**

Fig.5: *Pimeliacapito* dorsal view

Table 2: The measurement of various body parts (mm) of *Pimeliacapito*

	Mean ± S.D	
Parameter	Male (n=20)	Female(n=20)
Antennal segment	10.6± 0.81	10.11± 1.05
Antennal length	4.02 ± 0.60	4.24 ± 2.44
Length of Head	1.60 ± 0.41	2.0 ± 0.61
Distance between Eyes	2.10 ± 0.49	3.5 ± 1.5
Length of Pronotum	5.81 ± 2.37	6.16 ± 2.8
Length of Abdomen	12.66 ± 3.01	13.8 ± 3.16
Length of Femur	5.09 ± 2.13	6.7 ± 2.16
Length of Tibia	4.29± 1.8	4.9 ± 2.5
Total body length	20 .3± 5.39	21.33 ± 7.29

Remarks

*Pimelia*areunivoltine and known as detrivores but have ability to cannibalize other insect's adults, larva or eggs also. They adopt this behavior to fulfill extra nutrients in their body for ready to fight against their competitor. When the mating process done female lay single egg inside a shallow holes, and these eggs are similar to grain of white rice .Due to the rise of temperature more than 50ºC the adult population of beetles becomes died off. Till the maturation they remain below the surface. Winter is the favorable season for their emergence.

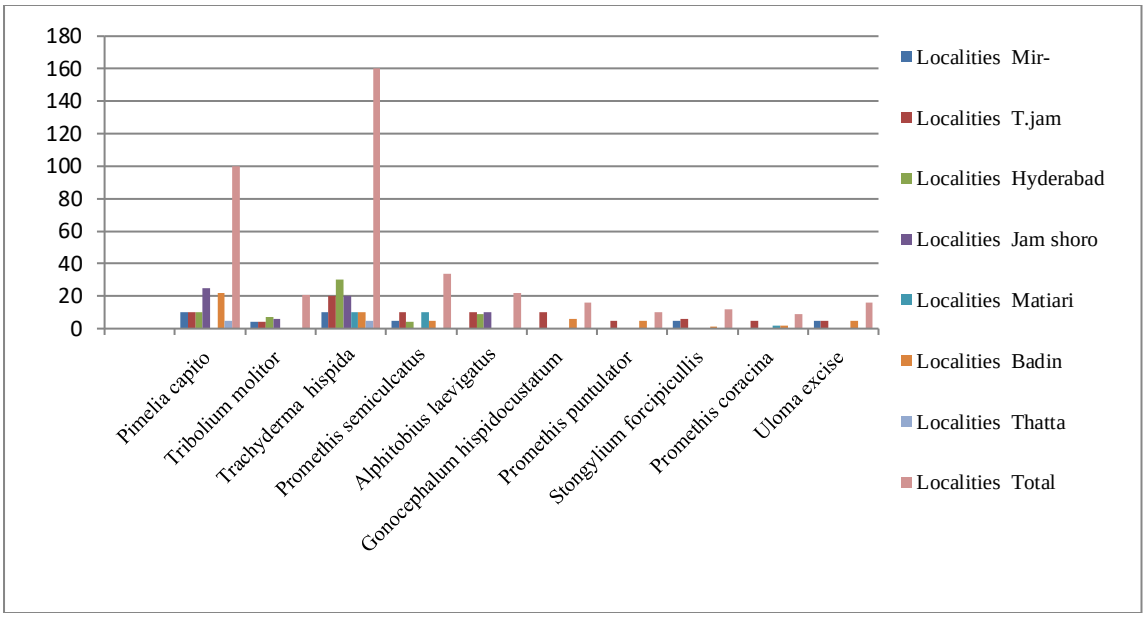

Fig.5. Distribution of various species Tenebrionidae

4. CONCLUSION

This study was conducted on the diversity status of three sub-families of Tenebrionidae which has significant impact on crops. All the insects were collected through different methods like light trap and pitfall trap to observed their distribution and seasonal abundance. During 2018-19 large size insect species captured by hand picking from various regions of Sindh Pakistan. These traps were monitored monthly and a total number of Tenebrionidae were calculated from all study sites. During this survey a total of 300 specimens of Tenebrionidae were collected and sorted out into 10 species. However, Trachyderma*hispida* (Forskal.1775) *Pimeliacapito* (Krynicky 1832) were captured for the first time they are new records for this regions

REFERENCES:

Aalbu, R. L., C. A. Triplehorn, J. M. Campbell, K.W. Brown, R. A. Somerby, and D. B. Thomas (2002). Family Tenebrionidae Latreille 1802, 463-509. CRC Press, Boca Raton, FL.

Anwar, M. A., A. Mubarik, and U. Noor (1995). Thermodynamic of wheat stored in metallic bins and its relationship with insect pest development, Pakistan Entomology, 17:46-50.

Anwar, T., S. Tahir, I. Ahmad, and Y.H. Hayat (2004). Pesticide residues in vegetables collected from markets of Mardan (NWFP), Lahore and Faisalabad (Punjab), Pakistan.

Arnett, R.H. (1963). The Beetles of the United States (a Manual for Identification). Catholic University of America Press, Washington D.C., 1112Pp.

Beutel, R.G. and R.A.B. Leschen (2005). A Natural History of the Phyla of the Animal Kingdom. Walter de Gruyter, Berlin and New York.

Buchholz, S., A. Jess, F. Hertenstein, and J. Schirmel (2009). Effect of the colour of pitfall traps ontheir capture efficiency of Carabid beetles (Coleoptera: Carabidae), spiders (Araneae) and other arthropods. Eur. J. Entomol., 107: 277– 280.

Horn, G. H. (1885). Synonymical notes (No. 3). Entomologia Americana 1: 108-113.

Lacordaire, J. T. (1859). Histoire Naturelle des Insectes. Genera des Coleopteres. Librarie Encyclopédique de Roret. Paris, 5:1-750.

Leconte, J.L. and G.H. Horn (1883). Classification of the Coleoptera of North America. Prepared for the Smithsonian Institution. Smithsonian Miscellaneous Collections, 26: 1-567.

Tahir, S. (2000). Pesticide effect on Human Health in Pakistan. Policy and strategy for rational use of pesticide, Pakistan 99/002/FAO, 57Pp.

Tahir, S., T. Anwar, I. Ahmed, S. Aziz, M. Ashiq, and K. Ahad (2001). Determination of pesticide residues in fruits and vegetables in Islamabad Market. Journal of Environment Biology, 2(1): 71-74.