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Odonates diversity in Pattukkottai Taluk, Thanjavur district, Tamil Nadu, India

Ramya P[1], Jayaseelan T[2], Dass K[2*]
[1] Department of Zoology, Tamilavel Umamaheswaranar Karanthai Arts College, Affiliated to Bharathidasan University, Tiruchirappalli, Karanthai, Thanjavur, Tamilnadu, India
[2] Department of Zoology, Annai Vailankanni Arts and Science College, Affiliated to Bharathidasan University, Tiruchirappalli, Thanjavur, Tamil Nadu, India

Abstract
Odonates are fascinating insects that continue to captivate people with their unique appearance and impressive ability and are important for the environment; they are biological indicators as well as biocontrol agents. The present survey recorded a total of 17 odonate species, among 12 species from the Anisoptera (dragonflies) and 5 species from the Zygoptera (damselflies). The diversity observed indicates the ecological value of these insects and their role in maintaining healthy aquatic ecosystems. Furthermore, understanding their population dynamics can offer important clues about environmental changes and habitat quality.

Keywords: Diversity, odonates, dragonflies, damselflies, ecosystem

Introduction

Odonates belong to the phylum Arthropoda and class Insecta. The classification consists of three distinct suborders: Anisoptera (dragonflies), Zygoptera (damselflies), and Anisozygoptera, they are, commonly referred to as dragonflies and damselflies, are predominantly connected to wetlands and aquatic areas [1]. The order odonata represents one of the most ancient groups of insects. Fossil evidence indicates that the origin of this group can be traced back to the permian period and odonata, are represent a group of predatory flying insect [2].

odonates have a long and fascinating past that goes back to about 300 million years ago, during the Carboniferous time. They are one of the oldest known groups of winged insects. Fossil records and genetic research have been used to study their development. This research reveals not only their evolutionary adaptations but also how they survived various mass extinctions. Today, odonates, including dragonflies and damselflies, continue to thrive in diverse habitats around the world, showcasing their resilience and ecological importance [3].

Odonates, which include dragonflies and damselflies, have around 6,000 different species found all over the world, there are 488 species and 27 subspecies of odonata documented in India. odonates divide into three suborders: Zygoptera, Anisozygoptera, and Anisoptera [4]. These remarkable insects are known for their striking colours and intricate wing patterns, which not only serve as a means of attraction during mating but also play a crucial role in their survival. Additionally, odonates are exceptional predators, often helping to control populations of other insects and thus contribute to the balance of their ecosystems [5].

Odonata are beneficial to both terrestrial and aquatic environments. They play two distinct functions as predators and prey, controlling the numbers of other insects, such as mosquitoes, which spread disease, and aiding in the cycling of nutrients [6]. They are also useful for monitoring and conservation efforts, as they are bioindicators of water quality and fundamental environmental health. By studying their populations and behaviours, researchers can gain valuable insights into the ecological status of their habitats. This makes odonata not only important for biodiversity but also crucial for the maintenance of healthy ecosystems [7].

Materials and methods

1. Study Area and Method of Survey

The survey odonates were conducted Pattukkotai taluk, Thanjavur district, Tamil Nadu, India from December-2024 to February-2025. During the survey, the odonates were observed by roadside, open places, grassland, agricultural land, different wetland and aquatic habitat in day time.

2. Identification

The observed odonates images are capture by mobile phone model, the photo images of dragonflies and damselflies identified by cross-checking with standard references [8, 9].

Results

A total of 17 odonate species were found, consisting of 12 species from the suborder Anisoptera (dragonflies) and 5 species from the suborder Zygoptera (damselflies) (Table 1). Among the 17 species, 12 notable species, including *Brachythemis contaminata*, *Bradinopyga geminata*, *Crocothemis servilia*, *Diplacodes trivialis*, *Ictinogomphus rapax*, *Orthemis ferruginea*, *Orthetrum sabina*, *Pantala flavescens*, *Potamarcha congener*, *Rhyothemis variegata*, and *Tholymis tillarga*, were identified. The most diverse family observed was Libellulidae, while five species, namely *Agriocnemis lacteola*, *Agriocnemis pygmaea*, *Ceriagrion coromandelianum*, *Ischnura aurora*, and *Ischnura senegalensis*, belong to the Cordulegastridae family (Fig.1 and 2)

Brachythemis contaminata, *Crocothemis servilia*, *Orthemis ferruginea*, *Orthetrum sabina*, *Pantala flavescens*, *Rhyothemis variegata*, *Tholymis tillarga*, *Agriocnemis lacteola*, *Agriocnemis pygmaea*, *Ceriagrion coromandelianum*, *Ischnura aurora*, and *Ischnura senegalensis* were observed in proximity to aquatic environments, including water taps, irrigation pipes, tanks, and canals.

Bradinopyga geminate, Diplacodes trivialis, Ictinogomphus rapax, Orthetrum sabina, and *Potamarcha congener* are predominantly observed in terrestrial environments such as sticks, compound walls, and sandy places, as well as occasionally in the water habitats of rural regions.

Discussion

Odonates are a living biological indicator of the environment. They play a critical role in the food chain and serve as predators of other tiny invertebrates. A total of 28 odonate species from five families have been identified throughout the research period. Of them, the order Anisoptera (dragonflies) has 21 species, while the Zygoptera (damselflies) had seven. With a high percentage composition and widespread distribution, the family Libellulidae dominated the order Anisoptera, whereas the Coenagrionidae controlled the order Zygoptera. The presence of these families highlights the ecological diversity within the studied habitats. Further analysis of their distribution patterns may reveal more about the environmental factors influencing their abundance and diversity [10].

The past study found that the Doon Valley has 19 different species of odonata. The Libellulidae family's species are the most prevalent in the Doon Valley. This family is characterised by its vibrant colours and diverse forms, making it a key focus for further ecological research. Additionally, the presence of these species indicates a healthy aquatic ecosystem within the valley, highlighting its importance for biodiversity conservation [11].

According to this survey, 3152 adult odonates were recorded in three distinct habitats: urban, rural, and agro-forest. A total of 52 species were identified, which included 35 Anisopteran species and 17 Zygopteran species. These species belonged to 29 genera and 6 families. Of these 51 species in agroforests, 48 were in rural areas, and the fewest (38 in total) were in urban areas. The variations in species richness across these habitats highlight the importance of environmental factors in supporting odonate diversity. Further studies are needed to explore the specific ecological characteristics that contribute to these differences [12].

A total of 67 species, which are members of 44 genera and belong to 11 families, were documented. These odonates, which belong to various families, contribute significantly to biodiversity and ecosystem health. Their presence often indicates water quality and habitat conditions, making them essential for monitoring environmental changes [13]. A total of 32 odonate species were identified during the survey. The research area contained a total of 22 dragonfly species from 2 families and 19 genera, while a total of 10 damselfly species from 2 families and 7 genera were discovered during the study period [14].

Danswrang (2024) [15] recorded 12 dragonfly species from three families in the studied area. The Libellulidae family was the most prevalent and numerous among them. The Libellulidae family was the most prevalent and numerous among them, showcasing a remarkable diversity in morphology and behaviour. This dominance highlights the ecological significance of this family within the local ecosystem, contributing to pollination and serving as indicators of environmental health.

The study identified a total of 11 species of damselflies and 23 species of dragonflies. The dragonflies exhibited a particularly diverse range of habitat preferences, primarily observing dragonflies near water sources and damselflies in vegetated areas. These insects serve as bio-indicators for the evaluation of garden ecosystems [16]. The survey examined the abundance of dragonflies and damselflies, as well as their seasonal changes, in Painganga Wildlife Sanctuary. They recorded a total of 25 odonate species, spanning across 2 suborders and 6 families. The suborder Anisoptera includes 10 Libellulidae, 2 Gomphidae, and 3 Aeshnidae species. The suborder Zygoptera has 6 Coenagrionidae, 3 Platycnemididae, and 1 Chlorocyphidae species. This study extensively examines the odonate variety in Painganga Wildlife Sanctuary in Yavatmal District, Maharashtra. Monsoon season has the most species; summer has the fewest. The Libellulidae dominate all three seasons with the most species. This group of insects may be bio-indicators for water body management and environmental monitoring, but further study is needed [17].

Conclusion

The current study concluded that a total of 17 odonate species were found; 12 of these species are members of the Anisoptera (dragonflies), and 5 are members of the Zygoptera (damselflies). We found them to be the most varied group, with Libellulidae being the most common five species. The complex life cycle of Zygoptera, or damselflies, reveals a fascinating tapestry of biodiversity within the insect realm. With five distinct species belonging to this family, they showcase remarkable adaptability and ecological significance. In contrast, the more extensive Libellulidae family, which boasts twelve species, exemplifies the diversity that characterises these winged insects. Furthermore, the Cordulegastridae family adds more interesting details with its five important species: *Agriocnemis lacteola, Agriocnemis pygmaea, Ceriagrion coromandelianum, Ischnura aurora*, and *Ischnura senegalensis*. Together, these families show the wide range and important roles that damselflies have in their environments, emphasising the need to protect these species as the environment changes.

Table 1: Number of odonates identified in Pattukkottai Taluk, Thanjavur District

S. No	Family	Common name	Scientific name	Local status	IUCN Status
Sub-order: *Anisioptera (Dragonflies)*					
1	Libellulidae	Ditch jewel, Common amberwing, Asian groundling, and Orange-winged groundling	*Brachythemis contaminata*	Rare	Least Concern
2	Libellulidae	Granite ghost	*Bradinopyga geminata*	Rare	Least Concern
3	Libellulidae	Carlet skimmer or ruddy marsh skimmer, Oriental scarlet	*Crocothemis servilia*	Common	Least Concern
4	Libellulidae	Ground skimmer, Blue percher, and Chalky percher	*Diplacodes trivialis*	Very Common	Least Concern
5	Libellulidae	Common clubtail or Rapacious flangetail	*Ictinogomphus rapax*	Rare	Least Concern
6	Libellulidae	roseate skimmer	*Orthemis ferruginea*	Very rare	Least Concern
7	Libellulidae	Green marsh Hawk, Slender skimmer, Green tiger skimmer,	*Orthetrum sabina*	Common	Least Concern

		Variegated green skimmer			
8	Libellulidae	Globe skimmer, Globe wanderer or wandering glider	*Pantala flavescens*	Common	Least Concern
9	Libellulidae	Yellow-tailed ashy skimmer, common chaser, and swamp watcher	*Potamarcha congener*	Rare	Least Concern
10	Libellulidae	Common Picturewing or Variegated Flutterer	*Rhyothemis variegata*	Very rare	Least Concern
11	Libellulidae	Coral-tailed cloudwing, old world twister, evening skimmer, crepuscular darter, foggy-winged twister and twister	*Tholymis tillarga*	Rare	Least Concern
12	Libellulidae	Black marsh trotter, ferruginous glider and voyaging glider	*Tramea limbata*	Very rare	Least Concern
Sub-order: *Zygoptera (Damselflies)*					
13	Coenagrionidae	Milky dartlet	*Agriocnemis lacteola*	Rare	Least Concern
14	Coenagrionidae	Pygmy dartlet, Pygmy Wisp, wandering midget, Wandering wisp	*Agriocnemis pygmaea*	Common	Least Concern
15	Coenagrionidae	Coromandel marsh dart and Yellow waxtail	*Ceriagrion coromandelianum*	Common	Least Concern
16	Coenagrionidae	Golden dartlet and Aurora bluetail	*Ischnura aurora*	Very common	Least Concern
17	Coenagrionidae	Common bluetail, marsh bluetail, ubiquitous bluetail, African bluetail, and Senegal golden dartlet.	*Ischnura senegalensis*	Common	Least Concern

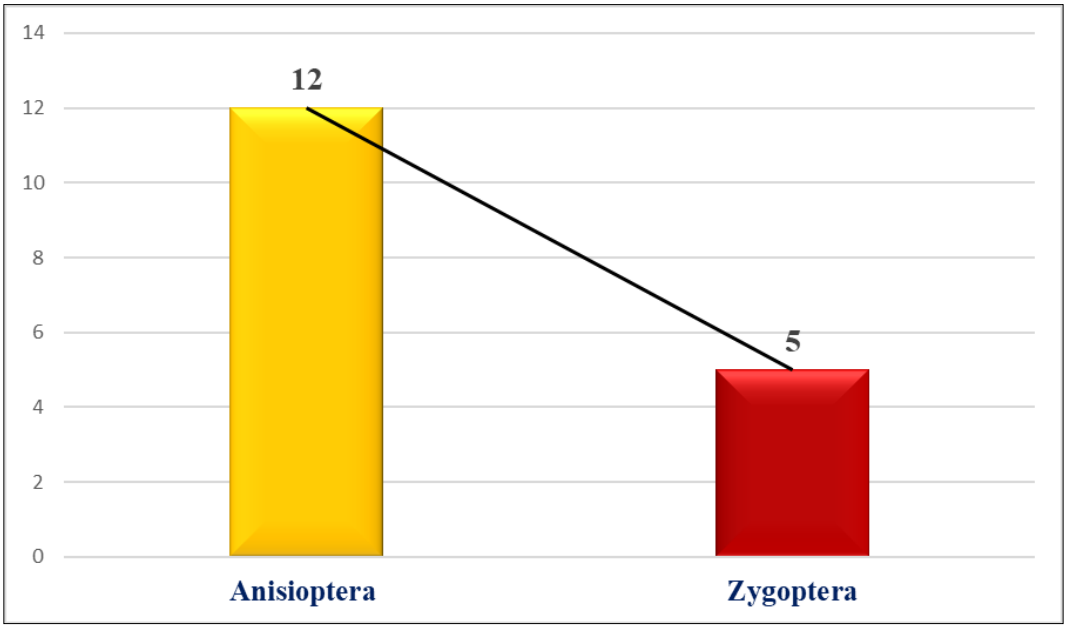

Fig 1: Abundance of Anisioptera and Zygoptera in Pattukkottai Taluk

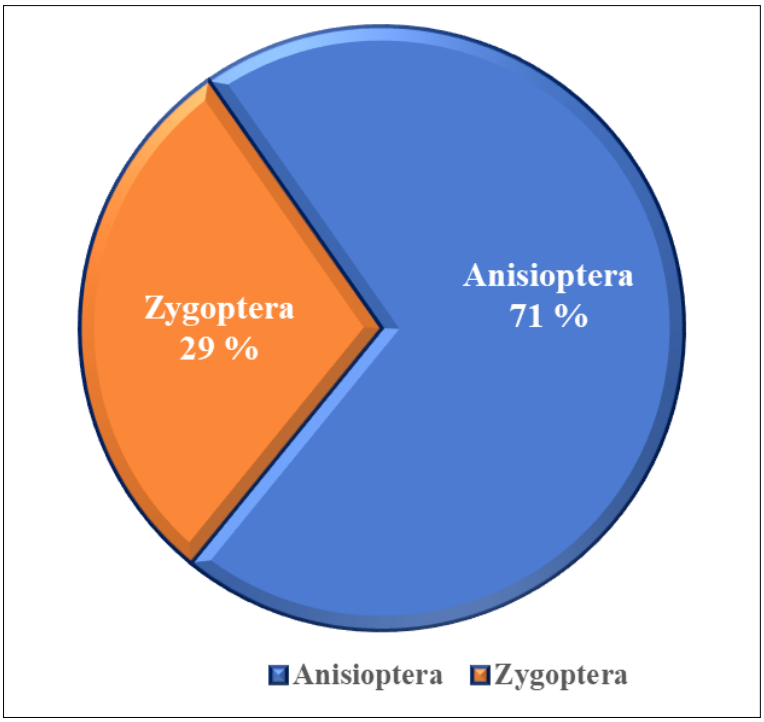

Fig 2: Percentage distribution of Anisioptera and Zygoptera in Pattukkottai Taluk

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