

BIODIVERSITY OF ORDER COLEOPTERA AT SELECTED LOCALITIES OF TEHSIL TAKHT BHAI, DISTRICT MARDAN THROUGH MALAISE TRAPPING SYSTEM

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Abstract- The most populous taxon in the animal kingdom are insects. As the largest animal category, insects are collected using a number of sampling techniques. Among several methods of sampling for the collection of various insect groups, sweep nets, light traps, pitfall traps, Winkler sampling, and malaise traps are common and very effective. Coleoptera is the largest order of class insecta and have more than 400,000 known species. The most popular nonattractant, static insect traps are Malaise trap, which are big, tent-like structure made of fine mesh netting. Tehsil Takht Bhai, District Mardan were selected for the installation of Malaise trap. Malaise trap were installed in four different sites (Jalala, Shergarh, Takht Bhai, Lund Khwar) for five months (June 2022 to September 2022). Total 404 samples were trapped of Order Coleoptera which were further identified to seven families and to 10 genera. Out of these families, the family Scarabaeidae were founded with the highest number of specimens and the family Carabidae, family Chrysomelidae and family Hybosoridae were founded with the lowest number of specimens.

Index Terms- Animal, Coleoptera, Diversity, Insects, Malaise trap,

INTRODUCTION

The most populous taxon in the animal kingdom are insects [1]. As the largest animal category, insects are collected using a number of sampling techniques. Among several methods of sampling For the collection of various insect groups, sweep nets, light traps, pitfall traps, Winkler sampling, and malaise traps are common and very effective [2]. There are around 7,51000 recognized species of insects on the universe, which is almost one-fourth of all animal species [3]. The Coleoptera, which comprises 3,87,100 species and represents for about 38% of all insect orders, which is the most effective one [4].

ORDER COLEOPTERA

Coleoptera is the largest order of class insecta and have more than 400,000 known species [5]. This order has a great deal of diversity in terms of size, shape, biology, and behavior. They have two types of wings, a pair of fore wings also called elytra

and a pair of membranous hind wings. They have complete metamorphosis and have chewing mouthparts which are modified for various functions. Coleoptera are found in various habitat like desert, water and feed on various plant and animal materials [6].

MALAISE TRAP

The most popular nonattractant, static insect traps are Malaise trap, which are big, tent-like structure made of fine mesh netting. Rene Malaise invented them when he observed insects in a tent that provided the first inactive method for observing and gathering a large number of flies. Several bug species will climb up when they encounter a barrier, which is advantageous for Malaise trap. The mesh walls of the traps stop flying insects, particularly Diptera and Hymenoptera, although they also catch a variety of ground-dwelling species [7]. Malaise traps can be set up everywhere there are likely to be flying insects, such as woodlands, open grasslands, prairies, and windy summits, but care must be taken to secure them in the event of strong winds. The placement of the traps has an impact on the biodiversity collection [8]. The traps can be used for general gathering, biodiversity surveys, and research into the migration of insects, and both nocturnal and diurnal patterns of abundance, as well as vertical stratification. The species that are gathered are affected by numerous variables. Abiotic variables like the weather and season can have a variety of consequences on the behavior of the target taxa and the species that are trapped. The species that are trapped will depend on the design, placement, and orientation of the trap as well as the addition of various lures. The kind and amount of plants nearby as well as species-specific behavior are biological factors that affect trap catch. Taxon-specific factors determine whether Malaise traps are superior or inferior to other trap types in terms of their ability to trap specific groups. Because they have the least taxon overlap with Malaise traps, pitfall traps and leaf litter extraction are good choices to couple with Malaise traps to enhance the amount of arthropod diversity tested while putting out the least amount of effort. Yet, there are certain drawbacks to using malaise traps. Commercially available traps cost a lot of money and are easily damaged by large

mammals like bears or by high winds. Also, because Malaise traps frequently gather enormous quantities of arthropods, there

STUDY SITE

This survey will be conducted in the different areas in tehsil Takht Bhai of district Mardan. Takhtbhai is a tehsil in the Mardan district of Khyber Pakhtunkhwa province. It is the second most populated tehsil in district Mardan. The name Takht-i-Bahi refers to a monastery that was part of the Purusapura dominion and served as a center for Buddhist study. According to local legend, the springs nearby or the two wells on the hill may have given the location its name. Takht in Persian means "top" or "throne," while bahi means "spring" or "water." Combining the two words means "spring from the top" or "high spring." There were also two water sources on mountain peaks. Another meaning put forward is "throne of genesis." The GPS coordinates for Takhtbhai, Mardan, Pakistan are 34°17'10" N and 71°56'48" E. The summertime is actually hot. A sharp rise in temperature was seen from May to June. Even in July, August, and September, the average temperature is still somewhat high. In May and June, there are often nighttime dust storms. The hottest month is June, with a temperature of 43.5 °C (110.3 °F). Because of extensive agriculture and artificial irrigation, the area is humid and extremely hot. (On July 7, 2006, high Heat Index was 69). But starting in October, there has been a dramatic rise in temperature. The coldest winter months are December and January. Much more rain falls during the months of July, August, December, and January. The largest yearly rainfall occurs in August, which is also the month with the greatest rainfall, with 12.8 mm. As winter comes to an end, there are fewer thunderstorms and hailstorms. Despite being relatively high throughout the year, December had the greatest relative humidity, at 73.33 percent. In Pakistan's Khyber-Pakhtunkhwa province, there is an ancient site called Takht Bhai (or TakhtBahi). It is regarded as Pakistan-best-preserved India's Buddhist coin. It is one of Pakistan's six World Heritage sites.

MALAISE TRAP DESIGN AND SETUP

Four wooden rods were buried in the ground in a square shape at a distance of 4 feet from each other. All the rods were covered with black cloth by three sides and one side was left opened. Black cloth attracts insects more than other cloths, so it is important to use black cloth in the trap. While the upper part of the trap were covered with white net like cloth. The four rods connect with each other by four wooden rods at the upper portion. A wooden rod turned into a cone structure and a bottle was attached to the cone and this bottle contained ethanol. Insects used to fly on the trap. Insects kept falling in the ethanol filled bottle when they move upward. All the insects were collected through this trap.

may be concerns about the trapped and demise of non-target by catch [9].



SAMPLING, PRESERVATION AND IDENTIFICATION

Forceps were used to remove all of the insect samples from the Malaise trap, and they were stored in small bottles. The trapped specimens were kept in 70% ethanol in small bottles. The trapped samples were kept in 70% ethanol in small bottles. The same species of insects were preserved in same one bottle. All the bottles were labelled with Order name, date and locations. The bottles were labelled with order name, date and locality. The specimens were further stored in fridge at 21°C in the Zoological Laboratory of Hazara University Mansehra. The trapped samples were first identified with the help of microscope. Up to Order levels in the Zoological Museum of Hazara University Mansehra. Up to species level, the specimens were identified in National Insect Museum (NIM) in National Agriculture Research Center (NARC) Islamabad.

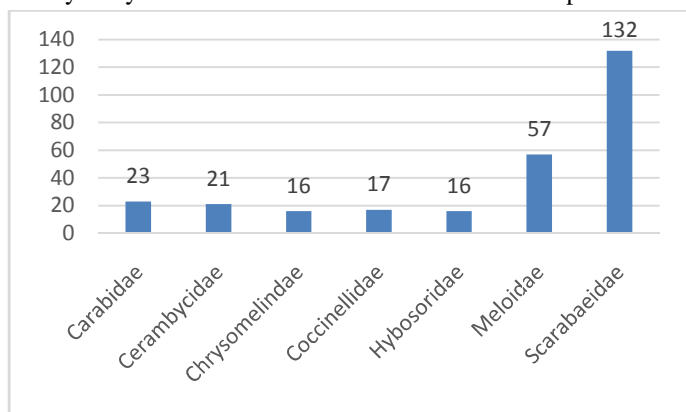
RESULTS

A total of 404 specimens of Order Coleoptera were trapped in five months (June 2022 to September 2022) which were identified in National Insect Museum, National Agricultural Research Center Islamabad, Pakistan. 404 Specimens of Order Coleoptera belonging to seven different families which were family Carabidae, family Cerambycidae, family Chrysomelidae, family Coccinellidae, family Hybosoridae, family Meloidae and family Scarabaeidae. The Malaise trap were installed in five different localities (Jalala, Shergarh, Takht Bhai, Lund Khwar) of District Mardan.

FAMILY WISE RICHNESS

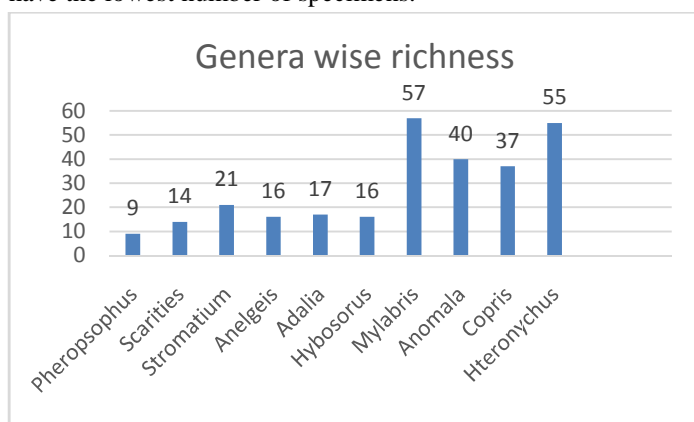
404 specimens were belonging to seven different families of order Coleoptera. Out of seven families, the family Scarabaeidae

have highest number of specimens and the family Hybosoridae, family Chrysomelindae have the lowest number of specimens.



GENUS WISE RICHNESS

The total specimens of seven families were further identified to 10 different Genera. Out of 10 Genera, the Genus Mylabris have the highest number of specimens and the Genus Pheropsophus have the lowest number of specimens.



LOCALITY WISE RICHNESS

The maliase trap were installed in five different localities of Tehsil Takht Bhai District Mardan. Out of these localities, maximum specimens were trapped at Sher Garh and minimum specimens were trapped at akht Bhahi. The locality wise richness are given below.



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