



Research Article

Taxonomic Status of Weevils Fauna of District Bannu Khyber Pakhtunkhwa Pakistan

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Abstract | Weevil belongs to family curculionidae under order Coleoptera, divides into 17 sub families. The current research is good endeavour to document and provide bio-geographical distribution of weevil in district Bannu of KP-Pakistan. This study was carried out first time comprehensively in district Bannu for exploration weevil fauna. Collection surveys were conducted in variable habitats such as natural vegetation, cropped, fields, and urban areas and specimens were collected during active season of 2018 and 2019 yielding a total of 95 specimens five species (*Mylocherus delicatulus*, *M. undatus*, *Lixus augustus*, *Ammocleonus aschabadensis*, *Rhynchophorous ferrugineus*) under four genera (*Mylocherus*, *Lixus*, *Ammocleonus*, *Rhynchophorous*) and 3 subfamilies (Lixinae, Entiminae and Dryophthorinae). For each recorded species details along with valid names, localities, ecological observation and abundance for all collected species are discussed. A need to explore weevil fauna along with more detailed surveys for weevil is highly suggested in the area.

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Keywords | Coleoptera, Curculionidae, Weevil, Bannu, Pakistan



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Introduction

Weevils (Coleoptera: Curculionidae) are pest insects which damage fruits, seeds and leaves of wide range of flora and stored grains. Curculionidae is one of the largest family with approximately 62,000 described species under 6000 genera (Hammond, 1992). Weevils are associated with cereals, pulses, vegetables, fruits, ornamental and forest plantations (Talwar, 2014). They attack almost all plants ranging from pteridophytes to bryophytes and angiosperms

to gymnosperms (Bhatti *et al.*, 2021). According to some workers, most of the species are phytophagous (Ross, 1963) in nature. Besides this, few species of weevils act as bio control agents, some have medicinal importance while some other are edible as well (Marshall, 1916).

Weevils are taken as successful group of pests due to their worldwide presence; they are found in Sub-Antarctic Island up to the North zone of Arctic region. Their great diversity can be seen over desert flora

(Zimmerman, 1994). Approximately 336 species of weevils are reported from Asia, Indian Subcontinent, Africa, China, Japan, Indonesia and Australia. Narrowing down to Sub Continent and according to Marshall, 342 species under curculionidae reported from Pakistan, Burma, India, Nepal and Ceylon during 1916, while five new genera reported from Indo. Pakistan areas (Chevrolate, 1875).

In Pakistan, biosystematics work were conducted over this important group of having a records of 11 subfamilies under single family Curculionidae which produce more than 300 and 150 genera (Marshall, 1916). Yet these were reported earlier to the partition of Sub-continent from the areas that are now part of Pakistan (Bhatti et al., 2021). Worldwide experts having lack of knowledge about geographic situation of Pakistan because of three geographical regions of worlds falls in Pakistan (Rafi et al., 2010). Major taxonomic works done in different decades of 19th Century i.e., Aslam (1961, 1963, 1966a, 1966b), Chaudhry et al. (1966, 1970); Hashmi and Tashfeen (1992), in Pakistan since inception (1947) and during 20th Century i.e., Rizvi et al. (2002); Ahmed et al. (2010); Ahmed and Legalov (2015), Kazi et al. (2017); but comprehensive faunistic work on weevil done by Bhatti (2018) and Bhatti et al. (2018; 2021) which brought forward a record of 35 species added in to national weevil fauna of Pakistan. Among all the above cited works, district Bannu of Khyber Pakhtunkhwa province remained ignored and neglected due to many hard to reach areas and uncertain ground conditions in few pockets. It was therefore planned to explore district Bannu for Curculionid fauna with a view to update Country information over this important group of pest insect.

Materials and Methods

The survey was carried out from March to July in each of 2017-2018 to collect adult weevils from nine different localities in district Bannu. The sites were selected on the basis of their topographic conditions and habitat. With some amendments sampling methods were based on Bhatti (2018), adult weevils were collected through different method like sweep net, beating method, hand picking using forceps and light trap during night. Unidentified weevil collection recorded from the area of study was deposited finally in Zoology department at Hazara University.

Adult collected specimens killed by using Ethyl acetate, killed specimens were kept in a polyethylene bags or separate vial. Information about locality, date of collection, and collector's name noted through lead pencil on vial. However, information about habitat, ecology, latitude, longitude and height were also noted during field. After pinning, they were labelled and shifted to storage boxes. To prevent attack of ants and small insects, Anti ant powder was sprinkled in and around collection boxes. Naphthalene balls were also mounted in boxes to keep pests away.

For identification, all specimens brought in National Insect Museum (NIM) at National Agricultural Research Centre (NARC) Islamabad. Collected specimens were identified up to the lowest possible taxa by running them through keys of Marshall (1916), Zarazaga and Lyal (1999) and Bhatti (2018). Specimens were identified using stereoscope (OLYMPUS, SZ2-ILST identified specimens have been deposited in Zoology Department of Hazara University, Mansehra. While representative of each species were kept at National Insect Museum, NARC for further reference and record.

Results and Discussion

Comprehensive surveys were carried out during summer season of years 2017-2018 to collect adult weevil from district Bannu. Among 95 specimens were collected resulting into five species *Mylocherus delicatulus*, *M. undatus*, *Lixus angustus*, *Ammocleonus aschabadensis*, *Rhynchophorous ferrugineus*) identified under four genera (*Mylocherus*, *Lixus*, *Ammocleonus*, *Rhynchophorous* and three subfamilies (Lixinae, Entiminae and Dryophthorinae).

Among these three sub families, sub family Dryophthorinae contains 65 specimens of *Rhynchophorous ferruginus* specimens found from eight locations out of, which indicates that *Rhynchophorous ferruginus* species and sub family Dryophthorinae dominate among other four species and two sub families. It is only reason that Bannu area consists of Date palm plantation. Only four specimens of *Mylocherus undatus* of sub family entiminae found in single one location. It is very interesting that from all nine locations, two species (*Ammocleonus aschabadensis* and *Lixus angustus*) with single number has been found, both species belonging to sub family Lixinae. Besides this Entiminae is a large subfamily of

family Curculionidae with reported maximum genera than other subfamilies. Entiminae with more than 12000 species which indicates are the largest group of weevils distributed worldwide and mostly tropical regions. These include many serious, injurious and agriculturally important pests (Yunakov and Nadein, 2006). A detail for the recorded fauna is provided

Family: Curculionidae Latreille, 1802

Subfamily: Entiminae

Tribe: Cyphicerini Lacordair, 1863

Genus: *Mylocerus* Sch, 1823

Species: *Mylocerus delicatulus* (Boheman, 1842)

Material examined: Domel: 1♂, 18-vii-2018; leg. M. Billa.

Host plant: Specimen collected from date palm tree.

Previous country records: It has been collected from Hazara; Thandiani in 1963 (Chaudhry *et al.*, 1966).

Global Distribution: Uttar Pradesh in India; America; Poland (Marshall, 1916).

Species *Mylocerus undatus* Marshall, 1916

Material examined: Musa Khel: 1♂ and 1♀; 15-v-2018, 1♂ and 1♀; 10-vii-2018, leg. M. Billa.

Host Plant: Species collected from *Ziziphusspinachristi* tree.

Previous country records: This species was first identified by Marshall (1916) and O'Brien *et al.* (2006) from Pakistan.

Global distribution: This species has been reported by Marshall (1916) from southern India, O'Brien *et al.* (2006) from Sri Lanka (Voss, 1960a) from Afghanistan.

Subfamily: Lixinae Schoenherv, 1823

Tribe: Lixini Schönherr, 1823

Genus: *Lixus* Fabricius, 1801

Species *Lixus angustus* (Herbst 1795)

Material examined: Pirba Khel: 1♂; 5-vii-2018; leg. M. Billa.

Previous country records: The species has been recorded from Islamabad (Bhatti, 2018) and Baluchistan (Broumand, 1998; Awal, 2010).

Host plant: The species was collected from barren land near wheat field.

Global distribution: Reported from Europe and the Mediterranean Basin (Broumand, 1998; Awal, 1997). Reported from large area of Iran (Awal, 1997).

Tribe: Cleonini Schoenherv, 1826

Genus *Ammocleon* Bedel, 1907

Species: *Ammocleon* *aschabadensis* (Faust, 1884)

Material examind: Patool Khel: 1♂, 5-iii-2018; leg. M. Billa.

Previous country records: First time reported from Pakistan by Hashmi and Tashfeen (1992) who reported it from Pakistan. Bhatti (2018) recorded its specimens it from Islamabad (Rawal Lake) while Chaudhry *et al.* (1970) recorded it from Peshawar, Chichawatni. It was also recorded from Baluchistan by Sadeghi *et al.* (2010).

Host plant: Species collected from the grams field after cutting.

Global distribution: From Tehran, Turkmenistan, Iran, India (Voss, 1959b; Broumand, 1998; Awal, 2010a).

Subfamily: Dryophthorinae Schönherr, 1825

Tribe: Rhynchophorini Schönherr, 1838

Genus: *Rhynchophorus* Herbst, 1795

Species: *Rhynchophorus ferrugineus* (Olivier, 1790)

Material examined: Azim Kala, 2♂, 3♀; 30-vi-2018; Pinda Khel, 14♂, 8♀; 28-v-2018; Domel, 7♂, 3♀; 26-iv-2018; Pirba Khel, 1♀; 28-vii-2018; Patool Khel, 3♂, 7♀; 2-vi-2018; Musa Khel, 9♂, 4♀; 12-vi-2018; Landi Jalander, 6♂, 2♀; 24-vii-2018; Bannu City, 1♂, 1♀; 20-v-2018; leg. M. Billa.

Host plant: Species collected from Date Palm trees.

Previous country records: Reported from different areas of Pakistan (Malumphy and Moran, 2007; Azam *et al.*, 2001; Bozbuga and Hazir, 2008).

Host plant: The specimens were collected from date palm garden and also from the trees present in between the vegetative land and individual trees of Date palm.

Global distribution: Known from all continents (Faleiro, 2006). It is native to South-East Asia. Present from Middle East, Mediterranean, Southern Europe and Arabian Peninsula (Mizzi *et al.*, 2009). Malumphy and Moran (2007) reported it from United Arab Emirates, Japan, Oman, China, Palestinian Authority Territories, Thailand, Vietnam, Turkey, Israel, France, Greece, Qatar, Sri Lanka, Taiwan, Kuwait, Laos, Iran, Solomon Islands, Myanmar (Burma), Cambodia, Philippines, Jordan, Western Samoa Bahrain, Spain, Malaysia, India, Indonesia, Bangladesh, Egypt, Italy, Iraq, Guinea and Saudi Arabia.

Pakistan has a unique distribution regarding geographical regional aspects i.e., Oriental, Palaearctic and Ethiopian fauna (Qadri, 1968). Weevils are mostly found in hot climate areas of the world. According to warm climate condition of Oriental region which provide most suitable habitat for this important group of weevil. Bannu is the study area present towards north-western side of Khyber Pakhtunkhwa has climates like the Palaearctic region. The study area has variable habitats and favourable for weevil having water streams, vegetative fields and terrestrial areas also have differential weather means hot (May to August) and cold (Oct to Feb).

From the current study, three sub families (Dryophthorinae, Entiminae and Lixinae) were reported. Among three sub families, Lixinae with four species and Entiminae with two species were recorded, while subfamily Dryophthorinae was recorded rare and have only one species with number of 71 specimens i.e. *Rhynchophorus ferrugineus*. Entiminae was an important subfamily of study area having two species *Mylocherus undatus* and *Mylocherus delicatulus*. In these two species *Mylocherus undatus* was reported from Pakistan by Marshall (1916) and from Sri Lanka, India, Iran and from Afghanistan (Voss, 1960a). Family Entiminae has been earlier discussed by Bhatti (2018) from Pakistan. While the second species is *Mylocherus delicatulus* recorded for first time from study area.

Subfamily dryophthorinae was recorded as rare and has only one species *Rhynchophorus ferrugineus*. Entiminae was an important subfamily of the study area having two species *Mylocherus undatus* and the second one *Mylocherus delicatulus*. these two species of genus *Mylocherus* was reported from Pakistan by Marshall (1916) in there publication named "Fauna

of British India" and also from neighbouring countries of Pakistan, reported from Sri Lanka, India, Iran and from Afghanistan (Voss, 1960a). Family Entiminae has been earlier discussed by Naz (2017) and Bhatti (2018) from Pakistan. From results, it can easily be decided that members of this genus are more readily adjustable in a different type of climates and ecologies of the study area than any other genus. While the second species is *Mylocherus delicatulus* recorded for the first time from the study area and also for the country record. In the present study, only one specimen from only one locality was recorded it shows their rareness in the study area.

The two species *Ammocleonus aschabadensis* and *Lixus angustus* belong to subfamily Lixinae and were also rare, because recorded only from one locality of the study area. The results of the current study also show that the subfamily Dryophthorinae was rare, but climates of the selected region were favourable for the species *Rhynchophorus ferrugineus*, because more specimens that were collected belonged to this species. In the present study, most of the specimens of *Rhynchophorus ferrugineus* were collected in hot summer from April to July 2018. *Rhynchophorus ferrugineus* belonging to sub family Dryophthorinae which is very important weevil sub family mainly contains genus *Rhynchophorus*. Therefore maximum number count 71 was recorded with this single species i.e., *Rhynchophorus ferrugineus*. The distribution of genus *Rhynchophorus* is worldwide. Its geographical range extends throughout the Oriental region. In the Oriental region, there are five species recorded: *Bilineatus*, *Distinctus*, *Ferrugineus*, *Lobatus*, and *Vulneratus*. These species extend from Taiwan, North Vietnam, through East Pakistan, India, Burma, Indonesia (Sumatra, Java, Borneo, and neighbouring islands), Southern Mainland China, Southern Japan, South Vietnam, Laos, Cambodia, Thailand, Malaysia, Territory of New Guinea and Papua. As well as economic point of view this *Rhynchophorus ferrugineus* is the most detrimental and unhealthy Pest of coconut in oriental region. In 1912, Ghosh described that weevil was very destructive to palm trees, especially in southern India. Its attacks were generally restricted to new emerging palms which were slowly killed. In present study most of specimens of *Rhynchophorus ferrugineus* were collected in hot summer from April to July 2018. After rain or monsoon weather, members of *Rhynchophorus ferrugineus* were commonly observed at morning and late afternoon. Similar results have

also been reported in previous studies like Kumar *et al.*, (2004) and Mizzi *et al.* (2009) also reported that the months (May to July) of hot weather are most active season of infestation for them. In the present study three species were recorded alongwith host range. *Mylocherus undatus*, collected from *Ziziphus* plant (*Ziziphus spinachristi*), while both of the species *Mylocherus delicatulus* and *Rhynchophorous ferrugineus* were collected from date palm tree.

The above results shows that Curculionidae fauna of district Bannu is very diverse, but was not documented so far because of their climates and important geographic location. Due to topographic diversity it is expected that high density (how) of weevils is present in different location of the area. If we compare present study with the vastness and rich environment of country for diversity of weevils, systematic information of Bannu weevils is still negligible. Keeping in view of findings that present study revealed about economic importance of weevils. For further study, Curculionid fauna from these study areas should be explored thoroughly for maximum exploration weevil fauna.

Conclusion and Recommendations

It is concluded that was among all recorded species of curculionid, *Rhynchophorous ferrugineus* was more abundant and widespread than other species collected from study area. it shows that more species are to be expected after more intensively collecting. The above results shows that Curculionidae fauna of district Bannu is very diverse, but was not documented so far. *Mylocherus delicatulus* species also collected from date palm, so further exploration should be done on focusing only fauna of date palm in future. Regarding to their climates and important geographic location, it thirsts for more extensive field work to reveal additional taxa from this area. Due to topographic diversity, it is expected that high density of weevils is present in different location of the area. Further collection surveys can unhide and explored existing and new species of area.

Novelty Statement

This is first time study conducted on weevil fauna in district Bannu, having a unique geographic position contains a lot of insect fauna.

Author's Contribution

Mutasim Billah: Conceived the idea and Collected data.

Sardar Azhar Mehmood: Assisted in result and discussion.

Abdul Rauf Bhatti: Taxonomic identification of all the specimens recorded.

Ahmad Zia: Overall management of the article.

Shabir Ahmed: Technical input at every step.

Muhammad Ishaque Mastoi: Assisted in methodology and references.

Waqas Ahmad: Financially contributed and assisted in field surveys.

Kiran Shahjeer: Assisted in field surveys.

Conflict of interest

The authors have declared no conflict of interest.

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