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Studies on the Species Diversity of Damselflies and Dragonflies (Odonata: Insecta) in the Four Selected Localities of Districts Solan and Sirmaur, Himachal Pradesh, India

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ABSTRACT: A detailed study on the species diversity of odonates has been conducted in the four selected localities of Districts Solan and Sirmaur, Himachal Pradesh during 2016-18. The studies reveal that so far 22 species belongs to 05 families and 2 suborders of order Odonata were recorded. In that 22 species, 19 species were recorded from Ashwini Khad followed by 16 species from Renuka Lake, 14 species from Rajgarh and 10 species from Kasauli study sites. The family Libellulidae was the most dominant family of order Odonata, represented by 16 species, followed by Coenagrionidae 03 species and Aeshnidae, Chlorocyphidae and Gomphidae each having 01 species. The present study reveals that the selected four localities of Districts Solan and Sirmaur, Himachal Pradesh are rich in Odonata fauna and provide a suitable natural habitat for their survival.

Keywords: Odonata, diversity, Solan, Sirmaur, Himachal Pradesh, India.

I. INTRODUCTION

Approximately 5,948 species and subspecies belonging to 653 genera in 30 families of Odonata are known from all over the world, out of which 475 species and subspecies of Odonata under 142 genera belonging to 18 families are reported from India Subramanian (2014) [8]. Perusal of literature reveals that no consolidated account is available on the Odonata fauna of the four selected localities of District Solan and Sirmaur, Himachal Pradesh. Therefore, the present studies had made a modest attempt to explore the existing diversity of odonates in the four selected localities of Districts Solan and Sirmaur, Himachal Pradesh, India.

II. MATERIALS AND METHODS

A detailed study of odonates was made in the four selected localities of Districts Solan and Sirmaur, Himachal Pradesh *i.e.* Ashwini Khad and Kasauli in District Solan and Renuka and Rajgarh in District Sirmaur, Himachal Pradesh during November, 2016 to December, 2018. The extensive studies of odonates were made during different seasons in these four selected localities of Districts Solan and Sirmaur, Himachal Pradesh and observation were made in the field. The odonates were caught in the field by using Insect net and after taking observation and identification of the species, the live individuals were released. The very few selected unidentified individuals were collected and transferred into insect collection paper packs and were brought to the laboratory and identification of the collected specimens was carried out using identification keys provided by Fraser (1933, 1934 & 1936) [4-6]. Also studied and identified the collection of odonates preserved in National Zoological Collections of High Altitude Regional Centre, Zoological Survey of India, Solan and National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi.

III. RESULTS AND DISCUSSION

The studies on the Odonata fauna in the four selected localities of Districts Solan and Sirmour, Himachal Pradesh reveals that so far 22 species belongs to 05 families and 2 suborders of order Odonata were recorded. In that 22 species, 19 species were recorded from Ashwini Khad followed by 16 species from Renuka Lake, 14 species from Rajgarh and 10 species from Kasaulistudy sites (Table 1). The study reveals that *Brachythemis contaminata* (Fabricius), *Ceriagrion coromandelianum* (Fabricius), *Crocothemis servilia* (Drury), *Ischnura aurora* (Brauer), *Orthetrum pruinosum* (Burmeister), *Orthetrum sabina* (Drury), *Pantala flavescens* (Fabricius) and *Trithemis aurora* (Burmeister) were the dominant species in the selected study sites.

On the basis of number of identified species, the family Libellulidae was the most dominant family of order Odonata, represented by 16 species, followed by Coenagrionidae (03 species) and Aeshnidae, Chlorocyphidae and Gomphidae each having 01 species. The dominance of family Libellulidae was reported by many earlier workers as Kumar and Mitra (1998) [2] recorded 42 species from Sahstradhara, Dehradun, out of which 18 species represented family

Libellulidae Prasad [11] (2002) recorded 162 species from Western Himalaya, out of which 42 species represented family Libellulidae Kumar (2002) [1] recorded 109 species in Jharkhand state, out of which 40 species represented family Libellulidae; Vashishth *et al.,* (2002) recorded 17 species in Rajaji National Park, out of which 9 species represented family Libellulidae [12]; Kandibane *et al*., (2005) recorded 12 species of odonates in an irrigated rice field of Madurai, out of which 7 species represented family Libellulidae [10]; Andrew (2013) recorded 34 species in Zilpi Lake of Nagpur, out of which 22 species represented family Libellulidae [14]. Charjan *et al.,* (2015) recorded 19 species of odonates in some Parts of Murtizapur Taluka of Akola District, Maharashtra, out of which 18 species represented family Libellulidae [3]; Gajbe (2015) recorded 28 species in the Karhandla Region of Umred-Karhandla Wildlife Sanctuary, Maharashtra, out of which 18 species represented family Libellulidae [13]; Emiliyamma *et al.,* (2005) recorded 137 species of odonates from Kerala, out of which 56 species represented family Libellulidae [9] and Sharma and Joshi (2007) recorded 30 species of odonates from from Dholbaha Dam, Punjab, out of which 18 species represented family Libellulidae [7].

The present study reveals that the selected four localities of Districts Solan and Sirmaur, Himachal Pradesh are rich in Odonata fauna and provide a suitable natural habitat for their survival, still more efforts are required in the field to explore the diversity of odonates in the remote localities and water bodies of Himachal Pradesh.

Table 1: Annotated checklist of Odonata in the selected localities of Districts Solan and Sirmaur, Himachal Pradesh, India.

S. No.	Species	Ashwini Khad, Distt. Solan	Kasauli, Distt. Solan	Rajgarh, Distt. Sirmaur	Renuka Lake, Distt. Sirmaur
(1) Suborder-Zygoptera					
(A) Family-Coenagrionidae					
1.	*Ceriagrion coromandelianum* (Fabricius)	+	–	+	+
2.	*Ischnura aurora* (Brauer)	+	–	–	+
3.	*Pseudagrion rubriceps* (Selys)	+	–	–	–
(B). Family- Chlorocyphidae					
4.	*Aristocypha quadrimaculata* (Selys)	+	–	–	–
(2). Suborder- Anisoptera					
(C). Family- Aeshnidae					
5.	*Anax immaculifrons* (Rambur)	+	+	–	+
(D) Family- Gomphidae					
6.	*Ictinogomphus rapax* (Rambur)	+	–	+	+
(E) Family- Libellulidae					
7.	*Brachythemis contaminata* (Fabricius)	+	+	+	+
8.	*Crocothemis servilia* (Drury)	+	+	+	+
9.	*Diplacodes trivialis* (Rambur)	+	+	+	+
10.	*Neurothemis tullia* (Drury)	+	–	–	–
11.	*Orthetrum glaucum* (Brauer)	–	–	–	+
12.	*Orthetrum pruinosum* (Burmeister)	+	+	+	+
13.	*Orthetrum sabina* (Drury)	+	+	+	+
14.	*Orthetrum triangulare* (Selys)	+	+	+	+
15.	*Palpopleura sexmaculata* (Fabricius)	–	–	+	+
16.	*Pantala flavescens* (Fabricius)	+	+	+	+
17.	*Rhyothemis variegata* (Linnaeus)	+	–	–	–
18.	*Tholymis tillarga* (Fabricius)	+	–	–	–
19.	*Tramea virginia* (Rambur)	–	–	–	+
20.	*Trithemis aurora* (Burmeister)	+	+	+	+
21.	*Trithemis festiva* (Rambur)	+	+	+	+
22.	*Trithemis pallidinervis* (Kirby)	+	–	+	–
	Total	**19**	**10**	**14**	**16**

where + = species present= species absent.

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