

## Research Article



# Dragonflies (Anisoptera: Odonata) Fauna of District Swabi Khyber Pakhtunkhwa, Pakistan

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**Abstract** | Odonata is one of the most important and potential predatory order and is an excellent indicator of ecosystem health. Current study was conducted in order to explore the dragonflies fauna in District Swabi of Khyber Pakhtunkhwa, Pakistan. A comprehensive field survey was conducted to collect dragonfly adults using aerial nets. 19 sites of District Swabi were surveyed during summer seasons of 2015 and 2016. The study revealed 23 species from 15 genera under 3 families. The abundant family was recorded as Libellulidae that was comprised of 19 species belonging to 11 genera, family Gomphidae included 3 species belonging to 3 genera and family Aeshnidae included one species belonged to one genus. Detailed description of each species, valid scientific names, their habitat, ecological observation, collection date and distributional range for all recorded species are provided.

**Received** | December 23, 2018; **Accepted** | April 26, 2020; **Published** | May 28, 2020

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**Citation** | Rehman, A., S. Ahmad, A. Zia, A. Ali, K. Shahjeer, A. Latif and T. Khan. 2020. Dragonflies (Anisoptera: Odonata) fauna of district Swabi Khyber Pakhtunkhwa, Pakistan. *Sarhad Journal of Agriculture*, 36(2): 675-684.

**DOI** | <http://dx.doi.org/10.17582/journal.sja/2020/36.2.675.684>

**Keywords** | Aeshnidae, Dragonflies, Gomphidae, Libellulidae, Odonata

## Introduction

Dragonflies are well known biocontrol agents and environmental quality indicators. They possess slender abdomen, large eyes short antennae and long wings (Dijkstra and Lewington, 2006). The dragonflies are the earliest along with the most prevalent hemimetabolous amphibiotic and paleopterous insect group and found on all continents excluding Antarctica (Silsby, 2001). Dragonflies are very valuable insects and the study of the fauna is significant for decision making about crops management and environmental protection (Rowe, 2003). Dragonflies also possess medicinal properties in some countries and sympetrum species are used

for curing fever (Mitra, 2002). Adult dragonflies are also taken as a minor food item in some countries like Africa, South America and Indonesia where adults are fried in oil or used in soup (Boyd, 2005). The naiads of dragonflies are also used by fisherman to catch a fish (Rowe, 2003). The larvae and adult act as biocontrol agent against different insect pests of medical importance and helps in managing different infectious diseases like dengue, filaria and malaria (Mitra, 2006). Odonates have achieved a focal point of research in various countries specially in the tropical countries (Woodward, 2001).

A lot of work has been carried out to explore species complex of dragonflies and about total of 70 species

of dragonflies were reported from different areas of Pakistan (Chaudhry, 2010; Raza, 2016). Information on Khyber Pakhtunkhwa (KP) Province fauna has been poorly collected throughout both studies. Though the existence of infinite natural water reservoirs like rivers lakes snow, streams , ponds favors Anisoptera survival and thus odonatologists are interested from all over word. District Swabi is situated in Khyber Pakhtunkhwa (KP) Province, Pakistan. It lies between the rivers of Indus and Kabul. It is located at 72.47° East longitude, 34.12° North latitude. This area possesses adjustable habitats and infinite resources of water like rivers, springs, canals and streams. District Swabi possess both plain and mountainous areas, along with plenty of habitats supporting dragonflies' activity for a prolonged time. The area was not explored for taxonomic identification of different dragonflies' species. Keeping in view all of the above-mentioned facts, a comprehensive survey was carried out to explore Odonata fauna of District Swabi and to study their distribution in unexplored area of Khyber Pakhtunkhwa Province of Pakistan.

## Materials and Methods

### Study area

A detailed survey was conducted to collect adult dragonflies of District Swabi, Khyber Pakhtunkhwa, Pakistan, during summer seasons of 2015 and 2016. Adult dragonfly specimen were randomly collected from all tehsils of District Swabi covering the whole district. Main localities were Adina L<sub>1</sub>, Yaruhussain L<sub>2</sub>, Turlandi L<sub>3</sub>, Dagai L<sub>4</sub>, Shewa L<sub>5</sub>, Naranji L<sub>6</sub>, Azamabad L<sub>7</sub>, Saleem khan L<sub>8</sub>, Maneri L<sub>9</sub>, Shamansor L<sub>10</sub>, Panjpir L<sub>11</sub>, Anbar L<sub>12</sub>, Lahor (Chota) L<sub>13</sub>, Marghuz L<sub>14</sub>, Topi L<sub>15</sub>, Gandaf L<sub>16</sub>, Ganiichatra L<sub>17</sub>, Kabghani L<sub>18</sub>, and Gabasnai L<sub>19</sub> as shown in Figure 1.

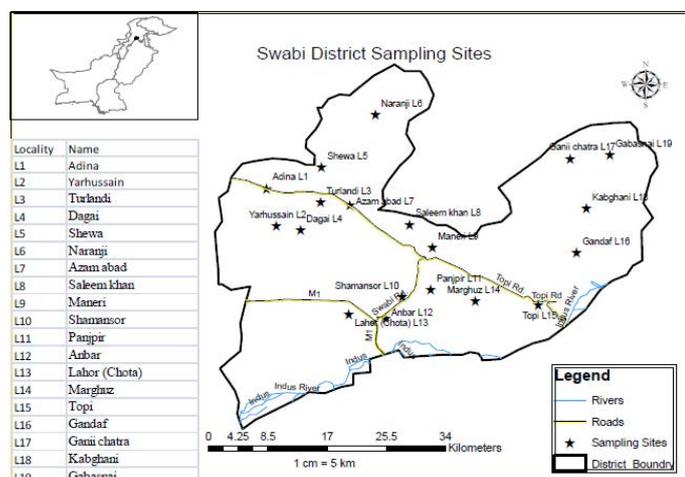


Figure 1: Map showing surveyed areas of district Swabi K.P Pakistan, where dragonflies' specimens were collected.

### Collection and preservation of adults

The adult dragonflies were collected with the help of aerial net in sunny days from 08 am to 05 pm. The collected specimens were killed in killing jar having ethyl acetate soaked cotton swabs. The killed specimens were taken from jar and placed in triangular paper envelope with their folded wings above the body. Information regarding locality, collector's name and date of collection was written on the paper envelope while other information like habitat were noted in the notebook. To prevent damage, the collected specimen was kept singly in each envelope. Specimen were properly pinned and the body part was set on appropriate setting board. Dried specimens were transferred to collection boxes, properly labeled and each specimen were tagged. Naphthalene balls and coopex powder were sprinkled in insect boxes to protect them from ants and other museum insect pests.

The collected specimens were identified in National Insect Museum, NARC Islamabad up to species level. The identification of specimens was carried out with the help of literature through Fraser (1933-1934, 1936), Chaudhry (2010) and Zia (2010) up to species level. Identified specimens were deposited in Insect Museum, Department of Entomology, The University of Agriculture, Peshawar and their representative specimen were deposited in NIM (National Insect Museum), NARC, Islamabad for future reference and studies.

## Results and Discussion

A total of 347 adult dragonflies specimen were collected from nineteen different localities of district Swabi. The study yielded a total of 23 species from 15 genera under 03 families. In current study, among the three subfamilies, family Libellulidae was found most

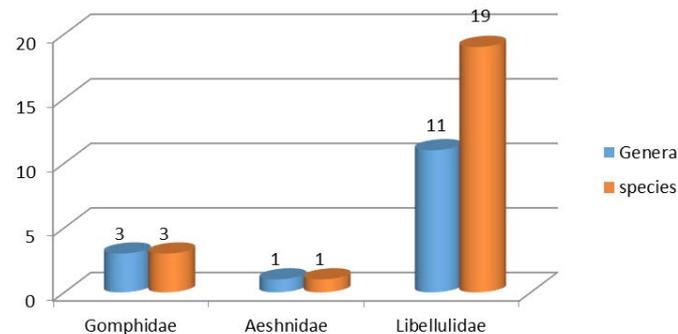


Figure 2: Anisoptera families, genera and species recorded from district Swabi.

abundant with 19 species followed by family Gomphidae with 03 Species and family Aeshnidae with only one species (Figure 2) Species *Ictinogomphus angulosus*, *Burmagomphus sivalikensis*, *Zyxomma petiolatum* were recorded for the first time from district Swabi as well as Khyber Pakhtunkhwa province. Details for these species are provided below.

Family Gomphidae

*Ictinogomphus angulosus* (Selys, 1854)



Plate 1: *Ictinogomphus angulosus*.

**Material examined:** L1 (34° 12' 50.16" N. 72° 15' 59.17" E. 1052 ft), 19-vi-2016, 07♂, 3♀, leg. Rehman; L2 (34° 11' 35.56" N. 72° 15' 32.09" E. 1037 ft), 28-viii-2016, 03♂, 01♀, leg. Ali.

**Habitat:** Found sitting on weedy grasses and collected from moving water from pounds and weedy water channels.

*Burmagomphus sivalikensis* (Laidlaw, 1922)



Plate 2: *Burmagomphus sivalikensis*.

**Material examined:** L17 (34° 15' 19.36" N. 72° 40' 12.17" E.; Elevation 1023 m), 01-ix-2016, 01♂, 1♀,

leg. Rehman; L19 (34° 15' 41.82" N. 72° 42' 40.38" E. 1152m), 31-viii-2016, 01♂, leg. Rehman.

**Habitat:** Sitting on rocks near water stream and water channel in mountainous regions.

*Onychogomphus bistrigatus* (Selys, 1854)



Plate 3: *Onychogomphus bistrigatus*.

**Material examined:** L8 (34° 10' 07.76" N. 72° 27' 41.62" E. 349m), 15-iv-2015, 02♂, 3♀, leg. Ahmad; L10 (34° 04' 15.87" N. 72° 27' 03.79" E. 328m) 23-vi-2016, 06♂, 4♀, leg. Rehman; L13 (34° 03' 06.44" N. 72° 22' 21.24" E. 334m), 08-x-2015, 01♂, 1♀, leg. Latif.

**Habitat:** Recorded from slow moving water having dense vegetation.

Family Aeshnidae

*Anax parthenope* (Selys, 1839)



Plate 4: *Anax parthenope*.

**Material examined:** L19 (34° 15' 41.82" N. 72° 42' 40.38" E. 1153m), 14-viii-2016, 02♂, leg. Rehman.

**Habitat:** slow moving water and stagnant water ponds.

Family Libellulidae

*Zygonyx torrida isis* (Fraser, 1924)



Plate 5: *Zygonyx torrida isis*.

**Material examined:** L1(34° 12' 50.16" N. 72° 15' 59.17" E. 321m), 05-iv-2015, 08♂, 03♀, leg. Rehman; L3 (34° 12' 21.41" N. 72° 19' 16.97" E. 340m), 10-v-2015, 02♂, leg. Ahmad; L5 (34° 14' 53.90" N. 72° 20' 34.83" E. 357m), 08-v-2016, 04♂, 01♀, leg. Rehman; L12 (34° 03' 00.56" N. 72° 25' 00.99" E. 329m), 10-iii-2016, 03♂, 02♀, leg. Rehman.

**Habitat:** These specimens were found floating little above on the water. All specimens were caught in flying from running water in rivers and canals.

*Zyxomma petiolatum* (Rambur, 1842)



Plate 6: *Zyxomma petiolatum*.

**Material examined:** L15(34° 03' 58.04" N. 72° 38' 08.84" E. 340m), 05-ix-2015, 02♂, leg. Rehman; L16 (34° 07' 01.76" N. 72° 41' 20.21" E. 482m), 19-ix-2015, 01♂, leg. Ahmad.

**Habitat:** These dragonfly adults were caught after sunset and were active during dusk and dawn. These specimens were collected in rain at night near light source.

*Acisoma panorpoides panorpoides* (Rambur, 1842)



Plate 7: *Acisoma panorpoides panorpoides*.

**Material examined:** L14(34° 04' 09.27" N. 72° 31' 51.01" E. 322m), 11-ix-2016, 01♂, 02♀, leg. Ali. L15(34° 03' 58.04" N. 72° 38' 08.84" E. 340m), 04-viii-2016, 05♂, 2♀, leg. Rehman; L16 (34° 07' 01.76" N. 72° 41' 20.21" E. 482m), 19-ix-2015, 01♂, 01♀, leg. Ahmad.

**Habitat:** weak fliers, found near stagnant water having dense vegetation.

*Orthetrum pruinatum neglectum* (Rambur, 1842)



Plate 8: *Orthetrum pruinatum neglectum*.

**Material examined:** L1(34° 12' 50.16" N. 72° 15' 59.17" E. 321m), 04-viii-2016, 14♂, 11♀, leg. Rehman; L5 (34° 14' 53.90" N. 72° 20' 34.83" E. 357m), 08-v-2016, 04♂, 01♀, leg. Khan; L6, (34°

19° 00.32" N. 72° 25' 00.01" E. 442m), 04-vi-2015, 08♂, 03♀, leg. Rehman; L4 (34° 10' 06.43" N. 72° 18' 01.50" E. 328m), 10-v-2015, 03♂, 05♀, leg Ahmad; L11 (34° 05' 17.11" N. 72° 28' 45.01" E. 329m), 29-vii-2015, 07♂, 02♀, leg. Ali; L13 (34° 03' 06.44" N. 72° 22' 21.24" E. 334m), 18-ix-2016, 12♂, 09♀, leg. Rehman.

**Habitat:** Both running and stagnant water in canals, rivers and streams.

*Orthetrum sabina* (Drury, 1770)



Plate 9: *Orthetrum sabina*.

**Material examined:** L3 (34° 12' 21.41" N. 72° 19' 16.97" E. 340m), 23-iv-2015, 02♂, 03♀, leg. Rehman; L5 (34° 14' 53.90" N. 72° 20' 34.83" E. 357m), 08-v-2016, 04♂, 01♀, leg. Rehman; L12, (34° 03' 00.56" N. 72° 25' 00.99" E. 329m), 09-viii-2015, 05♂, 03♂, leg. Latif.

**Habitat:** Slow moving water in ponds and streams.

*Orthetrum anceps* (Schneider, 1845)



Plate 10: *Orthetrum anceps*.

**Material examined:** L2 (34° 11' 35.56" N. 72° 15' 32.09" E. 316m), 23-iv-2016, 04♂, 02♀, leg. Ali; L3 (34° 12' 21.41" N. 72° 19' 16.97" E. 340m), 01-ix-2016, 07♂, 05♀, leg. Rehman; L17 (34° 15' 19.36" N. 72° 40' 12.17" E. 1022m), 14-viii-2016, 02♀, leg. Ahmad; L18 (34° 11' 17.01" N. 72° 40' 48.41" E. 576m), 25-viii-2016, 04♂, 02♀, leg. Rehman.

**Habitat:** sitting on stones or rocks near water channels and tall vegetation.

*Orthetrum triangulare triangulare* (Selys, 1878)



Plate 11: *Orthetrum triangulare triangulare*.

**Material examined:** L16 (34° 07' 01.76" N. 72° 41' 20.21" E. 482m), 05-ix-2015, 06♂, 01♀, leg. Rehman; L17 (34° 15' 19.36" N. 72° 40' 12.17" E. 1023m), 19-ix-2015, 02♀, leg. Ahmad; L19 (34° 15' 41.82" N. 72° 42' 40.38" E. 1153m), 19-ix-2015, 05♂, 03♀, leg. Ali.

**Habitat:** Found in fresh water streams in hilly regions.

*Sympetrum commixtum* (Selys, 1884)



Plate 12: *Sympetrum commixtum*.

**Material examined:** L6 (34° 19' 00.32" N. 72° 25' 00.01" E. 442m), 30-x-2016, 02♂, leg. Rehman; L15 (34° 03' 58.04" N. 72° 38' 08.84" E. 340m), 04-viii-2016, 01♂, 02♀, leg. Ali; L16 (34° 07' 01.76" N. 72° 41' 20.21" E. 482m), 05-ix-2015, 03♂, 01♀, leg. Rehman.

**Habitat:** Slow running fresh water streams having wild vegetation's.

*Sympetrum decoloratum* (Selys, 1884)



Plate 13: *Sympetrum decoloratum*.

**Material examined:** L4 (34° 10' 06.43" N. 72° 18' 01.50" E. 328m), 10-v-2015, 07♂, 04♀, leg. Rehman; L18 (34° 11' 17.01" N. 72° 40' 48.41" E. 576m), 14-viii-2016, 01♂, 03♀, leg. Ahmad.

**Habitat:** not strong fliers and found sitting on aquatic vegetation close to ponds.

*Diplacodes trivialis* (Rambur, 1842)



Plate 14: *Diplacodes trivialis*.

**Material examined:** L11 (34° 05' 17.11" N. 72° 28' 45.01" E. 328m), 29-vii-2015, 02♂, 03♀, leg.

Rehman; L15 (34° 03' 58.04" N. 72° 38' 08.84" E. 340m), 04-viii-2016, 03♂, 01♀, leg. Ali.

**Habitat:** Found in rice fields.

*Diplacodes lefebvrei* (Rambur, 1842)



Plate 15: *Diplacodes lefebvrei*.

**Material examined:** L15 (34° 03' 58.04" N. 72° 38' 08.84" E. 340m), 05-x-2015, 05♂, 03♀, leg. Ahmad; L18 (34° 11' 17.01" N. 72° 40' 48.41" E. 576m), 14-viii-2016, 03♂, 01♀, leg. Rehman.

**Habitat:** Sitting on top of bushes, rocks or on ground near water sources.

*Palpopleura sexmaculata sexmaculata* (Fabricius, 1787)



Plate 16: *Palpopleura sexmaculata*.

**Material examined:** L8 (34° 10' 07.76" N. 72° 27' 41.62" E. 349m), 22-v-2016, 04♂, 03♀, leg. Latif; L10 (34° 04' 15.87" N. 72° 27' 03.79" E. 328m), 12-vii-2015, 03♂, 01♀, leg. Rehman; L12 (34° 03' 00.56" N. 72° 25' 00.99" E. 329m), 09-viii-2015, 02♂, 01♀, leg. Rehman.

**Habitat:** Found sitting on long grasses close to slow running water, some specimens founded in muddy

places and easy to collect because they were slow fliers.

*Pantalla flavescens* (Fabricius, 1798)



Plate 17: *Pantalla flavescens*.

**Material examined:** L1 (34° 12' 50.16" N. 72° 15' 59.17" E. 321m), 05-iv-2015, 13♂, 09♀, leg. Rehman; L8 (34° 10' 07.76" N. 72° 27' 41.62" E. 349m), 22-v-2016, 05♂, 02♀, leg. Latif; L10 (34° 04' 15.87" N. 72° 27' 03.79" E. 328m), 12-vii-2015, 02♂, leg. Ahmad; L14 (34° 04' 09.27" N. 72° 31' 51.01" E. 322m), 11-ix-2016, 04♂, 05♀, leg. Rehman; L18 (34° 11' 17.01" N. 72° 40' 48.41" E. 576m), 14-viii-2016, 01♂, 03♀, leg. Rehman.

**Habitat:** Stagnant and moving waters having crowded vegetation. These dragonflies are strong fliers and can be found also far away from water.

*Trithemis aurora* (Burmeister, 1839)



Plate 18: *Trithemis aurora*.

**Material examined:** L2 (34° 11' 35.56" N. 72° 15' 32.09" E. 316m), 23-iv-2015, 12♂, 05♀, leg. Rehman; L9 (34° 18' 14.98" N. 72° 27' 52.97" E. 336m), 24-

iv-2016, 03♂, 01♀, leg. Khan; L17(34° 15' 19.36" N. 72° 40' 12.17" E. 1023m), 14-viii-2016, 4♂, 02♀, leg. Khan.

**Habitat:** Found in slow moving water channels.

*Trithemis festiva* (Rambur, 1842)



Plate 19: *Trithemis festiva*.

**Material examined:** L4 (34° 10' 06.43" N. 72° 18' 01.50" E. 326m), 06-x-2016, 09♂, 04♀, leg. Rehman; L5 (34° 14' 53.90" N. 72° 20' 34.83" E. 356m), 16-x-2016, 04♂, leg. Ali; L9 (34° 18' 14.98" N. 72° 27' 52.97" E. 336m), 12-vii-2015, 01♂, 02♀, leg. Rehman; L12 (34° 03' 00.56" N. 72° 25' 00.99" E. 329m), 09-viii-2016, 02♂, 01♀, leg. Ahmad.

**Habitat:** recorded from marshy, boggy places and were found sitting on top of aquatic vegetation.

*Trithemis kirbyi kirbyi* (Selys, 1891)



Plate 20: *Trithemis kirbyi kirbyi*.

**Material examined:** L6 (34° 19' 00.32" N. 72° 25' 00.01" E. 442m), 04-vi-2015, 03♂, 03♀, leg. Rehman;

L13 (34° 03' 06.44" N. 72° 22' 21.24" E. 334m), 01♀, leg. Ali.

**Habitat:** Recorded near fresh water ponds.

*Crocothemis servilla* (Drury, 1770)



Plate 21: *Crocothemis servilla*.

**Material examined:** L5 (34° 14' 53.90" N. 72° 20' 34.83" E. 357m), 08-v-2015, 06♂, 01♀, leg. Rehman; L6 (34° 19' 00.32" N. 72° 25' 00.01" E. 442m), 04-vi-2015, 01♂, 02♀, leg. Ali. L12, (34° 03' 00.56" N. 72° 25' 00.99" E. 329m), 01♂, 01♀, leg. Rehman.

**Habitat:** Recorded in running and stagnant water.

*Crocothemis erythraea* (Brulle, 1832)



Plate 22: *Crocothemis erythraea*.

**Material examined:** L2 (34° 11' 35.56" N. 72° 15' 32.09" E. 316m), 23-iv-2015, 04♂, leg. Rehman; L6 (34° 19' 00.32" N. 72° 25' 00.01" E. 442m), 04-vi-2015, 05♂, 07♀, leg. Khan.

**Habitat:** recorded from grassy tanks, ponds, marshy places and running water.

*Brachythemis contaminata* (Fabricius, 1793)



Plate 23. *Brachythemis contaminata*.

**Material examined:** L8 (34° 10' 07.76" N. 72° 27' 41.62" E. 349m), 22-v-2015, 05♂, 03♀, leg. Rehman; L10 (34° 04' 15.87" N. 72° 27' 03.79" E. 328m), 12-vii-2015, 02♂, 01♀, leg. Khan.

**Habitat:** found sitting on long grasses close to slow moving water.

Recording of 23 species under 15 genera and 03 families of Anisoptera from the study region indicates that the region is rich in Odonata diversity. During monsoon the Odonates were abundant in flooded crop-fields, grasslands and swamps, crop-fields ponds and streams. It is very imperative to document that being flying insects, Anisoptera are well known to fly long distances in search of food and best ecological conditions mainly for temperature and humidity preferences. Recording diversity of Odonata species of an area based on the collection of adults, arises doubts on their endemism (Zia et al., 2011). Yousaf (1972), initiated the work on Dragonflies, and identified 46 species belonging to 24 genera of Anisoptrous dragonflies from various localities of Pakistan. Published information about dragonflies at country level has been reported by (Chaudhry, 2010). Anisoptera fauna of KP province remained under explored with very limited records existing at present. Few short-term studies were conducted on dragonflies' fauna of Khyber Pakhtunkhwa by (Khan et al., 2016; Zada et al., 2016; Sayeb et al., 2015; Perveen et al., 2014; Akhtar et al., 2014; Khaliq and Maula, 1999; Ahmad, 1994; Yousuf, 1972). In all these studies, District Swabi was ignored and no record for Anisopterous species of this important district was available till now. This study opens the door for more faunistic surveys covering the whole province and

encourage taking steps toward their protection and survival for pest management.

## Conclusions and Recommendations

District Swabi of Khyber Pakhtunkhwa is rich in Odonates fauna. The climate, cropping pattern and topography of this area along with plenty of natural pastures and aquatic marshland support Odonates life cycle and biology.

## Acknowledgements

Corresponding author is thankful to Prof. Dr. Sajjad Ahmad, Department of Entomology, The University of Agriculture Peshawar, Pakistan for his critical insight, encouragement, consistent advice and technical guidance. Thanks to Dr. Syed Ahmed Zia, Senior Scientific Officer, NARC Islamabad for his affection, help, support and technical guidance.

## Novelty Statement

Current study reports 23 species for the first time from District Swabi, Khyber Pakhtunkhwa. Species *Ictinogomphus angulosus*, *Burmagomphus sivalikensis*, *Zyxomma petiolatum* were new record for Khyber Pakhtunkhwa. However all the species were already known to other areas of Pakistan.

## Author's Contributions

Abdur Rehman performed the research, identified the collected specimens and prepared the manuscript. Sajjad Ahmad conceived the idea and designed the research work. Abdul Latif and Taimur Khan helped in collection of specimens and surveys. Ahmed Zia helped in identifications of collected specimens and provided necessary literature. Asad Ali suggested the problems and helped in preparation of manuscript. Kiran Shahjeer reviewed thesis and manuscript and gave inputs for its improvement.

## Conflict of interest

The authors have declared no conflict of interest.

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