Article

Diversity of damselflies (Zygoptera) in Gorewada International Bio-Park, Nagpur, Central India

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Abstract

Gorewada International Bio-Park consists of a lake as a major water source, marshy shore and heterogeneity in vegetation. Its geographical location is 21°11′N 79°2′E. Observations are made through walking line transects along the lake border to determine the diversity of damselfly. Total 21 species of damselflies belonging to nine genera (*Aciagrion, Agriocnemis, Ceriagrion, Enallagma, Ischnura, Pseudagrion, Rhodischnura, Copera* and *Lestes*) and three families (Coenagrionidae, Lestidae and Platycnemididae) have been recorded. Out of total damselflies examined, 52.38% are common, 19.05% are occasional and 28.57% are rare species. The present study encourages the conservation of a wide range of indigenous damselfly species in this area.

Keywords Damselfly; Zygoptera; Odonata; Insects; Gorewada.

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1 Introduction

The earth's (approximately 3.8 billion year) history of life is representing just 0.1% of all the species of flora and fauna that have presently lived on earth. Thus 99.9% or virtually all of life that has existed on earth has gone extinct (Raup, 1991).

Damselflies and dragonflies are among the most attractive creatures on earth belonging to the most popular insect order- Odonata. These are observed near the ponds, lakes, rivers, ditches and all over the marshy places. Damselflies (suborder- Zygoptera) have front and hind wings are similar in shape with narrowed base. The wings of the two sexes are similar in shape. At resting condition wings are held either together above the body or slightly divergent. The head is elongate transversely and in dorsal view is usually wider than the thorax.

Damselflies and dragonflies can be traced back to the Carboniferous and Permian periods of the Paleozoic Era (500-200 million years ago). However, modern families of these insects date from the upper Jurassic and

Cretaceous periods (150-60 million years ago) (Westfall and May, 1996). Silsby (2001) described about 6000 species of dragonflies in all over the world. India is also highly diverse with more than 500 species of Odonata (Subramanian, 2005). Total almost 1,100 species, Coenagrionidae is the largest family of damselflies, forming a major part of the odonate fauna in all continents. With Lestidae, it is the only damselfly family of which many species inhabit standing waters (Dijkstra and Kalkman, 2012). Subramanian (2009) recorded 267 species diversity of damselfly belonging to 87 genera and 8 families in India.

Gorewada is developing International Bio-Park situated at North-West of Nagpur city and its geographical location is 21°11′N 79°2′E (Fig. 1 and 2). It is basically divided into African Safari, Bio-Park, Energy Plaza, Trails, Indian Safari, Height Safari, Rescue Safari and Gorewada Reservoir. Gorewada Reservoir is bordered by thick forest on three sides. Reservoirs catchment area is approx. 11 sq. mile (17,702.74 sq.mt.). Gorewada is a good habitat for biodiversity of damselflies. In spite of its global significance, studies of damselflies diversity of Gorewada International Park have been least undertaken.

Since, the main objective of this study has been conduct preliminary observation of damselflies and carried out the checklist, occurrence and richness inhibiting the Gorewada International Bio-Park.

Fig. 1 Line transects along the Lake of Gorewada International Bio-Park (Courtesy- Google Map).

Fig. 2 Photograph showing ecology of Gorewada Lake.

2 Material and Methods

Watching and recording of damselflies has been done during Sunday and holidays in such a way that there should be least one visit in each line transect during a week for a period of two years from March 2011 to February 2013. Observations were made through walking transects of 0.7 km to 1.0 km length with 2 m to 5 m on either side of the lake border. The present study is based on 4 line transects (Fig. 1) to study the damselflies population. The sites were visited to note maximum species of damselflies and record its activities. The observations were recorded with the aid of binocular and digital cameras and the species are identified with the help of photographs, reference books and publications.

3 Results

Gorewada International Bio-Park provides heterogeneity in vegetation. The importance of the lake is as a major water source and marshy shore. This lake is rich in aquatic fauna which includes micro and macro-organisms, shrimps, fishes and protein-rich invertebrates. This region is suitable for feeding and resting for many odonates due to the abundance of food throughout the year.

Table 1 Damselflies of Gorewada International Bio-Park, Nagpur, Central India.

S. N.	Species	Common Name	Status
	Family: Coenagrionidae		
1	*Aciagrion hisopa*(Selys, 1876)	Violet-Striped Slender Dartlet	O
2	*Aciagrion occidentale* (Laidlaw, 1919)	Green-Striped Slender Dartlet	O
3	*Agriocnemis lacteola*(Selys, 1877)	Milky Dartlet	R
4	*Agriocnemis pygmaea* (Rambur, 1842)	Pigmy Dartlet	C
5	*Agriocnemis splendidissima* (Laidlaw, 1919)	Splendid Dartlet	O
6	*Ceriagrion coromandelianum* (Fabricius, 1798)	Coromandel Marsh Dart	C
7	*Ceriagrion olivaceum* (Laidlaw, 1914)	Rusty Marsh Dart	R
8	*Ceriagrion rubiae* (Laidlaw, 1916)	Orange Marsh Dart	O
9	*Enallagma parvum* (Selys, 1876)	Azure Dartlet	C
10	*Ischnura aurora* (Brauer, 1865)	Golden Dartlet	C
11	*Ischnura senegalensis* (Rambur, 1842)	Senegal Golden Dartlet	C
12	*Pseudagrion decorum* (Rambur, 1842)	Three-Lined Dart	C
13	*Pseudagrion indicum* (Fraser, 1924)	Yellow-Striped Blue Dart	R
14	*Pseudagrion microcephalum* (Rambur, 1842)	Blue Grass Dartlet	R
15	*Pseudagrion* rubriceps (Selys, 1876)	Saffron-Faced Blue Dart	C
16	*Rhodischnura nursei* (Morton, 1907)	Pixie Dartlet	C
	Family: Platycnemididae		
17	*Copera marginipes* (Rambur, 1842)	Yellow Bush Dart	C
18	*Copera vittata* (Selys, 1917)	Blue Bush Dart	C
	Family: Lestidae		
19	*Lestes elatus* (Selys, 1862)	Emerald Spreadwing	R
20	*Lestes umbrinus* (Selys, 1891)	Brown Spreadwing	C
21	*Lestes viridulus* (Rambur, 1842)	Emerald-Striped Spreadwing	R

Abbreviations- C- Common; O- Occasional and R- Rare

Total 21 species of damselflies belonging to 9 genera and 3 families (Coenagrionidae, Platycnemididae, Lestidae) have been recorded (Table 1). Coenagrionids are medium to small sized damselflies with transparent wings which are rounded attips. The hindwings are shorter than abdomen with non-metalliccolors. Family-

Coenagrionidae consists of 16 species belong to 7 genera (*Aciagrion, Agriocnemis, Ceriagrion, Enallagma, Ischnura, Pseudagrion* and *Rhodischnura*). Platycnemidids are black colored medium-sized damselflies with yellow markings and wings are transparent with round-tips. Hindwings are shorter than the abdomen. Platycnemididae family is consisting of 2 species belonging to single genus (*Copera*). Lestids are medium-sized damselflies shows predominantly green or brown ground colored with iridescent markings. Family Lestidaeis consists of 3 species belonging to single genus (*Lestes*) (Plate 1 and 2).

Family- Coenagrionidaeis the largest family carries the maximum number of genera and species followed by Lestidae and Platycnemididae. Out of total 21 damselflies species examined, 11 (52.38%) are common, 4 (19.05%) are occasional and 6 (28.57%) are rare species (Table 2 and Fig. 3).

Table 2 Status of Damselflies of Gorewada International Bio-Park.

S.N.	Status	No. of species	% of species
1.	Common	11	52.38
2.	Occasional	04	19.05
3.	Rare	06	28.57
		21	100

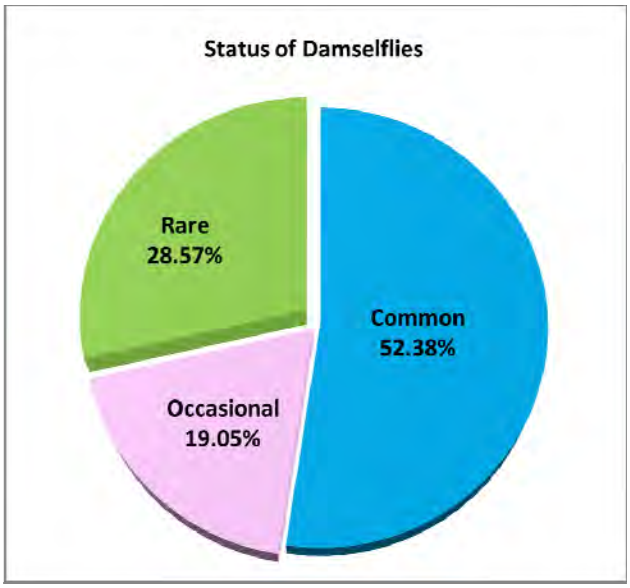
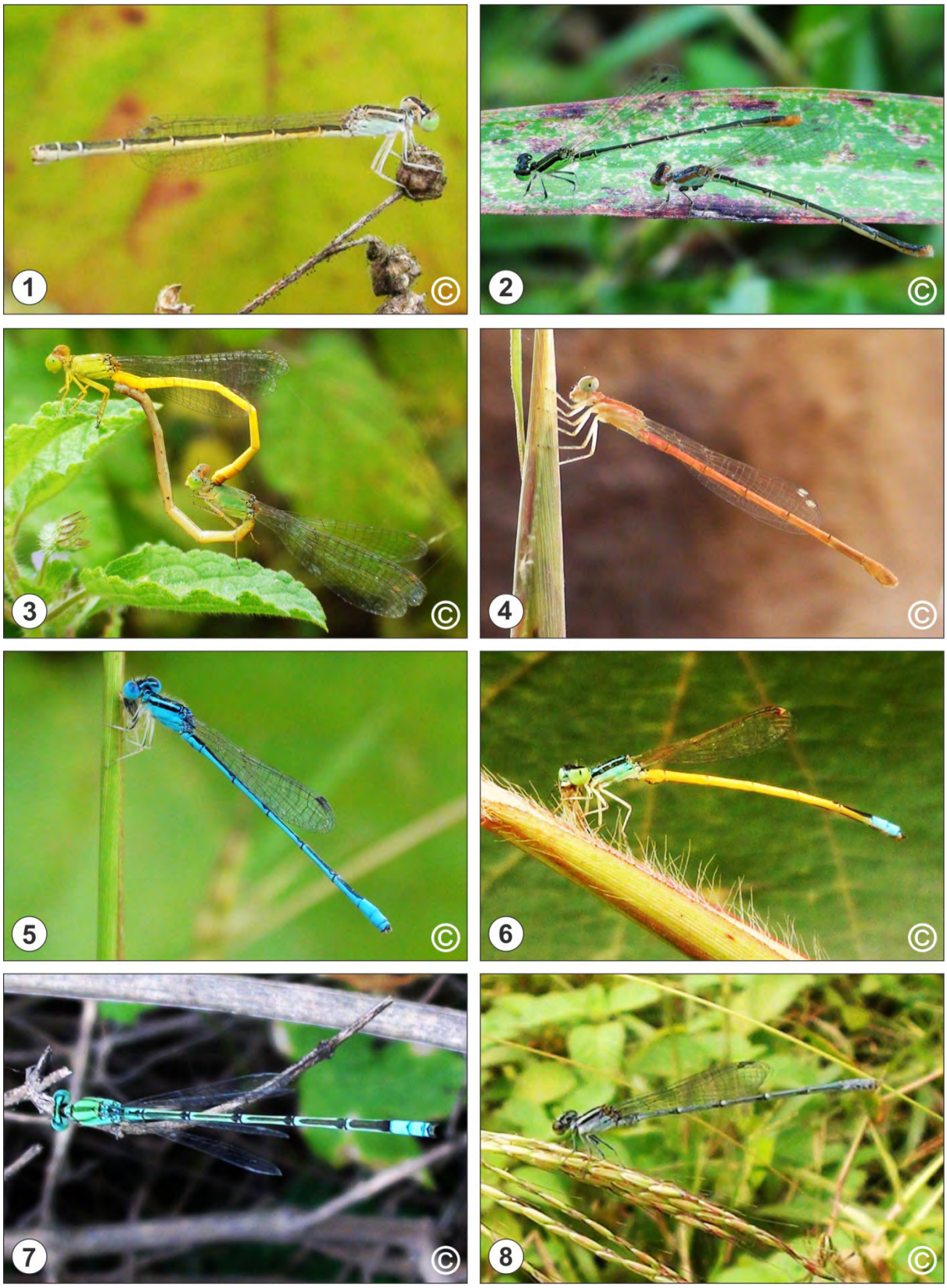


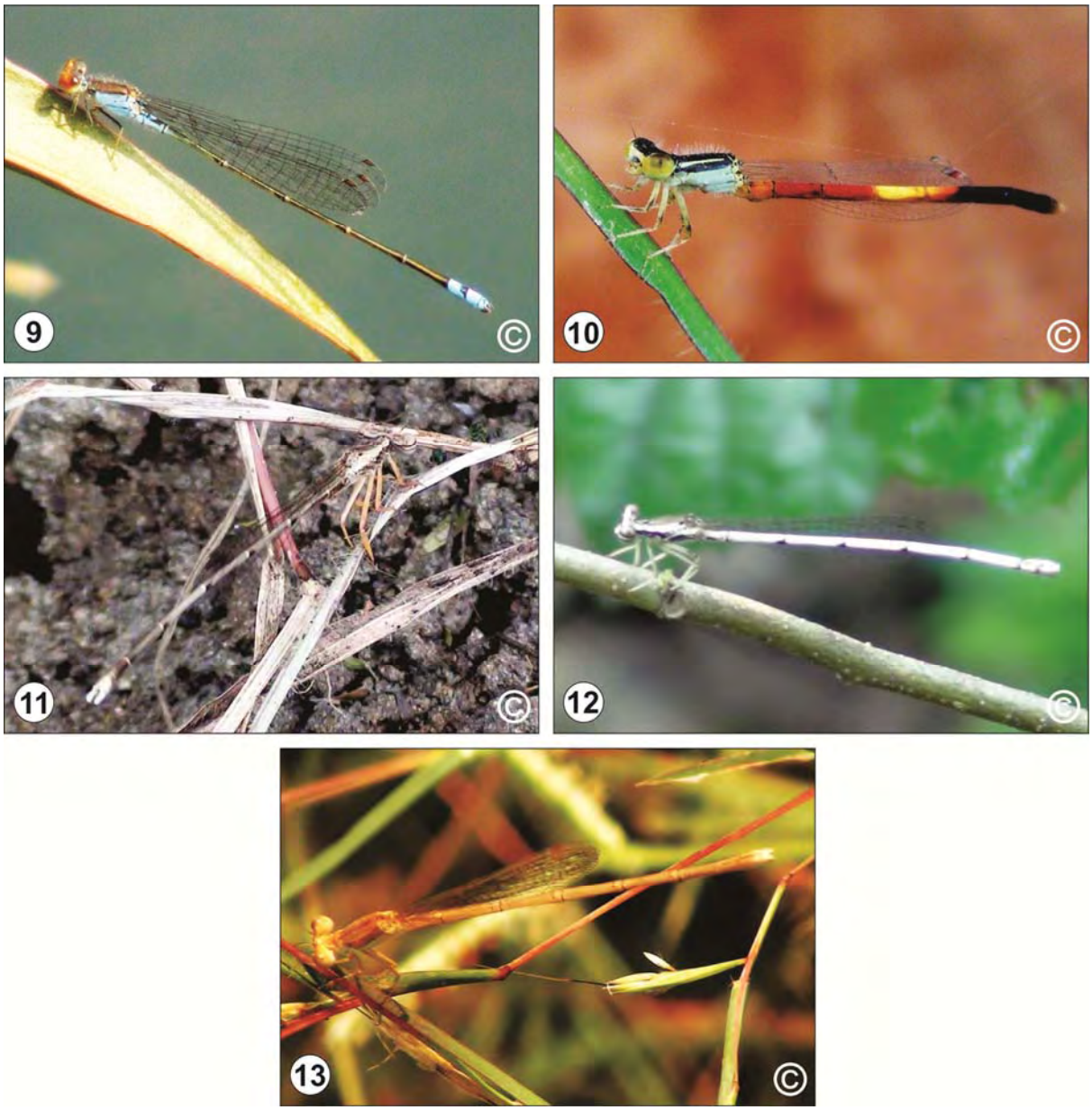
Fig. 3 Status of damselflies.

Plate 1



Figures showing diversity of damselflies. 1. *Aciagrionhisopa* (Violet-Striped Slender Dartlet); 2. *Agriocnemis pygmaea* (Pigmy Dartlet); 3.*Ceriagrion coromandelianum* (Coromandel Marsh Dart); 4. *Ceriagrion rubiae* (Orange Marsh Dart); 5. *Enallagma parvum* (Azure Dartlet); 6. *Ischnura aurora* (Golden Dartlet); 7. *Pseudagrion decorum* (Three-Lined Dart); 8. *Pseudagrion indicum* (Yellow-Striped Blue Dart).

Plate 2



Figures showing diversity of damselflies. 9. *Pseudagrion rubriceps* (Saffron-Faced Blue Dart); 10. *Rhodischnura nursei* (Pixie Dartlet); 11. *Copera marginipes* (Yellow Bush Dart); 12. *Copera vittata* (Blue Bush Dart), and 13. *Lestes umbrinus* (Brown Spreadwing).

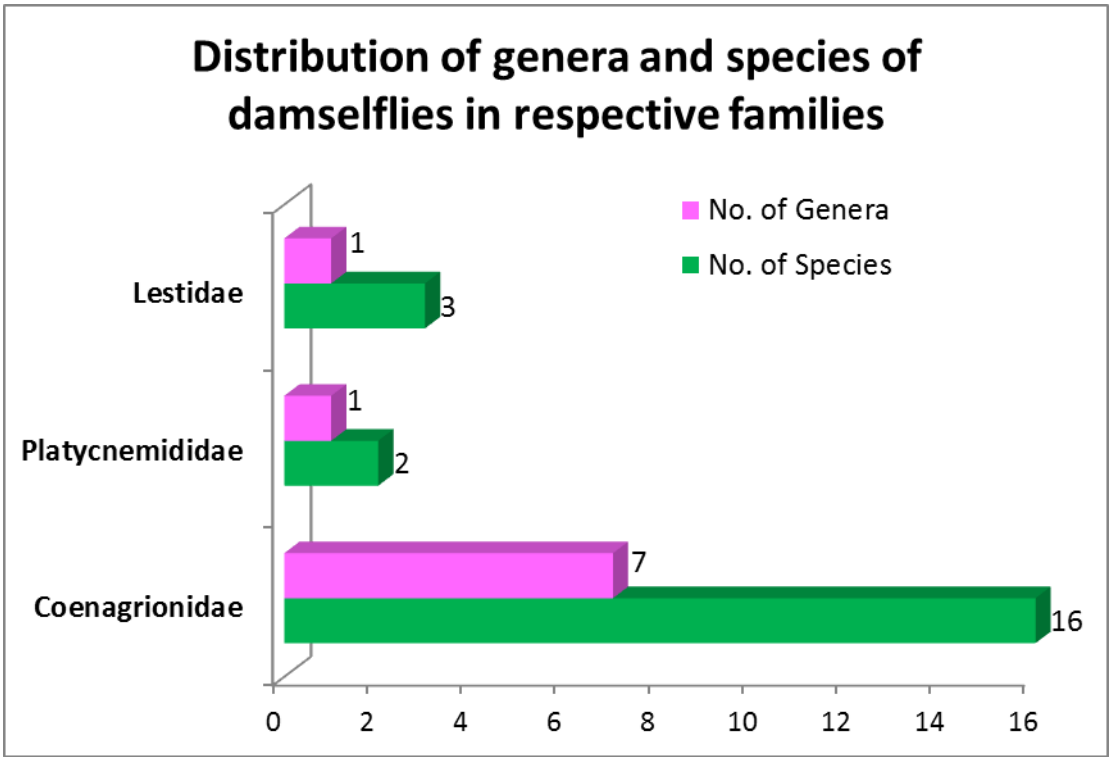


Fig. 4 Distribution of genera and species of damselflies in respective families.

4 Discussion

Indian Agricultural Research Institute, New Delhi India, had a collection of 273 species of odonata, out of which 125 species of damselflies were belonging to 10 families. Family- Coenagrionidae reported 38 species while Lestidae and Platycnemididae reported 10 species each (Sharma et al., 2009). Subramanian et al. (2011) had examined 8 families of damselflies belonging to 29 genera and 67 species, of which 25 were endemic. The maximum number of species were reported in Family- Coenagrionidae (25 species) followed by protoneuridae (15 species), Platystictidae and Lestidae (8 species), Euphaeidae (4 species), Chlorocyphidae and Calopterygidae (3 species) and only two species were reported in Family-Platycnemididae of damselflies in the Western Ghats. Manwar et al. (2012) had reported total 9 species of damselflies of which 8 species were belonging to the family Coenagrionidae and single species from family Platycnemididae in Chatri Lake Region of Pohara–Malkhed Reserve Forest, Amravati, Maharashtra (India).

However, during the months July 2010 to June 2011, Tijare and Patil (2012) were observed 8 species of damselflies in and around Gorewada National Park, Nagpur; of which 5 species belonging to Family-Coenagrionidae, 2 species from Lestidae and single species from Platycnemididae. These above observations are similar with the present observations.

This study encourages the conservation of a wide range of indigenous damselfly species in an area.

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