

Diversity of Odonata in the region of Doon Valley, Uttarakhand

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Abstract

Order Odonata include both dragonflies and damselflies commonly found in both aquatic as well as terrestrial habitats. The present study revealed occurrence of 19 species of Odonata in Doon valley. Species from the family Libellulidae was observed to be the most dominant in Doon valley. *Orthetrum pruinosum* is the most common species found in the selected area. The present study provided the diversity and distribution of dragonflies and damselflies in Doon valley which would be helpful for future research.

Keywords: Odonata, dragonflies, damselflies, Doon valley, Uttarakhand

1. Introduction

The most interesting and fascinating of all insects belongs to order Odonata are Dragonflies (suborder Anisoptera) and damselflies (suborder Zygoptera) are amongst the most attractive creatures on the earth and one of ancient group of insects (Dawn and Chandra, 2014) ^[1]. According to Kulkarni and Prasad (2002) ^[2], out of 5000 species reported from the world, 500 species belonging to 139 genera of 17 families have been reported from India.

Dragonflies and damselflies are commonly found near water bodies like reservoirs, lakes, backwaters ponds, rivers, pools, streams and also at marshy places (Sathe and Bhusnar, 2010; Bora and Meitei, 2014) ^[3,4]. The adults are terrestrial and nymphs are aquatic so they are an important link between aquatic and terrestrial ecosystem. Dragonflies are bio-control agents because both adults and nymph are predators of mosquito's larvae, and they work as a bio control of arthropod-borne diseases in human populations (Sathe and Bhusnar, 2010; Tiple *et al.*, 2012; Bora and Meitei, 2014) ^[3, 5, 4].

The first published record of Odonata of India was published by F.C. Fraser in 1933 ^[6]. Moreover, Fraser (1933; 1934; 1936) ^[6, 7, 8] published three volumes on Odonata in the 'Fauna of British India including 536 species and subspecies of Odonata. In that there are 500 species of dragonfly (Anisoptera) which include 90 genera from India and there are 39 genera including 168 species and subspecies belonging from damselfly (Zygoptera). Odonata of Doon Valley has been extensively worked upon by Kumar and Prasad (1977) ^[9]. Taxonomic survey on Odonata of Doon Valley was also carried out by Singh and Prasad (1976) ^[10].

The present study aimed to explore the species richness diversity and distribution of Odonata insects (dragonflies and Damselflies) in different sites of Doon valley which may be helpful for future research for effective strategy for conservation of Dragonflies and Damselflies.

2. Materials and Methods

The Odonates is collected from different area of Dehradun district, Uttarakhand. From Selected sites are Dehradun Cantt, Jaintanwala, Robber's Cave, Rajpur, Sahastradhara,

Maldevta, Raipur, Lachhiwala. Unidentified dragonflies and damselflies were collected by nylon net with long handle. After collection, specimens were kept into bottles containing 70% alcohol or chloroform. All species were identified following Fraser (1933; 1934; 1936) ^[6, 7, 8] and field guide by Subramanian (2009) ^[11].

3. Results and Discussion

The present study, total 19 species of Dragonfly and Damselfly was collected from study sites in Doon valley region during January to June (2015 and 2016). Under order Odonata and suborder Anisoptera (Dragonfly) 3 families were recorded for the selected sites, 2 species belong to family Aeshnidae, 2 belong to family Gomphidae, However, 1 from Coenagrionidae and the dominant number of species 14 belong to family Libellulidae. Moreover from Zygoptera (Damselflies) 1 species belong to Coenagrionidae (Table 1). The result showed that out of total species recorded in the present study *Brachythemis contaminata* was the most abundant species (65%) and *Trithemis festiva* (62%). *Orthetrum triangulare* is very common with (58%) and *Orthetrum pruinosum neglectum* and *Orthetrum luzonicum* was least abundant with 10%, 9% respectively. However, damselfly *Ischnura aurora* (10%) (Figure1).

In the study sites, Sahastradhara is much diverse for odonates as compare to other sites. In Sahastradhara 14 species were observed. In Lachhiwala region 11 species were observed and 9 species in Robbers cave and maldevta region. However, only one species were observed in Rajpur region. And *Anax immaculifrons*, found in only 2 sites (Table 1). *Crocothemis servilia*, *Orthetrum pruinosum* are the most abundant species found in 6 study sites. *Orthetrum taeniolatum*, *Trithemis aurora* and *Trithemis festiva* are observed in 5 selected sites.

Dragonflies and Damsflies are most diversified insect in earth and bio indicators of the aquatic ecosystems (Sathe and Bhusnar 2010; Ankalgi and Jadesh 2014) ^[3, 12]. Odonates are predator and also an important link between ecosystem of aquatic and terrestrial (Basumatary *et al.*, 2015) ^[13]. From the family Aeshnidae, *Anax guttatus* (Burmeister, 1839) and *Anax immaculifrons* (Rambur, 1842) is a very rear species (Basumatary *et al.* 2015). In Dehradun

region they are found in Rajpur and Sahastradhara. However, family Libellulids is the most diverse group of dragonflies having *Brachythemis contaminata* (Fabricius, 1793), *Bradinopyga geminata* (Rambur, 1842) (Singh and Prasad 1976; Basumatary *et al.*, 2015) ^[10, 13]. *Trithemis aurora* (Burmeister, 1839) is the most common species in Doon valley (Singh and Prasad 1976) ^[10]. *Orthetrum luzonicum* (Brauer, 1868) is a very rear species mostly found in Robbers cave and Rishikesh area (Singh and Prasad 1976) ^[10]. *Trithemis festiva* (Rambur, 1842) is one of the most common species in Dehradun region and *Crocothemis servilia* (Drury, 1770), *Orthetrum pruinosum* (Burmeister, 1839), *Orthetrum taeniolatum* (Schneider, 1845) *Orthetrum glaucum* (Brauer, 1865), *Orthetrum triangulare triangulare* (Selys 1878) mostly found in found near ponds and streams are common species in Doon valley (Dayakrishna *et al.*, 2015; Singh and Prasad 1976) ^[10, 14]. *Zyxomma petiolatum* (Rambur, 1842) is a very rear species and also found in India, Sri Lanka, Burma, Philippines (Singh and Prasad 1976) ^[10]. *Trithemis kirbyi kirbyi* (Selys, 1891) is a rear species found in maldevta region and they are very fast in flying and not easy to catch (Singh and Prasad 1976) ^[2]. *Sympetrum commixtum* (Selys, 1884) is very rear species and known from North to North West region in India (Singh and Prasad 1976) ^[10]. *Ictinogomphus rapax* (Rambur, 1842) is a rear species mostly found in the region of Bhanianwala and Rishikesh (Singh and Prasad 1976) ^[10]. *Nepogomphus modestus* (Selys, 1878) is a rear species known from north east region. (Singh and Prasad 1976) ^[10]. *Ischnura aurora* belong to sub order Zygoptera is common species (Basumatary *et al.*, 2015) ^[13]. India' provides documentation of 536 species and subspecies from India with many species from several countries but documentation of distribution is still not known for most of the species (Muthukumaravel *et al.*, 2015) ^[15]. and most of the species of damselflies were reported from various parts of India such as *Anax guttatus* *Anax immaculifrons* *Ictinogomphus rapax*, *Brachythemis contaminate*, *Trithemis pallidinervis*, *Orthetrum pruinosum* *Ischnura aurora* from North and North East (Bora and Meitei, 2014; Basumatary *et al.*, 2015) ^[4, 13]. In Central India species of Odonates such as *Anax guttatus*, *Anax immaculifrons*, *Brachythemis contaminate*,

Crocothemis servilia, *Crocothemis servilia*, *Trithemis festiva*, *Trithemis kirbyi* Kirbyi, *Trithemis pallidinervis* are recorded by Shende and Patil, 2013 ^[16] and Tiple *et al.*, 2012 ^[5]. Moreover, *Anax immaculifrons* and *Crocothemis servilia* are recorded in Western Ghats of India by Sathe and Bhusnar 2010 ^[3].

In south India, *Anax guttatus*, *Brachythemis*, *contaminate*, *Crocothemis servilia* dragonfly was examined by Muthukumaravel *et al.*, 2015 ^[15]. Collection and identification of Odonates from selected sites showed diversity of species richness mostly in springs and river area. Subramanian and Babu 2018 ^[17] reported diversity of Odonates from Eastern Himalaya and western himalaya viz., Sikkim-Darjeeling, Arunachal Pradesh, Jammu and Kashmir, Uttarakhand and Himachal Pradesh. According to Subramanian and Babu 2018 ^[17], *Crocothemis servilia*, *Orthetrum pruinosum*, *Orthetrum taeniolatum*, *Orthetrum triangulare*, *Sympetrum commixtum*, *Trithemis aurora*, *Trithemis festiva*, *Trithemis kirbyi kirbyi*, *Trithemis pallidinervis*, *Zyxomma petiolatum*, *Ischnura aurora*, *Anax guttatus*, *Brachythemis contaminate*, *Bradinopyga geminate* are found in Himalaya of Jammu and Kashmir and Himachal Pradesh. *Anax guttatus*, *Anax immaculifrons*, *Brachythemis contaminate*, *Bradinopyga geminate*, *Crocothemis servilia*, *Nepogomphus modestus*, *Orthetrum luzonicum*, *Orthetrum pruinosum*, *Orthetrum taeniolatum*, *Orthetrum triangulare*, *Sympetrum commixtum*, *Trithemis aurora*, *Trithemis festiva*, *Trithemis kirbyi kirbyi*, *Trithemis pallidinervis*, *Zyxomma petiolatum*, *Ischnura aurora* found in Himalaya of Himachal Pradesh, Uttarakhand, Sikkim, West Bengal and Darjeeling. Moreover, *Anax guttatus*, *Brachythemis contaminate*, *Crocothemis servilia*, *Orthetrum luzonicum*, *Orthetrum pruinosum*, *Orthetrum taeniolatum*, *Orthetrum triangulare*, *Sympetrum commixtum*, *Trithemis aurora*, *Trithemis festiva*, *Trithemis pallidinervis*, *Ischnura aurora* found in Himalaya of Arunachal Pradesh.

In the present study, the occurrence of 19 species of donates were reported from Doon valley. Among these *Crocothemis servilia* and *Orthetrum pruinosum* was most abundant species. From this study we conclude that Sahastradhara and Lachiwalla area are very much diverse in fauna of Odonates.

Table 1: List of dragonfly and damselfly collected from study area

Anisoptera (Dragonflies)								
Species	Family	Dehradun Cantt	Jaintanwala	Robber's Cave	Rajpur	Sahastradhara	Maldevta	Lachhiwala
<i>Anax guttatus</i> (Burmeister, 1839)	Aeshnidae	A	NA	NA	NA	NA	NA	NA
<i>Anax immaculifrons</i> (Rambur, 1842)	Aeshnidae	NA	NA	NA	A	A	NA	NA
<i>Brachythemis contaminate</i> (Fabricius, 1793)	Libellulidae	NA	NA	NA	NA	A	A	A
<i>Bradinopyga geminate</i> (Rambur, 1842)	Libellulidae	A	NA	NA	NA	A	NA	NA
<i>Crocothemis servilia</i> (Drury, 1770)	Libellulidae	A	A	A	NA	A	A	A
<i>Nepogomphus modestus</i> (Selys, 1878)	Gomphidae	NA	NA	A	NA	A	NA	NA
<i>Orthetrum luzonicum</i> (Brauer, 1868)	Libellulidae	NA	NA	A	NA	NA	NA	A
<i>Orthetrum glaucum</i> (Brauer, 1865)	Libellulidae	NA	NA	A	NA	A	A	A
<i>Orthetrum pruinosum</i> (Burmeister, 1839)	Libellulidae	A	A	A	NA	A	A	A

<i>Orthetrum taeniolatum</i> (Schneider, 1845)	Libellulidae	NA	A	A	NA	A	A	A
<i>Orthetrum triangulare</i> (Selys 1878)	Libellulidae	NA	NA	A	NA	A	A	A
<i>Ictinogomphus rapax</i> (Rambur, 1842)	Gomphidae	NA	NA	NA	NA	NA	NA	A
<i>Sympetrum commixtum</i> (Selys, 1884)	Libellulidae	NA	NA	NA	NA	A	NA	NA
<i>Trithemis aurora</i> (Burmeister, 1839)	Libellulidae	NA	A	A	NA	A	A	A
<i>Trithemis festiva</i> (Rambur, 1842)	Libellulidae	NA	A	A	NA	A	A	A
<i>Trithemis kirbyi kirbyi</i> (Selys, 1891)	Libellulidae	NA	NA	NA	NA	A	NA	NA
<i>Trithemis pallidinervis</i> (Kirby, 1889)	Libellulidae	NA	NA	NA	NA	A	A	A
<i>Zyxomma petiolatum</i> (Rambur, 1842)	Libellulidae	A	NA	NA	NA	NA	NA	NA
Zygoptera (Damselflies)								
<i>Ischnura aurora</i> (Brauer, 1865)	Coenagrionidae	NA	NA	NA	NA	A	NA	NA

*A= Available, NA= Not Available.

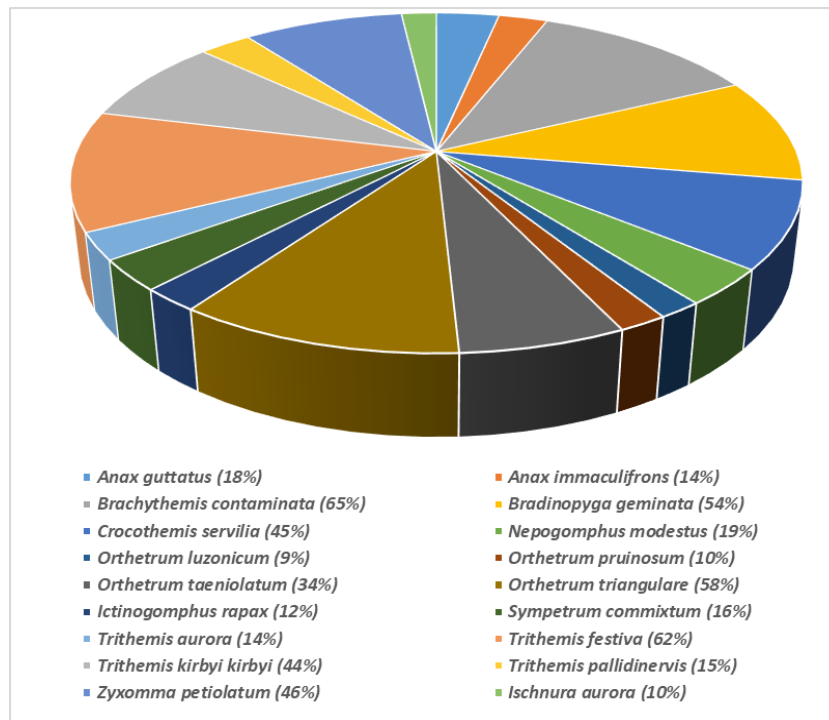


Fig 1: Abundance of dragonfly and damselfly in Doon Valley (% in approx.)

5. Conclusion

The current study high density and species richness of odonates of family Libellulidae is widely distributed in Doon Valley. At the site of Sahastradhara region 14 species were found as compare to other study sited. And in Rajpur only one species were found. *Crocothemis servilia* and *Orthetrum pruinosum* are common in the study sites. The references or database of Odonata from the study area is very low and this study is useful for future research.

6. References

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