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Ecology

Response of Odonata communities to dry season in a Deciduous Forest in the Northern Minas Gerais, Brazil

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Abstract. Odonata sampling effort in the state of Minas Gerais has intensified throughout the 21st century. However, research on these insects in some regions and ecosystems such as the Deciduous Forest are incipient, and the effect of prolonged dry periods over these insects is still unknown. This study thus aimed to assess changes in adult Odonata species composition over one year in a Brazilian Deciduous Forest and the Odonata species richness in the Mata Seca State Park in the Manga and Itacarambi municipalities in the Northern region of the state of Minas Gerais State, Brazil. Twenty-four days of sampling were distributed in February, May, July and November, adopting an active search through entomological nets close to lentic environments (Lagoa Angical, Lagoa Comprida, Lagoa Encantada, Lagoa da Prata and two wetlands of Lajedo da Lua); lotic environments (São Francisco river) and in associated terrestrial ecosystems. In total, 55 species were collected. Rainy and dry periods altered Odonata communities' composition but did not affect species richness and abundance due to the presence of permanent lagoons associated with the São Francisco river. This study shows the importance of the Mata Seca State Park for preserving Odonatofauna in the state of Minas Gerais and for protecting those permanent lagoons.

Keywords: Dry Forest; Inventory; Marginal lagoons; *Neoneura waltheri*; Seasonality.

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Insects of the Odonata order are popularly known in Brazil as *libélulas, libelinhas, lava-bunda, donzelinhas, lavadeiras, zig-zag, jacintas*, among other names (Costa *et al.* 2012; Brasil & Vilela 2019). They play a relevant ecological role as bioindicators of water quality and associated terrestrial ecosystems (Catling 2005; Gonçalves 2012). For example, the family Coenagrionidae becomes more frequent and abundant compared to other families of Zygoptera, as well as Libellulidae to other families of Anisoptera, in tropical forests of higher anthropic pressure (Sigutová *et al.* 2019), such as areas of pasture or cocoa cultivation, which promote modifications in Odonata communities compared to native areas (Santos & Rodrigues 2022). Besides that, in the trophic levels, both larvae and adults are predators (Costa *et al.* 2012; Fulan & Anjos 2015; Vatandoost 2021) and also serve as prey for different taxa (Costa *et al.* 2012; Souza *et al.* 2018).

Different environmental parameters affect Odonata species occurrences, such as seasonal variations, for example. This is known for different landscape settings around the world, including semi evergreen forest, crop areas, industrial anthropic (Kulkarni & Subramaniam 2013), urban marshy lands from western India (Saha & Gaikwad 2015) and tropical dry deciduous vegetation (Narender *et al.* 2016); the semiarid from South Central United States (Smith & Patten 2020). In Brazilian phytophysiognomies, the same was found in the savanna Brazilian central region (Batista 2010; Vilela *et al.* 2016; Barbosa *et al.* 2019), southern Deciduous Forest (Pires *et al.* 2019). This was also described for immature communities in southeastern Brazil Cerrado-Atlantic echotone (Silva *et al.* 2018). In all of these cases, Odonata communities varied drastically from hot to cold season.

More than 6000 species of Odonata are known worldwide, distributed in three suborders: Anisozygoptera (restricted to Asia), Anisoptera and Zygoptera (Kalkman *et al.* 2007; Dijkstra *et al.* 2013; Paulson *et al.* 2022). Brazil is the country with the highest richness, 872 species (IUCN 2022). Of these, 325 species have been recorded in the State of Minas Gerais so far (Vilela 2022), probably due to the growing sampling effort that has intensified mainly from the 21st Century onwards in the phytophysiognomies of the Cerrado and the Atlantic Forest (De Marco-Júnior & Vianna 2005; Pessacq & Costa 2007; Souza *et al.* 2017; Amorim *et al.* 2018; Borges *et al.* 2019; Silva & Souza 2020; Dos Anjos *et al.* 2020; Ávila Júnior *et al.* 2021; Stefani-Santos *et al.* 2021; Venâncio *et al.* 2021). Among brazilian phytogeographical settings, the dry forest is expected to play an essential role in odonates conservation, since Deciduous Forests comprise environments with plenty of water maintenance mechanisms (Mátyás & Sun 2014), so those may constitute a favorable environmental context to Odonata communities (*e.g.*, Souza *et al.* 2017). However, research on these insects in some regions and ecosystems such as the Deciduous Forest are incipient (Souza *et al.* 2017). Establishing priority actions for biodiversity conservation can be difficult if information is scarce (Pimm

et al. 2001).

The Dry Forest or Seasonal Deciduous Forest loses original areas every year for economic activities, such as cattle raising and charcoal production, as well as for illegal deforestation, which also affects the Mata Seca State Park (Belém & Carvalho 2013). This Conservation Unit is extremely relevant for Brazil since it houses the biggest area of the Seasonal Deciduous Forest in the state of Minas Gerais and a permanent lake system associated with the São Francisco River (Belém & Carvalho 2013), justifying the need for studies of biota inventories.

This study aimed to assess possible changes in the species composition of Odonata throughout one year in a Brazilian Deciduous Forest and to provide knowledge on the Odonata species richness in the Mata Seca State Park. Additionally, in light of the exposed above, we hypothesize that the deciduous forest Odonata communities will have different compositions in dry and rainy seasons, also presenting increased richness and abundance of species in the rainy periods.

MATERIAL AND METHODS

Study area. The study was conducted in the Mata Seca State Park (Figure 1) in the Manga and Itacarambi municipalities, Northern of the state of Minas Gerais, Brazil (14°52'00" S 43°59'57" W), amounting to an area of 15,360.07 ha of Seasonal Deciduous Forest, in the Atlantic Forest Domain (Oliveira-Filho 2006). The forest presents deciduous tree strata because of its two well-defined climatic seasons: a rainy and a dry one, which extends from April to October so the tropical climate predominates in the Mata Seca State Park region (Ferreira *et al.* 2019), where the average annual rainfall is 818 mm, with an average temperature of 24° C for year (Madeira *et al.* 2009; Rodrigues *et al.* 2013). More than 50% of tree species in the forest lose their leaves (*i.e.*, decidual) in adverse periods (Belém *et al.* 2021), significantly changing the vegetal structure of the area (Figure 2).

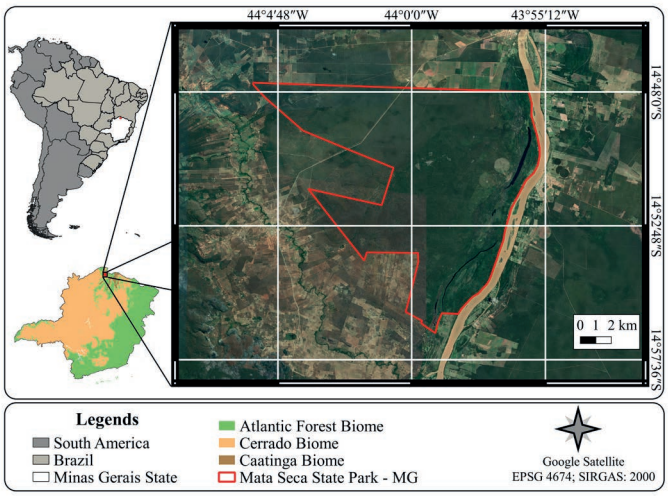

Figure 1. Geographic localization and boundaries of the Mata Seca State Park, Northern state of Minas Gerais, Brazil.

Specimens' collection. Collected specimens were stored in entomological envelopes (7 x 10 cm) with the proper identification (place of collection, date and collector) for about eight hours to empty the digestive tract. Then, they were submerged in acetone PA (pure for analysis) to be sacrificed, where they remained for a minimum of 12 hours (depending on the size of the specimen) for the dissolution of the lipids, which contributes to the preservation of the color of the specimens (Garrison *et al.* 2006).

Specimens of the Zygoptera suborder were sent for identification to the taxonomist Dr. Frederico Augusto de Atayde Lencioni whereas Anisoptera specimens were identified to the specific level with dichotomous keys of Garrison *et al.* (2006, 2010). Later, all specimens were deposited and cataloged in the Biological Collection of the Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas (IFSULDEMINAS) *Campus* Inconfidentes.

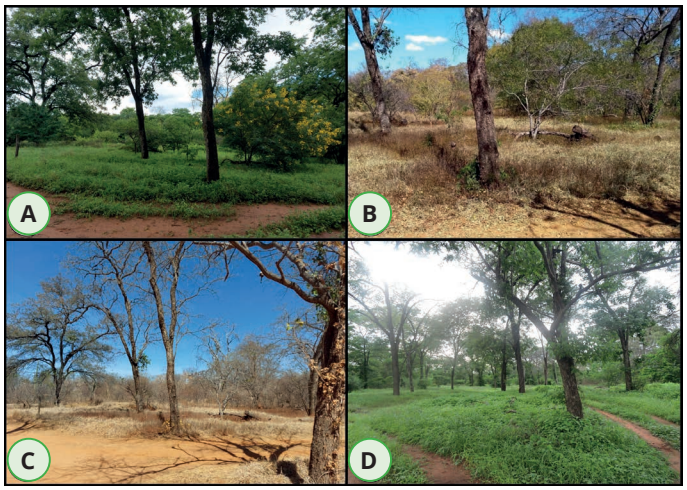

Figure 2. Landscape changes caused by seasonality in (A) summer, (B) fall, (C) winter, and (D) spring throughout 2021 in the Mata Seca State Park, Northern state of Minas Gerais, Brazil.

Sampling points. Six researchers carried out 24 days of sampling divided into four field campaigns in February, May, July and November 2021 (one per season), in order to sample the communities of Odonata the different seasons of the year. Each campaign resulted in 36 hours of sampling, totaling 144 hours of sampling effort per researcher, which together total 864 hours of sampling. Only adult individuals were collected by active search with the aid of entomological nets in lentic environments called Lagoa Angical (14°55'27.8"S; 43°59'02.8"W), Lagoa Comprida (14°54'38.0"S; 43°58'31.8"W), Lagoa Encantada (14°51'53.2"S; 43°56'52.1"W), Lagoa da Prata (14°51'03.5"S; 43°56'21.3"W), in addition to two flooded areas present in Lajedo da Lua (14°50'37.2"S 43°59'18.8"W); and also at a lotic point (14°52'04.8"S; 43°56'22.9"W) located on the banks of the São Francisco River, so the associated terrestrial ecosystems were also investigated (Figure 3) from 9 am to 2 pm and from 5 pm at 18:00, also aiming at capturing twilight species.

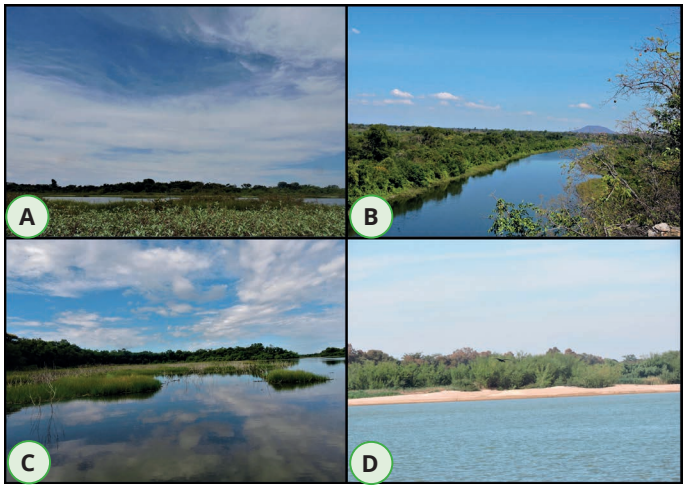

Figure 3. Lentic (A, B, and C) and lotic (D) freshwater ecosystems sampled for adult Odonata individuals at the Mata Seca State Park, Minas Gerais, Brazil. A. Lagoa Encantada, B. Lagoa Comprida, C. Lagoa da Prata, D. São Francisco river.

Statistical analysis. To assess community structure throughout the seasons, we compared richness, abundance, and the number of exclusive species. To verify the statistical

difference in richness and abundance of Zygoptera, Anisoptera, and the total over the seasons, the Kruskal-Wallis (KW) H test was applied; in case of difference, the Mann-Whitney U test was applied using the Past 3.03 software (Hammer *et al.* 2005). To evaluate the similarity of the species community between the seasons of the year, a Principal Coordinate Analysis (PCoA) was carried out using the Jaccard index, produced from the presence/absence data of the species. Subsequently, a PERMANOVA (Permutational multivariate analysis of variance) was performed to verify if there was a significant difference in the community between the seasons using the same software. To evaluate the success of the sampling effort, an accumulation curve was created using the observed richness with a 95% confidence interval under the Bootstrap 1 estimator in the EstimateS 9.1.0 software (Cowell 2013). This estimator uses information from all the collected species rather than from rare species only (Santos 2003). This study was licensed by the Biodiversity Authorization and Information System (SISBIO) and the Instituto Estadual de Florestas (IEF-MG) (ICMBio: 76140-1 and IEF: 038/2020).

RESULTS

We collected 471 individuals of 55 species, of which 37 species belonged to Anisoptera and 18 belonged to Zygoptera (Table 1). We observed no significant difference in the Odonata species richness and abundance (considering Anisoptera and Zygoptera together) over the seasons (species richness: p= 0.2627; abundance: p= 0.2721). We observed the same pattern separately for Anisoptera (species richness: p= 0.119; abundance: p= 0.0734) and for Zygoptera (species richness: p= 0.579; abundance: p= 0.6869).

Although the richness and abundance of species did not indicate statistical differences, PERMANOVA showed a statistical difference in the Odonata community throughout the year (p= 0.0266). The dragonfly community in winter is different from summer (p= 0.0134) and spring (p= 0.0031) (Figure 4). Collections found 18 exclusive species during rainy periods (November to January) and only five exclusive species in the dry period (April to October). Furthermore, only 10 species (18% of the total) remained constant throughout the year (Table 1). *Erythemis peruviana* (Rambur) was the most abundant species, present in all seasons. We emphasize the collection of *Neoneura waltheri* Selys (Figure 5), considered a rare species (Jurzitza 1981).

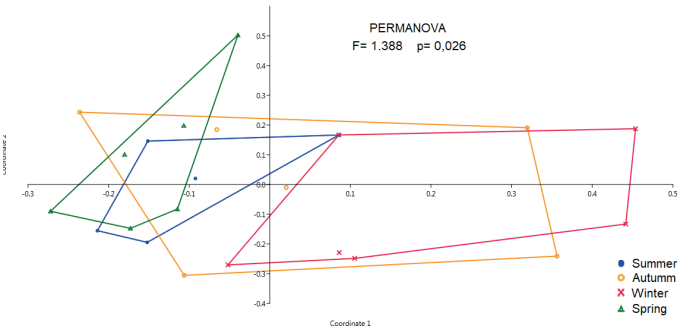

Figure 4. PCoA analysis and PERMANOVA test of the Odonata community. The different colors indicate the different seasons of the year. The results of the PERMANOVA test are shown at the top of the figure.

In this study, we recorded six new species for the state of Minas Gerais: *Acanthagrion chararum* Calvert (Coenagrionidae); *Erythrodiplax basalis* (Kirby); *Erythrodiplax fervida* Erichson; *Micrathyria tibialis* Kirby (Libellulidae); *Gynacantha mexicana* Selys (Aeshnidae); and *Aphylla producta* Selys (Gomphidae) (Vilela 2022). The accumulation curve of species (Figure 6) shows a tendency to reach an asymptote. Estimated species number (BootStrap1 = 62.99) was strongly near the 95% confidence limit (62.1).

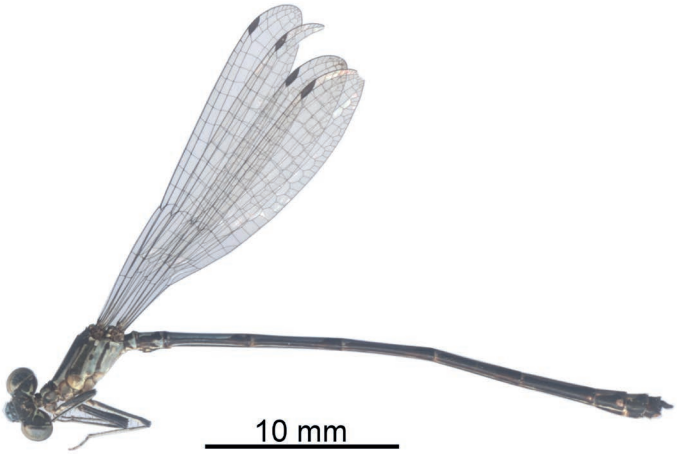

Figure 5. *Neoneura waltheri* Selys, male individual collected in the Deciduous Forest at the Mata Seca State Park, Minas Gerais, Brazil.

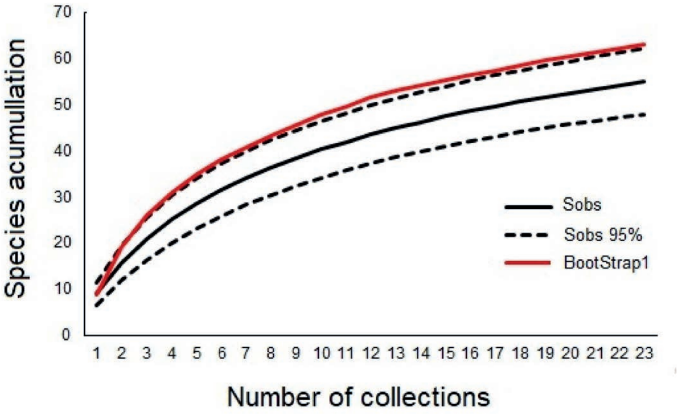

Figure 6. Accumulation curve of species for Odonata collected at the Mata Seca State Park using the species richness observed within a 95% confidence interval and the estimated species richness (Bootstrap 1).

DISCUSSION

The study hypothesis was partially refuted, as there was no difference in richness and abundance of Odonata in the rainy and dry seasons, however, there was a change in the composition of the communities, as predicted (Figure 4).

The richness and abundance of Odonata along the seasons in the Deciduous Forest at the Mata Seca State Park remained equal, possibly, due to the continuous presence of water in the ecosystem, ensured by the marginal lagoons associated with the São Francisco River. This shows the relevance of such environments for maintaining Odonata populations throughout the year, especially in the typical long droughts of this phytophysiognomy (Belém *et al.* 2021), which is considered the most threatened forest formation of Brazil (Portillo-Quintero & Sánchez-Azofeifa 2010). The permanent lagoons of the area are essential for the maintenance and safety of the regional biodiversity (Agostinho *et al.* 2000) and for the diversity of assemblages, such as fishes (Pompeu & Godinho 2003) and turtles (Balestra *et al.* 2008).

Considering the relevance of these marginal lagoons, changes in such freshwater ecosystems can affect Odonata populations, reducing the richness of the Zygoptera suborder, as previously discussed by other authors (Monteiro-Júnior *et al.* 2015; Sganzerla *et al.* 2021), which emphasizes the need for protecting those environments.

Studies show that Zygoptera species, in general, are forest specialists (Ribeiro *et al.* 2021a) with a preference for

Table 1. Suborder, family, species, abundance, richness, and exclusive species of Odonata collected per season throughout 2021 in the Deciduous Forest in the Mata Seca State Park, Minas Gerais, Brazil (A = Anisoptera, Z = Zygoptera) "*": New records for the state of Minas Gerais.

Suborder	Family	Species	Summer	Autumn	Winter	Spring
Anisoptera	Aeshnidae	*Anax amazili* (Burmeister)	1	0	0	0
		Coryphaeshna adnexa (Hagen)	0	0	1	2
		Gynacantha bifida Rambur	0	0	0	2
		Gynacantha mexicana Selys*	0	1	0	2
		Triacanthagyna septima (Selys)	0	0	0	1
	Gomphidae	*Aphylla producta* Selys*	0	0	0	1
	Libellulidae	*Brachymesia herbida* (Gundlach)	3	0	0	0
		Diastatops obscura (Fabricius)	0	0	2	3
		Erythemis carmelita Williamson	0	1	0	1
		Erythemis credula (Hagen)	2	0	0	0
		Erythemis haematogastra (Burmeister)	0	1	0	0
		Erythemis peruviana (Rambur)	31	7	1	14
		Erythemis plebeja (Burmeister)	5	2	0	6
		Erythemis vesiculosa (Fabricius)	8	0	0	6
		Erythrodiplax basalis (Kirby)*	2	4	2	2
		Erythrodiplax fervida Erichson*	0	1	0	0
		Erythrodiplax fusca (Rambur)	1	1	0	0
		Erythrodiplax media Borror	5	3	5	3
		Erythrodiplax sp.	0	0	3	2
		Erythrodiplax umbrata (Linnaeus)	11	1	0	23
		Macrothemis hemichlora (Burmeister)	0	0	1	0
		Macrothemis sp.	1	0	2	1
		Miathyria simplex (Rambur)	0	0	2	2
		Micrathyria hesperis Ris	0	0	1	0
		Micrathyria laevigata Calvert	4	2	6	1
		Micrathyria ocellata Martin	6	4	1	10
		Micrathyria sp.	1	5	3	1
		Micrathyria tibialis Kirby*	0	5	3	1
		Nephepeltia berlai Santos	3	0	0	1
		Nephepeltia phryne Perty	0	2	3	2
		Orthemis discolor (Burmeister)	3	0	0	0
		Pantala flavescens (Fabricius)	0	0	0	2
		Perithemis lais (Perty)	1	0	0	3
		Perithemis tenera (Say)	0	4	0	1
		Tauriphila argo (Hagen, 1869)	1	0	0	0
		Tauriphila australis (Hagen)	0	0	0	2
		Tholymis citrina Hagen	0	0	0	2
Zygoptera	Coenagrionidae	*Acanthagrion aepiolum* Tennessen	0	0	4	2
		Acanthagrion chararum Calvert*	0	0	0	1
		Acanthagrion cuyabae Calvert	0	3	2	3
		Acanthagrion gracile (Rambur)	1	1	0	5
		Acanthagrion minutum Leonard	0	0	0	1
		Homeoura nepos (Selys)	2	2	6	14
		Ischnura capreolus (Hagen)	8	5	21	7
		Ischnura fluviatilis (Selys)	1	0	0	0
		Neoneura sylvatica Hagen	0	4	1	0
		Neoneura waltheri Selys	0	0	0	1
		Telebasis corallina (Selys)	0	0	0	2
		Telebasis filiola (Perty)	13	16	24	20
		Telebasis griffinii (Martin)	0	0	0	1
		Telebasis obsoleta (Selys)	2	2	3	2
		Telebasis vulcanoae (Machado)	0	0	1	0
		Telebasis willinki Fraser	0	0	0	1
		Tigriagrion aurantinigrum Calvert	1	0	0	2
	Lestidae	*Lestes forficula* Rambur	5	1	0	14
Richness			**26**	**24**	**23**	**42**
Abundance			**122**	**78**	**98**	**173**
Exclusive species per suborder			**5 A / 1 Z**	**2 A / 0 Z**	**2 A / 1 Z**	**6 A / 6 Z**
Total richness			**55 spp.**			
Total abundance			**471 individuals**			

environments with denser riparian forest and more closed canopy, with morphological and behavioral characteristics related to low dispersal capacity and greater dependence on the environment for their thermoregulation, so Zygoptera probably had lower richness and abundance than Anisoptera due to greater intolerance of sunlight exposure, intensified during droughts after a 90% loss of leaves from trees in the study area (Belém *et al.* 2021). This implies obstacles for Zygoptera, which have a slender body and are therefore more sensitive to sunny environments in tropical regions (Paulson 2006; Juen & De Marco-Júnior 2011).

The fact that Anisoptera showed greater richness may be related to the flight capacity of its representatives, since the larger the individuals, the longer the flight time (Jesus *et al.* 2008) and the longer the flight time, the longer the possibility of reproduction (De Marco-Júnior *et al.* 2005). This is a result of the broad fore and hind wings, which also aid in thermoregulation of Anisoptera, providing greater tolerance to solar intensity (May 1976; Oliveira-Junior *et al.* 2013; Oliveira-Junior *et al.* 2015; Oliveira-Junior *et al.* 2017; Oliveira-Junior & Juen 2019). Furthermore, many Anisoptera species are generalists regarding environmental conditions, but occur mainly in open areas (Teixeira-Gamarra *et al.* 2012).

Vilela *et al.* (2016) also reported Odonata community changes over the year in Cerrado, an environment which also undergoes a significant dry period. Freshwater environments are subjected to seasonal changes, including physical and chemical characteristics which may influence the composition of invertebrate communities during the seasons (Bischof *et al.* 2013; Dijkstra *et al*. 2014). Adult individuals of some Odonata species present different times of annual emergence due to their life cycle and can be present in the environment only in determining periods (Souza 2003). Studies with Odonata larvae have shown that changes in environmental characteristics influenced the structure of Odonata communities (Novello-Gutiérrez *et al*. 2002; Gómez-Anaya *et al.* 2010). Besides the presence of permanent lagoons in the Mata Seca State Park, the seasonal drought of some of the flooded areas (wetlands of Lajedo da Lua) in this Conservation Unit could explain the several exclusive species during the rainy season, emphasizing the importance of temporary and permanent lentic ecosystems in the study area for protecting these insects.

Among several factors, the *E. peruviana* species is abundant since it (i) is a widely distributed species in the neotropical region (Machado *et al.* 1991); (ii) explores different ecosystems in Amazônia (Garcia Junior *et al.* 2022), Cerrado (Venâncio *et al.* 2021), Atlantic Forest (Ferreira-Peruquetti & De Marco-Júnior 2002; De Marco-Júnior *et al.* 2005), Pantanal (Lopes 2013), Caatinga (Koroiva *et al.* 2021), and ecotones of Cerrado and Pantanal (Prado *et al.* 2019); and, finally, (iii) is a common species in lentic environments (Venâncio *et al.* 2021), which comprise the main aquatic system sampled in this study. In the state of Minas Gerais, *E. peruviana* occupy different biomes, such as the State Park of Rio Doce and in the municipality of Viçosa, inserted in the Atlantic Forest (Ferreira-Peruquetti & De Marco-Júnior 2002; De Marco-Júnior *et al.* 2005), the Triângulo Mineiro region, municipality of Uberlândia, in Cerrado area (Venâncio *et al.* 2021), and the municipality of Barroso, in transition areas between Cerrado and Atlantic Forest (Souza *et al.* 2013) and between Cerrado and Caatinga (Souza *et al.* 2017).

Neoneura waltheri species is considered rare due to the few deposited specimens in entomological collections (Jurzitza 1981), but this condition may change depending on the increase of inventories of the Order in the Country. This species was recorded for the first time in Minas Gerais by Vilela *et al.* (2020) in the municipality of Ituiutaba, western of the State, Cerrado Biome Domain (Miyazaki 2017). The species also occupies the Atlantic Forest, occurring in the states of Rio de Janeiro and Paraná, and also has been documented in the State Park of Iguazú, Argentina (Jurzitza 1981; Garrison 1999; Vilela *et al.* 2020). Females were observed performing endophytic oviposition together with the male in lotic environments (Vilela *et al.* 2020) nonetheless, in this study, from a unique specimen recorded in Lagoa Encantada, we reported the first record for *N. waltheri* in the Seasonal Deciduous Forest, a Forest Atlantic phytophysiognomy – thus increasing information on the geographical distribution of this species. We interpret this occurrence to be due to the landscape context which is a lentic environment configured by a permanent marginal lagoon to the São Francisco River.

Of the six new species records we found for the state of Minas Gerais, *A. chararum* is also considered rare (Dalzochio *et al.* 2011), with no description for females until now. This species had been recorded in the Brazilian states of Amazonas, Mato Grosso, and Mato Grosso do Sul (Garcia Junior *et al.* 2022), but this is the first record of it for the Atlantic Forest Domain. According to Souza (2003), this species is probably correlated to aquatic environments with arboreous vegetation in its surroundings, which configures continuous riparian forests.

The species *E. basalis* occurs in ecotones between the Cerrado and Caatinga Biome in the State of Maranhão (Veras *et al.* 2020) and is widely distributed in the Amazonian region (Garcia Junior *et al.* 2022) addition has been recorded in the states of Mato Grosso, Mato Grosso do Sul, São Paulo, Rio de Janeiro, and Espírito Santo (Reis *et al.* 2011; Damaceno *et al.* 2014; Pinto 2022). Borror (1942) reports that this is a territorial species of lentic ecosystems and a bioindicator of impacted aquatic environments (Oliveira-Junior *et al.* 2015). Despite this ecological role of the species, the present study reveals that it may be present in preserved environments, since the Mata Seca State Park is the largest fragment of this phytophysiognomy in the State Minas Gerais (Belém & Carvalho 2013), where all human activity is condemned (Minas Gerais 2000; Brasil 2006).

In Brazil, *E. fervida* were only recorded in the state of Espírito Santo and Bahia (Costa & Oldrini 2005; Ribeiro *et al.* 2021b). In Cuba, this species is frequently reported in lacustrine complexes (Trapero-Quintana & Reyes-Tur 2008) but it has also been documented flying over streams and rivers of low current (Alayo 1968).

Micrathyria tibialis species is widely distributed in the Legal Amazon states of Amazonas, Pará, Roraima, and Mato Grosso (Garcia Junior *et al.* 2022) and has been recorded in the states of Mato Grosso do Sul (Souza & Costa 2002), Rio Grande do Sul (Renner *et al.* 2015), and Ceará (Navás 1924). The species is present in arborized environments with a temporary humidity and in humid zones with herbaceous vegetation, preferring high temperatures and with emergence peak of adults in the summer and fall (Dickens *et al.* 2020), thus corroborating our field data.

Gynacantha mexicana is a species of crepuscular behavior found in lentic environments, what can explain your record (Carvalho & Ferreira-Junior 1989). Occur in the Legal Amazon states of Amazonas, Amapá, Pará, and Roraima (Garcia Junior *et al.* 2022) and in Espírito Santo (Costa & Oldrini 2005). The specimens of this sp. were always recorded in late afternoons flying over the vegetation that surrounds the Lagoa Prata. One specimen was captured in autumn and two in spring.

Finally, *A. producta* species occurs in the states of Amapá, Pará, Bahia, Pernambuco, São Paulo, Rio Grande do Sul, and Santa Catarina (Garcia Junior *et al.* 2022; Pinto 2022). This species are probably present in the Mata Seca State Park, due to different ecological factors, such as their occurrence in permanent aquatic environments in prolonged drought environments

(Renner *et al.* 2020), adapted to the semi-arid climate, as they occur in different localities of the Caatinga biome (Ribeiro *et al.* 2021b).

The obtained results from the species estimator show that the sampling effort was enough. This means that field sampling over a year produced information that may be considered a good approximation to the real biotic diversity in the study area, providing reliability to the present discussion.

This study shows the relevance of the Deciduous Forest for the conservation of the Odonatofauna in the State of Minas Gerais, as well as the need to protect the permanent lagoons of the São Francisco River present in the Mata Seca State Park. We suggest the need for news studies in Deciduous Forest, in order to know the real diversity of Odonata in this phytophysiognomy in Brazil.

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