



Diversity of Odonata in District Poonch and Sudhnoti of Kashmir Valley – Pakistan, with a new record for the country

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Abstract

Detailed surveys were carried out from two districts viz. Poonch and Sudhnoti of Kashmir Valley during summer seasons of 2007 and 2008 to make an updated record of inhabiting Odonata. Ten localities were selected on the basis of variables keeping in view the habitat requirements of Odonata. The present study provides a record of 16 Anisopteran species spreading to 9 genera and 29 Zygopteran species spreading to 14 genera. Among these *Lestes patricia* is a new record for the country. The distribution, synonymy, richness and abundance of the species are discussed in this paper. The Kashmir Valley is rich in insect biodiversity, the odonate fauna of this valley needs to be further explored.

Keywords: Odonata, Poonch, Sudhnoti, Kashmir Valley.

Introduction

The Kashmir valley is the liberated part of State of Jammu and Kashmir. It lies between longitude 73° – 75° and latitude of 33° – 36° and is spread over an area of 13,297 Km². The topography is mostly hilly and mountainous alongwith valleys and plains. Climate is highland subtropical. Districts Poonch & Sudhnoti are mostly mountainous and lie at the foot hills of Himalayas. District Poonch has an area of 855

Km², however Sudhnoti is spread over 569 Km² (IPAK, 2008).

Odonates are important predator of serious pests in terrestrial and aquatic ecosystem. They consume noxious flies, mosquitoes, aphids, jassids, bollworms (Fraser, 1933) and black flies (Subramanian, 2005). They are good indicator of the condition of aquatic and terrestrial ecosystems (Brown

1991). Odonata themselves may also be significant prey items of birds, fishes and some other invertebrates such as spiders and predatory coleopterans (Kapoor, 1985).

Previously, Laidlaw (1915) and Fraser (1933-34) reported Odonata from subcontinent, Kanth (1985), Khaliq (1990), Khaliq *et al.* (1994), Ali (1995), Yousuf *et al.* (2000) studied Odonata of different districts of Kashmir valley. Khaliq and Siddique (1995), Khaliq *et al.* (1990) and Khaliq *et al.* (1995) studied the Odonates of Poonch district of Kashmir Valley. However, during the year 1995, Poonch was divided into two individual parts i.e Poonch and Sudhnoti. No significant work has been done on the Odonate fauna of the area after partition. It is important to know the existing fauna of both the districts individually. The area has greater biodiversity and is rich in water resources. In view to this, it was planned to extensively explore the Odonata of Poonch and Sudhnoti to make an updated and authentic record.

Materials and Methods

Five sites (Fig.1.) were selected each from the district Poonch and Sudhnoti of Kashmir Valley. The sites were selected on the basis of variables which may be important according to Clark and Samway (1996) in influencing the distribution of adult Odonata. Among Poonch [Datot (L1), Hajira (L2), Rawalakot (L3), Banjosa (L4), Abbaspur (L5)] and Sudhnoti [Tattapani (L6), Palandri (L7), Azad Pattan (L8), Goraha (L9) and Tararkhal (L10)] were surveyed during the summer season of two consecutive years (2006 & 2007).

Methods of sampling were based on Wahizatul-Afzan *et al.* (2006) with minor additions. The collected specimens were brought to Odonata section at National Insect

Museum, Islamabad – Pakistan. The preservation methodology was based on Borror & White (1970). All the collected specimens were identified by running them through taxonomic keys. The taxonomic literature by Fraser (1933 - 1934), Khaliq (1990) and Subramanian (2005) were followed. Voucher specimens have been deposited in National Insect Museum, NARC – Islamabad.

Results

The study provides a record of 45 species of Odonata including, 16 Anisopterous species identified under 9 genera and 3 families (Table 1) and 29 Zygopterous species identified under 14 genera and 8 families (Table 2). Among Anisoptera, (*Trithemis pallidinervis*) is first time recorded from Poonch district. However in Zygoptera (*Lestes patricia* and *L. viridulus*) are first time reported from both the districts. Among these, *Lestes patricia* (Zygoptera) is a new record for country's Zygopterous fauna. Richness of species (Fig. 2) was observed, which shows that 45 species of Odonata were recorded from district Poonch. However from Sudhnoti, 37 species were collected. Abundance of species (Fig. 3) was also taken into consideration, showing *Orthetrum triangulare triangulare* (Anisoptera), *Agriocnemis pygmaea* (Zygoptera) as one of the most common, abundant and widely distributed species of the area, recorded from seven and nine localities respectively. Amongst Anisoptera (*Anax nigrolineatus*) and Zygoptera (*Ceriagrion cerinorubellum*) appear to be less common or even rare and were recorded from single locality only. Due to lot of topographic diversity and aquatic habitats, further surveys can unhide more species of Odonata from these areas.

Table 1: Valid names, Synonyms and distributional details for the collected Anisopterous species.

Family	Species	Synonyms	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Libellulidae Rambur, 1842	<i>Orthetrum triangulare</i> Selys, 1878	<i>Libellula triangularis</i> Selys, 1878 <i>Libellula delesserti</i> Selys, 1878 <i>Libellula melanica</i> Selys, 1883 <i>Pseudothemis nigrifrons</i> Matsumura, 1898 <i>Orthetrum ganeshii</i> Mehrotra, 1961 <i>Orthetrum chandrabali</i> Mehrotra, 1961	-	+	+	-	+	+	+	-	+	+
	<i>O. pruinorum neglectum</i> Burmeister, 1839	<i>Libellula pruinosa</i> Burmeister, 1839 <i>Libellula neglecta</i> Rambur, 1842 <i>Libellula petalura</i> Brauer, 1865 <i>Libella clelia</i> Selys, 1878 <i>Orthetrum schneideri</i> Forster, 1903	-	+	+	+	+	-	+	-	-	-
	<i>O. sabina</i> Drury, 1770	<i>Libellula sabina</i> Drury, 1770 <i>Libellula gibba</i> Fabricius, 1798 <i>Libellula leptura</i> Burmeister, 1839 <i>Libellula ampullacea</i> Schneider, 1845 <i>Lepthemis divisa</i> Selys, 1878 <i>Orthetrum nigrescens</i> Bartenev, 1929 <i>Orthetrum viduatum</i> Liefinck, 1942	+	+	-	-	-	-	+	-	-	-
	<i>O. glaucum</i> Brauer, 1865	<i>Libellula glaucum</i> Brauer, 1865 <i>Orthetrum gangi</i> Sahni, 1965	-	+	+	-	+	+	-	-	-	-
	<i>Sympetrum meridionale</i> Selys, 1841	<i>Libellula basilaris</i> Palisot de Beauvois, 1805 <i>Tamea burmeisteri</i> Kirby, 1889	-	+	+	-	+	-	-	-	-	-
	<i>Tamea basilaris</i> Palisot de Beauvois, 1805	<i>Acisoma ascalaphoides</i> Rambur, 1842 <i>Acisoma inflata</i> Selys, 1882 <i>Acisoma variegatum</i> Kirby, 1898	-	+	+	+	+	-	+	-	-	-
	<i>Paipopleura sexmaculata</i> Fabricius, 1787	<i>Libellula sexmaculata</i> Fabricius, 1787	-	+	+	-	-	-	-	-	-	-
	<i>Trithemis festiva</i> Rambur, 1842	<i>Libellula festiva</i> Rambur, 1842 <i>Libellula infernalis</i> Brauer, 1865 <i>Trithemis proserpina</i> Selys, 1878	-	+	-	-	-	+	-	-	-	-
	<i>*T. pallidinervis</i> Kirby, 1889	<i>Sympetrum pallidinervis</i> Kirby, 1889 <i>Trithemis dryas</i> Selys, 1891	-	+	-	-	-	-	+	-	-	-
	<i>Crocothemis servilia</i> Drury, 1773	<i>Libellula servilia</i> Drury, 1773 <i>Libellula ferruginea</i> Fabricius, 1793 <i>Libellula soror</i> Rambur, 1842 <i>Crocothemis reticulata</i> Kirby, 1886	+	-	-	+	-	-	+	+	-	-
	<i>C. erythraea</i> Brulle, 1832	<i>Libellula erythraea</i> Brullé, 1832 <i>Libellula rubra</i> de Villers, 1789 (nec Müller, 1764) <i>Libellula ferruginea</i> Vander Linden, 1825 (nec Fabricius, 1775) <i>Libellula coccinea</i> Charpentier, 1840 <i>Libellula inquinata</i> Rambur, 1842 <i>Crocothemis chaldaea</i> Morton, 1920	+	-	-	+	-	-	+	-	-	-
	<i>Pantala flavescens</i> Fabricius, 1798	<i>Libellula flavescens</i> Fabricius, 1798 <i>Libellula viridula</i> Palisot de Beauvois, 1805 <i>Libellula analis</i> Burmeister, 1839 <i>Libellula terminalis</i> Burmeister, 1839 <i>Sympetrum tadicola</i> Singh, 1955	+	-	+	+	-	+	-	-	-	-
	Gomphidae Rambur, 1842	<i>Mesogomphus lineatus</i> Viswanathan & Varadaraj, 1985	<i>Gomphus lineatus</i> Selys, 1850 <i>Onychogomphus lineatus</i> Selys, 1854 <i>Lindenia lineata</i> Kirby, 1890 <i>Mesogomphus lineatus</i> Fraser, 1924	-	-	-	-	+	-	-	-	-

Table-1: Continued

Family	Species	Synonyms	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
	<i>Anax immaculifrons</i> Rambur, 1842		-	-	+	-	-	-	-	+	-	-
<i>Aeshnidae</i> Rambur, 1842	<i>A. nigrolineatus</i> Fraser, 1935	<i>Anax bacchus</i> Martin 1908 <i>Anax guttatus</i> 1921 <i>Anax fumosus</i> 1923 <i>Anax nigrolineatus</i> 1935	-	-	+	-	-	-	-	+	-	-
	<i>A. parthenope</i> Selys, 1839	<i>Aeschna parthenope</i> Selys, 1839 <i>Anax julius</i> Brauer, 1865 <i>Anax bacchus</i> Hagen, 1867 <i>Anax major</i> Gotz, 1923 <i>Anax parisinus</i> Rambur, 1842 <i>Anax geyri</i> Buchholz, 1955 <i>Anax jordansi</i> Buchholz, 1955	-	-	+	-	-	-	-	+	-	-

*New Record for the district

Table-2: Valid names, Synonyms and distributional details for the collected Zygopteran species.

Family	Species	Synonyms	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
<i>Lestidae</i> Calvert, 1901	<i>Lestes thoracicus</i> Laidlaw, 1920	* <i>L. viridulus</i> Rambur, 1842	-	-	+	+	+	-	+	-	-	-
	<i>L. umbrinus</i> Selys, 1891	<i>Orolestes motis</i> Baijal and Agarwal, 1955	-	+	-	-	-	-	+	-	-	-
	* <i>L. patricia</i>		-	-	-	+	+	-	-	-	-	+
	* <i>L. viridulus</i> Rambur, 1842	<i>Lestes viridulus</i> Kirby, 1890	-	-	-	-	-	+	-	+	-	-
<i>Synlestidae</i> Tillyard,	<i>Megalestes major</i> Selys, 1962		-	+	+	-	-	-	+	+	-	-
<i>Chlorocyphidae</i> Cowley, 1937	<i>Rhincocypha unimaculata</i> Selys, 1853	<i>Paracypha unimaculata</i> , Fraser 1949 <i>Libellago unimaculata</i> Walker, 1853	-	+	+	+	-	-	-	+	-	-
	<i>R. quadrimaculata</i> Selys, 1853	<i>Aristocypha quadrimaculata</i> Laidlaw, 1950 <i>Libellago quadrimaculata</i> Walker, 1853	+	+	-	-	-	+	-	-	-	+
	<i>R. trifasciata</i> Selys, 1853	<i>Libellago trifasciata</i> Walker, 1853 <i>Aristocypha trifasciata</i> Laidlaw, 1950	+	-	-	+	-	-	-	-	+	+
	<i>R. hiliaryae</i> Fraser, 1927		-	+	-	+	+	-	-	-	-	-
	<i>R. immaculata</i> Selys, 1871		-	+	+	-	-	-	-	+	-	-
<i>Coenagrionidae</i> Kirby, 1890	<i>Pseudagrion rubriceps</i> Selys, 1876	<i>Archibasis ceylonica</i> Kirby, 1891 <i>Pseudagrion flavifrons</i> Needham and Gyger, 1939	-	+	+	-	+	+	+	-	-	+
	<i>P. laidlawi</i> Fraser, 1922		-	+	-	-	-	-	-	+	+	-

Table-2: Continued

Family	Species	Synonyms	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
	<i>P. decorum</i> Rambur, 1842	<i>Agrion decorum</i> Rambur, 1842	-	+	+	-	-	-	-	+	-	-
	<i>P. hypermelas</i> Selys, 1876		+	+	+	+	-	-	-	+	-	+
	<i>P. spencei</i> Fraser, 1922		-	-	-	+	-	-	-	-	+	+
	<i>Ceragrion cerinorubellum</i> Brauer, 1865	<i>Agrion cerinorubellum</i> Brauer, 1865 <i>Pyrthosona cerinorubellum</i> Brauer, 1865	-	-	+	-	-	-	-	-	-	-
	<i>C. coromandelianum</i> Fabricius, 1798	<i>Agrion coromandelianum</i> Fabricius, 1798 <i>Agrion cerinum</i> Rambur, 1842	+	+	+	-	+	+	+	+	+	-
	<i>Aciagrion hisopa</i> Selys, 1876	<i>Pseudagrion hisopa</i> Selys, 1876 <i>Aciagrion aciculare</i> Lieftink, 1929	+	-	-	-	+	-	-	-	-	+
	<i>Ischnura forcipata</i> Morton, 1907	<i>Ischnura musa</i> Bartenev, 1913 <i>Ischnura gangetica</i> Laidlaw, 1913 <i>Agrionemis nainitalensis</i> Sahni, 1965 <i>Coenagrion needhami</i> Neves, 1933	+	+	+	-	+	+	+	+	-	-
	<i>I. elegans</i> Vander Linden, 1820	<i>Agrion elegans</i> Vander Linden, 1820 <i>Ischnura lamellata</i> Kolbe, 1885	-	-	+	-	+	+	-	-	+	-
	<i>I. aurora</i> Brauer, 1865	<i>Agrion aurora</i> Brauer, 1865 <i>Agrion delicatum</i> Hagen, 1876 <i>Ischnura delicata</i> Hagen, 1876 <i>Micronympha aurora</i> Kirby, 1890 <i>Nanosura aurora</i> Kennedy, 1920 <i>Ischnura bhimtalensis</i> Sahni, 1965	+	+	+	-	+	+	+	-	-	+
	<i>I. senegalensis</i> Rambur, 1842	<i>Agrion senegalensis</i> Rambur, 1842 <i>Enallagma brevispina</i> Selys, 1876	-	+	-	-	+	-	-	-	+	+
	<i>Agrionemis pygmaea</i> Rambur, 1842	<i>Agrion pygmaeum</i> Rambur, 1842 <i>Agrionemis australis</i> Selys, 1877 <i>Agrionemis velaris</i> Selys, 1882 <i>Agrion kagiensis</i> Matsumura, 1911 <i>Agrionemis hyacinthus</i> Tillyard, 1913	+	-	+	+	+	+	+	+	+	+
	<i>Rhodoschnura nursei</i> Morton, 1907	<i>Ischnura nursei</i> Morton, 1907	+	+	-	-	-	-	-	+	-	-
	<i>Calcynemis eximia</i> Selys, 1863	<i>Calcynemis atkinsoni</i> Selys, 1886	-	-	+	+	-	-	-	-	-	-
Platycnemidae Tillyard, 1917	<i>Copera marginipes</i> Rambur, 1842	<i>Platycnemis marginipes</i> Rambur, 1842 <i>Platycnemis lacteola</i> Selys, 1863 <i>Psilocnemis marginipes</i> Selys, 1863 <i>Psilocnemis striatipes</i> Selys, 1863 <i>Copera acutimargo</i> Krug, 1898 <i>Disparoneura bhatalnagri</i> Sahni, 1965	-	+	+	-	-	-	-	-	-	-
Protoneuridae Tillyard, 1917	<i>Elatoneura nigerrima</i> Laidlaw, 1935	<i>Disparoneura nigerrima</i> Laidlaw, 1917	-	-	+	-	-	-	-	+	-	+

Table-2: Continued

Family	Species	Synonyms	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Calopterygidae Selys, 1850	<i>Neurobasis chinensis</i> Linnaeus, 1758	<i>Libellula chinensis</i> Linnaeus, 1758 <i>Agrion nobilitata</i> Fabricius, 1776 <i>Agrion chinensis</i> Guerin, 1829 <i>Calopteryx disparilis</i> Rambur, 1842 <i>Calopteryx chinensis</i> Rambur, 1842 <i>Calopteryx sinensis</i> Walker, 1853 <i>Neurobasis c. chinensis</i> Fraser, 1934	-	+	+	-	+	-	+	-	-	-
Euphaeidae Selys, 1853	<i>Baydera indica</i> Selys, 1853	<i>Epallage indica</i> Selys, 1853	+	+	-	-	-	+	+	-	-	-

- New record for districts
- New record for the country

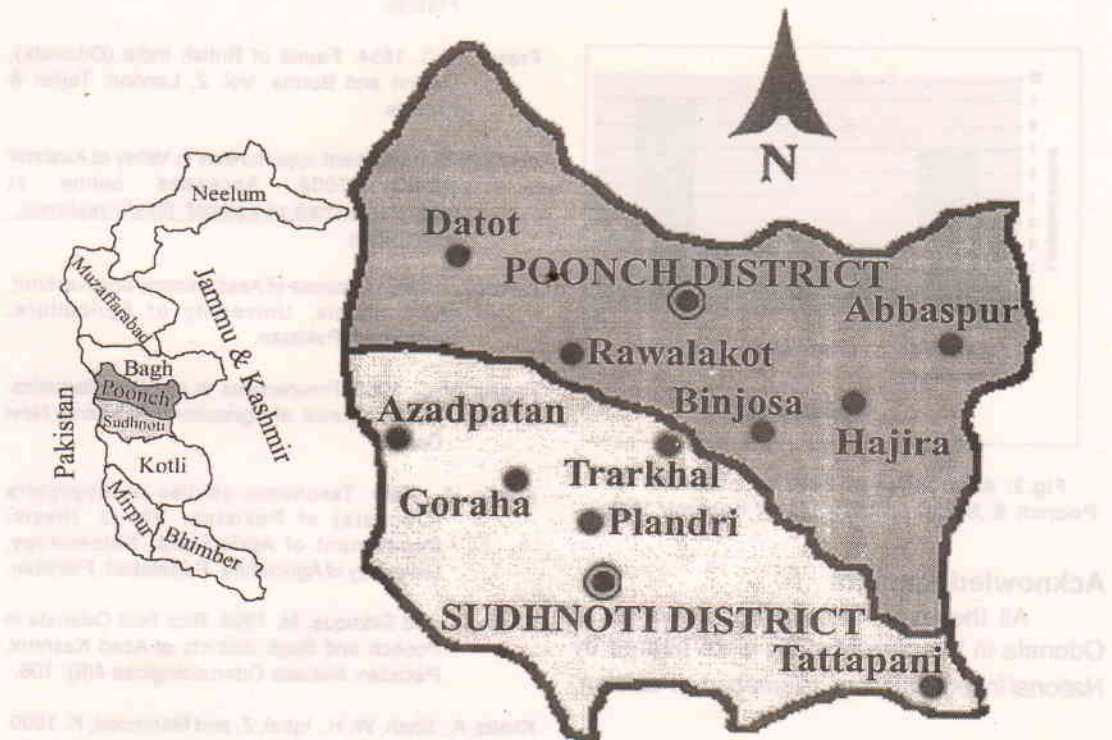


Fig.1: Map of District Poonch and Sudhnoti, Kashmir Valley.

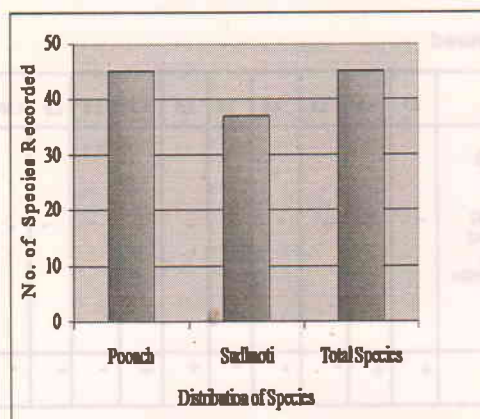


Fig.2: Richness of Species Observed in Poonch & Sudhnoti Districts of Kashmir Valley.

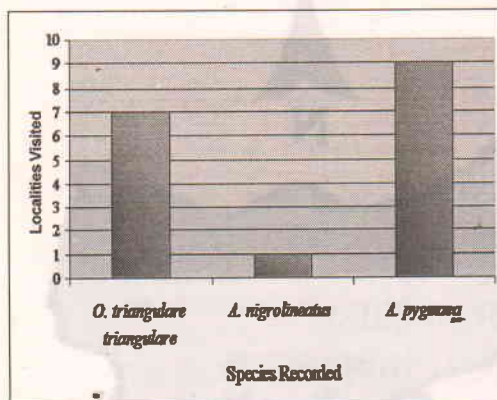


Fig.3: Abundance of Species observed in Poonch & Sudhnoti Districts of Kashmir Valley.

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References

Ali, M. 1995. Survey of insect pest of rice from district Poonch and evaluation of the potential of

dragonfly feeding in captivity. B.Sc. thesis, University College of Agriculture, Rawalakot, Valley of Kashmir.

Borror, D. J. and White, R. E. 1970. A field guide to the insects. New York: Houghton Mifflin Company.

Brown, J. K. S. 1991. Conservation of neotropical environments: Insects as indicators. In: Collins, N. M. & Thomas, J. A. (eds.). The conservation of insects and their habitats, London, Academic Press: 349 – 404.

Clark, T. E and Samways, M. J. 1996. Dragonflies (Odonata) as indicators of biotope quality in Kruger National Park, South Africa. Journal of applied ecology 33: 1001 – 1012.

Fraser, F. C. 1933. Fauna of British India (Odonata), Ceylon and Burma, Vol. 1, London: Tayler & Francis.

Fraser, F. C. 1934. Fauna of British India (Odonata), Ceylon and Burma, Vol. 2, London: Tayler & Francis.

IPAK. 2008. Investment oppurtunities in Valley of Kashmir (IPAK), 2008. Accessed online at http://www.pmajk.gov.pk/pdf_files/Investment_conference

Month, Z. I. 1985. Odonata of Azad Jammu and Kashmir. M.Sc. thesis, University of Agriculture, Faisalabad, Pakistan.

Kapoor, V. C. 1985. Prespectives in insect systematics. Indian Council of Agricultural Research, New Delhi.

Khaliq, A. 1990. Taxonomic studies on Zygoptera (Odonata) of Pakistan. Ph. D. thesis, Department of Agricultural Entomology, University of Agriculture, Faisalabad, Pakistan.

Khaliq, A. and Siddique, M. 1995. Rice field Odonata in Poonch and Bagh districts of Azad Kashmir, Pakistan. Notulae Odonatologicae 4(6): 106.

Khaliq, A., Shah, W. H., Iqbal, Z. and Mahmood, K. 1990. Damselflies (Zygoptera: Odonata) of district Poonch. Pakistan Entomologist 12(1-2): 90-91.

- Khaliq, A., Ayub, M., Nafees, M. A., and Maula, F. 1994. A collection of Odonata from Gilgit and Baltistan. Kashmir with three new species for Pakistan. *Notulae odonatologicae* 4(4): 68–69.
- Khaliq, A., Aslam, S., and Anjum, S. A. 1995. Description of the naiads of six species of Odonata from Poonch Valley of Azad Kashmir. *Pakistan Journal of Zoology* 27(1): 71 – 76.
- Laidlaw, F. F. 1915. Notes on oriental dragonflies in Indian museum. *Record of Indian Museum* 11(1-3):197-199.
- Subramanian, K. A. 2005. *Dragonflies and damselflies of Peninsular India - A field guide*. Project Lifescape. Indian Academy of Sciences, Bangalore, India.
- Wahizatul - Afzan A., Julia, J. and Amirrudin, A. 2006. Diversity and distribution of dragonflies (Insecta: Odonata) in Sekayu recreational forest, Terengganu. *Journal of Sustainability Science and Management* 1(2): 97-106.
- Yousuf, M., Abbasi, L. M. and Khaliq, A. 2000. Description of a new allotype of *Bayadera longicauda* Fraser (Euphaeidae: Odonata) from Azad Kashmir. *Pakistan Entomologist* 22(1–2): 45 – 46.